

T.C.
ANKARA YILDIRIM BEYAZIT UNIVERSITY
GRADUATE SCHOOL OF SOCIAL SCIENCES

THE USE OF ARTIFICIAL INTELLIGENCE IN THE PUBLIC SERVICES: THE CASE OF TURKISH ADMINISTRATIVE JURISDICTION

PhD THESIS

Fatih ULAŞAN

DEPARTMENT OF POLITICAL SCIENCE AND PUBLIC ADMINISTRATION

ANKARA, 2021

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Supervisor
Prof. Dr. Murat ÖNDER

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THESIS ACCEPTANCE APPROVAL PAGE

The thesis prepared by Fatih ULAŞAN titled “The Use Of Artificial Intelligence In The Public Services: The Case Of Turkish Administrative Jurisdiction” has been accepted by the jury members as a thesis at Ankara Yıldırım Beyazıt University, Graduate School Of Social Sciences, Department Of Political Science And Public Administration.

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Director of the Graduate School of Social Sciences Doç. Dr. Seyfullah YILDIRIM

DECLARATION

I hereby declare that all information in this thesis has been obtained and presented in accordance with academic rules and ethical conduct. I also declare that, as required by these rules and conduct, I have fully cited and referenced all material and results that are not original to this work; otherwise I accept all legal responsibility.

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DEDICATION PAGE

To My Mother and My Father…

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ABSTRACT

THE USE OF ARTIFICIAL INTELLIGENCE IN THE PUBLIC SERVICES:

THE CASE OF TURKISH ADMINISTRATIVE JURISDICTION

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The artificial intelligence (AI) technology focuses on the construction of machines which understand, monitor, reason, predict, interact, learn, improve and work like humans, and tries to solve complex problems which are nearly impossible to be solved and dealt with by humans. AI have been very popular and have been applied in almost every field, especially in public services. AI can help public services in many ways, for instance, by providing smarter analytical abilities and better understanding of real-time processes, and can provide shorter and more abundant feedback loops for each level of governance. Especially, in judicial systems, AI can be highly helpful, by speed, accuracy, support, quality and etc. For instance, in the Turkish judicial system, delays and inefficiency of judiciary process, inefficient legal procedures and court processes, the length of hearings, insufficient court resources, caseloads and growing demands which affect the quality can be called as major challenges along with workloads of judges and the predictability of decisions. AI has the power to assist the judicial system to be faster, cheaper, and more predictable. AI can be used well in some specific areas of the Turkish judicial system such as in the Turkish administrative jurisdiction, especially when the judicial system is inclined to be automated in a certain extent. To use AI more efficiently, the preliminary preparations are very important in the government, education and law policies and this thesis will focus on what these policies should be. The proposed ways of implementation of AI in the Turkish administrative jurisdiction will be analysed for the usage of the AI technology in the administrative courts. The usability of AI methods will be analyzed in the light of the realization of the ground rules of Turkish administrative jurisdiction, including the constitutional principles of justice and the principles of administrative procedures.

Keywords: Artificial Intelligence, Turkish Administrative Jurisdiction, Law, Public Administration, Public Services.

ÖZET

YAPAY ZEKÂNIN KAMU HİZMETLERİNDE KULLANIMI:
TÜRK İDARİ YARGI ÖRNEĞİ

ULAŞAN, Fatih

Doktora, Siyaset Bilimi ve Kamu Yönetimi Anabilim Dalı

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Yapay zekâ teknolojisi, insan gibi anlayan, izleyen, akıl yürüten, tahmin eden, etkileşime giren, öğrenen, gelişen ve insan gibi çalışan ve insanlar tarafından çözülmesi ve ele alınması neredeyse imkânsız olan karmaşık sorunları çözmeye çalışan makinelerin yapımına odaklanır. Yapay zekâ çok popüler olmuş ve hemen hemen her alanda, özellikle kamu hizmetlerinde uygulanmıştır. Yapay zekâ, örneğin daha zeki analitik yetenekler sağlayarak ve gerçek zamanlı süreçlerin daha iyi anlaşılmasını sağlayarak kamu hizmetlerini pek çok şekilde destekleyebilir ve tüm yönetişim seviyeleri için daha kısa ve daha çok geri bildirim döngüleri sağlayabilir. Özellikle yapay zekâ yargı sistemlerine hız, doğruluk, destek, kalite açısından katkısı çok büyük olabilir. Örneğin, Türk yargı sisteminde, gecikmeler ve yargı sürecinin verimsizliği, verimsiz hukuki prosedürler ve mahkeme süreçleri, duruşmaların uzunluğu, yetersiz mahkeme kaynakları, dosyaların fazlalığı ve artan talepler ve yargıçların iş yükü ve kararlarının öngörülebilirliği önemli zorluklar olarak adlandırılabilir. Yapay zekâ teknolojisi, yargı sisteminin daha hızlı, daha ucuz ve daha öngörülebilir olmasına yardımcı olma gücüne sahiptir. Yapay zekâ, Türk İdari Yargılama Hukuku gibi Türk yargı sisteminin bazı belirli alanlarında, özellikle yargı sisteminin belirli bir ölçüde otomatikleştirilme eğiliminde olduğu durumlarda iyi bir şekilde kullanılabilir. Yapay zekânın daha verimli kullanılması için özellikle devlet, eğitim ve hukuk politikalarında ön hazırlıklar önemlidir ve bu tezde bu politikaların neler olması gerektiği üzerinde durulacaktır. Yapay zekânın Türk İdari Yargılama Hukukunda önerilen uygulama yolları, idare mahkemelerinde yapay zekâ teknolojisinin kullanımına yönelik olarak tasarlanama olasılığı üzerinde durulacaktır. Yapay zekâ yöntemlerinin kullanılabilirliği, anayasal adalet ilkeleri ve idari yargılamanın esasları da dâhil olmak üzere Türk İdari Yargılama Hukukunun temel kurallarının kavranması yolu ile incelecektir.

Anahtar Kelimeler: Yapay Zekâ, Türk İdari Yargılama Hukuku, Hukuk, Kamu Yönetimi, Kamu Hizmetleri.

TABLE OF CONTENTS

ABSTRACT i

ÖZET ii

TABLE OF CONTENTS iii

LIST OF TABLES ix

LIST OF FIGURES x

ABBREVIATIONS xi

CHAPTER 1 – INTRODUCTION 1

1.1. Methodology 12

1.2. Research Subjects and the Aim of the Thesis 15

1.3. Contributions of Study 17

1.4. Scope, Challenges and Limitations of the Study 19

1.5. Overview of Chapters 19

CHAPTER 2: CONCEPTUAL FRAMEWORK: ARTIFICIAL INTELLIGENCE 22

2.1. Introduction 22

2.2. Definition of Artificial Intelligence 27

2.3. Deep Learning and Machine Learning 30

2.4. The History of Artificial Intelligence 33

2.4.1. Early Discoveries and Dreams (8th century B.C. –20th century A.D. (1943)) 33

2.4.2. The Gestation of Artificial Intelligence (1943–1955) 35

2.4.3. The Birth of Artificial Intelligence (1956) 36

2.4.4. Early Eagerness and Expectations (1952–1969) 37

2.4.5. The Standstill Period (1966–1973) 38

2.4.6. The Rise of Knowledge-based Systems (1969–1979) 38

2.4.7. The Industrial Artificial Intelligence (1980–2001) 39

2.4.8. The Modern Artificial Intelligence (2001–present) 39

2.5. Artificial Intelligence Strategies and Pursuits 41

2.5.1. National AI Strategies and funds 44
2.5.2. The Potential of Artificial Intelligence in the World 48
2.6. Benefits of Artificial Intelligence 51
2.7. Risks of Artificial Intelligence 53
2.8. Artificial Intelligence and Public Service 55
2.8.1. The Use of Artificial Intelligence in Public Services 56
2.8.2. Artificial Intelligence and Public Services: A Close Look at Current Applications 58
2.8.3. Benefits of Artificial Intelligence in Public Services 62
2.8.3.1. Impacts on the citizens´ quality of life 64
2.8.3.2. Electronic Government Services 67
2.8.3.3. The Replacement of Human Labour with High-Value Work 70
2.8.3.4. The Management of Resources 71
2.8.4. Problematic Areas of Public Services in the Use of Artificial Intelligence 72
2.8.4.1. Occupations, Financial Systems and Social Safety Nets 75
2.8.4.2. Income Deficit 77
2.8.4.3. Citizen Protection 77
2.8.4.4. Privacy 78
2.8.4.5. The Decline of Human Public Administrators and the Rise of AI and Programmers 79
CHAPTER 3: THE USE OF AI IN LAW AND COURTS 81
3.1. Introduction 81
3.2. Artificial Intelligence and Law 88
3.2.1. Artificial Intelligence and Law: A Close Look at Current Applications 89
3.2.2. Intelligent Interfaces 98
3.2.3. Artificial Intelligence in the Administration of Law 99
3.2.3.1. AI for Judges and Administrators in Decision-Making 100
3.2.3.2. Artificial Intelligence Used in Policing 101

3.2.3.3. AI and “Users” of Law 103
3.2.4. Contemporary Issues in Artificial Intelligence and Law 103
3.2.5. Law as a Body of Rules 105
3.2.6. Law as a Body of Exogenous Factors in Society 106
3.2.7. Law as a Body of the Mixture of Rules and Exogenous Factors in Society .. 107
3.3. The Use of Artificial Intelligence in Courts 108
3.3.1. The Legal Relevance of Autonomous Machines: Technology, Law and Autonomous Decision-Making in Law 109
3.3.2. The Use and Practical importance of Artificial Intelligence’s Application ... 111
3.3.3. The Technical Principles of a Possible Intelligent Auxiliary Case Handling System 112
3.3.4. Selected AI National Pursuits for Legal Services 113
3.3.4.1. Portugal 113
3.3.4.2. France 114
3.3.4.3. China 115
3.3.4.4. United States 117
3.3.4.5. Estonia 119
3.3.4.6. Netherlands 120
3.3.4.7. Brazil 121
3.4. Legal Technology 124
3.4.1. Legal Analysis Systems 127
3.4.2. The Current State of the Legal Technology in Turkey 128
3.5. The Regulation of Robot Judges 130
3.6. Judicial Reasoning: The Making of Legal Information 132
3.6.1. Distinctions between logical and non-logical 133
3.6.2. Legal Reasoning 134
3.6.2.1. Rule-Based Reasoning 135
3.6.2.1.1. Knowledge acquisition and representation 136

3.6.2.2. Case-Based Reasoning 139
3.6.2.2.1. Main types of Case-Based Reasoning 141
3.6.2.2.2. The CBR cycle 142
3.6.2.2.3. Legal Case-Based Reasoning 145
3.6.2.3. Hybrid systems 148
3.6.2.4. Other Techniques 152
3.7. The Ways of the Knowledge and Information Representation 154
3.7.1. Statute Law 154
3.7.2. Case Law 154
CHAPTER 4: THE CASE OF TURKISH ADMINISTRATIVE JURISDICTION IN THE IMPLEMENTATION OF THE AI ROBOT 156
4.1. Introduction 156
4.2. The Turkish Administrative Jurisdiction 158
4.2.1. The Sources of the Turkish Administrative Law 159
4.2.2. Features of Administrative Law 161
4.2.3. The Freedom of Evidence and Its Limits in Administrative Jurisdiction 162
4.2.4. Features of Administrative Procedural Law 164
4.3. The Benefits of Artificial Intelligence on the Administrative Jurisdiction in Turkey 167
4.3.1. Time Saving and Efficiency 168
4.3.2. Cost Saving 171
4.3.3. The Quality of Justified Verdicts 175
4.3.4. Fair Trail and Correct Verdicts with Legal Certainty 177
4.3.5. Principles of Independence and Impartiality 178
4.4. The Preliminary Preparations of the Use of Artificial Intelligence on the Administrative Jurisdiction Procedures in Turkey 179
4.4.1. The Government Policy 179
4.4.1.1. Infrastructure and Networking 184

4.4.1.2. National Artificial Intelligence Strategy of Turkey 187

4.4.1.3. The Coordination of the Artificial Intelligence Implementation..... 193

4.4.1.4. Natural Language Processing and Big Data..... 196

4.4.2. Education Policy 197

4.4.2.1. The Modification of Primary and Secondary Educations 201

4.4.2.2. The Modification of Law Faculties..... 204

4.4.2.3. The Modification of the Training Programs in the Justice Academy of Turkey 207

4.4.2.4. The Use of AI in Education..... 210

4.4.2.5. The Framework of the Proposed Development Cycle of Curriculum for Educators on AI..... 213

4.4.3. The Law Policy 215

4.4.3.1. Regulation, Ethics and Safety 215

4.4.3.2. Possible Statuses for Autonomous Robots..... 219

4.4.3.2.1. Legal Personality as Status – An Animal Model..... 220

4.4.3.2.2. Legal Personality as Status – A Tool Model 221

4.4.3.2.3. Legal Personality as Status – A Human Model..... 223

4.4.3.2.4. Legal Personality as Status – a Company Model as a Legal Entity 225

4.4.3.2.5. Legal Personality as Status –A Legal Representative Model..... 226

4.4.3.2.6. Legal Personality as Status –A Slavery Model 228

4.4.3.2.7. Legal Personality as Status –An Electronic Person Model as a Robot Personality 230

4.4.3.2.8. Legal Status According to Turkish Law..... 232

4.4.3.3. Legal Liability of AI Robots in the World..... 235

4.4.3.4. Legal Liabilities of AI Robots in Turkish Law 241

4.4.3.4.1. From the Point of Obligations Law 241

4.4.3.4.2. From the Point of Criminal Law..... 244

4.4.3.5. The Types of Robots Used in Courts 246

4.4.3.6. The Proposed Turkish AI Development Act 248
4.4.3.7. The Proposed Turkish AI Agency 248
4.4.3.8. The Courts' Functions in the Certified AI and Liability 249
4.5. The Proposed Ways of Implementation of the Administrative Law Robot Judge 250
4.5.1. Automated Decision Making System 251
4.5.1.1. The Modelling of the Reasoning Process in Administrative Courts 251
4.5.1.2. Filling a Case, Preliminary Examination and the Petition Exchange 252
4.5.1.3. Discovery and Court Investigation 255
4.5.1.4. The Formation of Verdicts 256
4.5.2. AI Systems facilitating AI Decision Making 256
4.5.2.1. The collection and analysis of documents 257
4.5.2.2. Online Administrative Courts 261
4.5.2.2.1. Smart Contracts 264
4.5.2.2.2. Arbitration 266
CHAPTER 5: CONCLUSIONS AND POLICY RECOMMENDATIONS 269
REFERENCES 303

LIST OF TABLES

Table 1: Artificial vs. Human Intelligence (modified) 23

Table 2: Various Categories of AI (modified) 28

Table 3: Government AI Readiness Rankings 42

Table 4: National AI Strategies with Funding 45

Table 5: Types of Governmental Problems Suitable for the AI Tools 57

Table 6: Potential AI Applications for Public Sectors 59

Table 7: Examples from Country Practices 61

Table 8: Prospective Benefits of Artificial Intelligence in Public Services 62

Table 9: Main Functions of Bots 71

Table 10: Prospective Risks of the Public Artificial Intelligence 73

Table 11: Current Applications of AI Used in Law 91

Table 12: AI Tools in Brazilian Courts 122

Table 13: Legal Technology 127

Table 14: Sources of the Turkish Administrative Law 159

Table 15: The Number of Cases for per Judge in Administrative Jurisdiction and the Number of Cases Completed by Per Judge 168

Table 16: The Number of Cases in Administrative Courts 169

Table 17: The Number of Judges and Public Prosecutors (2017-2019) 172

Table 19: AI Governance Framework 180

Table 20: Organizing Framework 182

Table 21: AI Networking and Public Infrastructures in Selected Countries 185

Table 22: Selected Countries` AI education policies 199

Table 23: Compulsory Courses in Turkish Law Faculties 205

Table 24: Selected Countries` AI Regulation, Ethics and Safety 215

Table 25: The Possible Rights of the Different AI Legal Status in Law 234

LIST OF FIGURES

Figure 1: AI Applications and Techniques 25

Figure 2: Which Regions Will Gain the Most from AI? 49

Figure 3: Top 10 Countries with Artificial Intelligence Investments 50

Figure 4: The CBR Cycle 143

Figure 5: Methods and Techniques Commonly Used for Implementing Each Stage of a Typical CBR System 144

Figure 6: Task-method decomposition of CBR 145

Figure 7: Hybrid Reasoning Method (CBR, RBR and MBR) 149

Figure 8: Global Legal Technology Investments 175

ABBREVIATIONS

AI	: Artificial Intelligence
ANN	: Artificial Neural Network
CBR	: Case-Based Reasoning
COMPAS	: Correctional Offender Management Profiling for Alternative Sanctions
CSP	: Constraint Satisfaction Problem
DL	: Deep learning
DSS	: Decision Support System
ECHR or ECtHR	: European Court of Human Rights
GA	: Genetic Algorithm
GPS	: General Problem Solver
HP	: Hierarchical Planning
ICAIL	: International Conference of Artificial Intelligence and Law
IR	: Information Retrieval
MBR	: Model-Based Reasoning
ML	: Machine Learning
NGO	: Non-Governmental Organizations
NLP	: Natural Language Processing
RBR	: Rule-Based Reasoning
TÜBİTAK	: The Scientific and Technological Research Council of Turkey

CHAPTER 1 – INTRODUCTION

AI is called as one of the key technological developments of the twenty-first century by numerous researchers, scholars and politicians and AI effects society, culture, economy and nations in various ways. MIT AI Laboratory executive Edward Fredkin pointed out the value of improvements in AI on a TV show (Copeland, 1993; Yücebalkan, 2019: 83): *"There are three important events in history. First, the creation of the universe. Second, beginning of life. Third, which I think has the same significance, emergence of the artificial intelligence".* Studies about AI began more intensely soon after World War II and the term AI was coined in 1956. Until this time, the studies have grown remarkably and the connections with other fields has been more various and stronger. Today, AI includes an enormous number of various fields and subfields. They range from very general (learning, planning, representation, reasoning, perception and etc.) to very specific areas (playing chess and go, proving mathematical theorems, writing poetry, creating art, driving cars autonomously, diagnosing diseases and etc.). AI seems appropriate for nearly every intellectual job, which proves that AI is a universal field. Due to this, this technology has a big potential to make numerous people redundant in the near future. Especially jobs which are routine and repetitive are at a high risk of automation. According to a significant study of the effect of AI on 702 jobs, lawyers and judges are approximately at the midpoint of occupations to be replaced by AI. AI machines which can scan documents for key words and phrases has already changed the role of paralegals and legal assistants significantly (Morison and Harkens, 2019:5). AI is expected to create a $15 trillion ecosystem by 2030 (Manyika et al., 2018). The quality and quantity of the data mining and technological infrastructure carried out by AI are great. AI has multidimensional transformative influences on the public sector.

AI is getting widespread in a huge number of fields by making the computers learn and deal with complicated tasks which at an earlier time need considerable arduous tasks by people. AI is getting important due to increased client demands on firms to be more competent and efficient. Owing to the sophisticated accuracy and speed, AI can be helpful to public servants, lawyers and judges to make work processing more efficient. The range of computer applications in the public service[1] area is extensive. The range makes a large area

[1] It refers to the administrative organization in organic terms, and general benefit services in material terms (Mehdiyev and Saygın:2011, 17).

from general applications to applications modelled particularly for the specific field such as law. Especially, the legal technology in the world has increased significantly by changing traditional methods and generating new types of the legal service delivery. It started with the empowerment of humans in the technological world and started to help humans do their jobs with document production, computer-assisted legal researches and early e-discovery systems (Goodenough, 2017). Later, it levelled up to replace humans with smart case forms, interactive resources and remote assistance, web services and internet robots. Today, it has steered the decision making process in the legal world with legal analysis systems with decision making and prediction justice tools. Some states and companies already have created algorithms which make verdicts about cases and have tried to use them in various ways. For instance, Lex Machina provides statistics about the success of the potential motion, win/loss rates, settlement rates, time to settlement and etc. to law firms and companies. It can unearth the tendency in damages, awards and remedies and help people have an efficient strategy to sue a law suit with the highest success possibility by comparing results of previous cases, similar litigations, and recognize whether arguments are successful according to a certain judge. Some governments are willing to use the AI technology in law. Especially they believe that this technology can prove the efficiency and certain sorts of disagreements can be solved robotically by the AI technology in a faster, cheaper, more accurate and reliable way. The members of the judiciary under the increasing heavy workload and the current systems which are unable to keep up with the changing conditions of new technologies require a transformation in courts. The AI systems can be more objective judges than human judges, since it is thought to be more impartial and make decisions without favoring any of the parties due to past or present relations, misplaced empathy, admiration or other subjective impacts. The caseload of the court can reduce because parties cannot challenge the AI system as unqualified to carry out legal tasks due to a clash of interest or the absence of neutrality. Because they are not humans, they do not own any favor to any person and others do not feel any doubt about discriminative actions to themselves owing to close relations and kinship relations. The AI system can perform without miscalculations. The software can be designed and all amounts can be calculated without the risk of human error (Nakad-Westrate et al., 2015: 65).

This system does not do any mistake because of fatigue, lack of knowledge, lack of experience, family affairs or money problems, they do not feel tired and do not need any holiday and any working hour. This means that they can always work and this makes this

system much cheaper in the medium and long term. They can make the same decisions so the unity of decisions can be maintained. People can understand what the judge can make decision about their own cases according to prior decisions. In addition, the AI system can give the correct verdict without fear, favor, hesitation or any other feeling. In 2004, some professors from Washington University used their system to check the accuracy of the algorithm in predicting Supreme Court verdicts on 628 cases in 2002. These professors matched their algorithm's verdicts with a group of specialists' verdicts. Although specialists had 59% accuracy, the algorithm had 75% accuracy. Between 1816 and 2015, Prof. Daniel Katz and his 2 colleagues found 70.2% accuracy on case verdicts of the Supreme Court in 2017. In the same way, Nikolaos Aletras and his colleagues employed machine learning (ML) to inspect the case text of the European Court of Human Rights (ECHR or ECtHR) and reached 79% accuracy on the result prediction (Faggella, 2020). The study of Legal AI platform LawGeex took place with the help of law professors from American Universities. 20 qualified advocates were against the AI system about the evaluation of legal contracts by assigning scores according to the accurate identification of issues. The human lawyers scored about 85% accuracy rate on average. But the AI machine had 95% accuracy. In addition, while the human lawyers finished the task with 92 minutes on average, AI finished the task with 26 seconds on average (Nicholson, 2018**)**. States started to invest money into legal technology to enhance the efficiency of their law systems. Legal services can be called as among enormous list of sectors which China wants to renovate with AI. Thanks to a national plan on the improvement of the AI technology, China has worked on many AI machines such as mobile legal services, live-streamed court hearings, virtual judges, voice-activated robot assistants and etc. Today, for instance, Shanghai High People`s Court furthers the progress of AI and the judicial practice, they believe that AI can modernize the Shanghai court judicial system and its capability and apply AI to the law field. In 2017, a Beijing court used an AI-based robot as a helper in the explanation of legal terms and for legal advices (Dai, 2020). The U.S. has already started the assessment tool which is called as Correctional Offender Management Profiling for Alternative Sanctions (COMPAS) and it is serving as an example of how artificially-intelligent tools can create verdicts based on statistical information such as 137 questions answered by the offender during an interview, and on the information taken from the offender's criminal history (Gyuranecz et al., 2019:5-6). Especially, Estonia is a nominee to be a vital centre in the legal technology for public services. The aim of the Estonian government is to bring the AI technology into a variety of ministries to streamline services to citizens. In 2017, Estonia started testing some plans about

the usage of AI for agencies. In thirteen areas, the AI technology replaced civil servants. For instance, it ranges from controlling government subsidies for farmers to a robot judge making decisions about small claims disputes under €7,000 (Cowan, 2019).

In the Continental Europe legal system, where laws are the main source of law, courts are obliged to make decisions in accordance with laws. Even in cases where there are no provisions in the laws, the judge has to make a decision and resolve a dispute by filling the gaps that occur knowingly or as a result of the negligence of the legislator. The judge can fill this gap by making use of case law. Case law is among the sources of law. In some systems, case law is considered compulsory and in some systems, it is considered as an auxiliary source. Although it is basically among the auxiliary sources in Turkish Law, decisions on the unification of conflicting judgments are binding. If the legislation is not clear enough, case law can be considered as an auxiliary source. The case-law may be called as an important source that creates and develops administrative law. The principles of the administrative law can be created with annulment decisions in annulment actions that have consequences not only for the parties of the case but also for everyone. The provisions and consequences of annulment actions are valid for everyone, not only for regulatory transactions but also for individual transactions. It can be argued that annulment actions regarding individual transactions are binding in terms of their practical effects, just like decisions to consolidate case law (Akgül, 2020: 46-47). However, the administrative procedures have been regulated by laws in Turkey. If the opposite rule is not made, legal arrangements regarding the administrative jurisdiction are applied even in the cases and works that are in progress. But, Turkey does not have a general administrative procedure law consisting of general administrative procedural rules as a whole. Therefore, any classification or definition identified by a general law for parties in the process of the administrative decision-making is not available. Instead of this, various legal regulations are used in Turkey and they consist of administrative procedural rules (e.g. the Law on the Collection Procedures of Assets, Law on the Protection of Competition, Law on Customs Procedures, Right to Information Act, Public Procurement Act, Law on Expropriation and Customs Law) (The Federal Administrative Court of Germany and ACA-Europe, 2018:1).

The creators of legal expert systems use various models of legal reasoning for these systems and these creators mostly focus on the quality of the predictions and the quality of the arguments when they design the systems. Helpful and practical legal expert systems

should make decisions similar to that which parties may get from judges in the courts, so these robots should be created based upon a pragmatic approach to law by making the problem of knowledge acquisition simpler. According to the country law system, legal expert systems can choose various legal models and main models are basically rule-based reasoning (RBR), case-based reasoning (CBR) and hybrid systems. These can be called as decision-support systems which give an interactive environment where decision makers rapidly recognize and use the data essential for the construction of final verdicts (Zhang et al., 2010: 338). For instance, some countries use case law (judicial precedent, judge-made law or common law) which is considered as the body of law based on verdicts of courts and similar tribunals like the UK, the USA, Canada and etc. In this type of countries, CBR is mostly used and it has the capability to use the particular knowledge of previous and concrete cases. When a new problem appears, a similar past case is discovered to solve the new problem, and the CBR method reutilizes the knowledge and the information of the similar previous case for the new problem situation (Yan et al., 2008:3333). However, in such countries like France, Turkey and etc. statute law is used (written/codified/civil law). In these countries, the statutes are decided by the legislation. Considerable amounts of the statutory law are fundamentally definitional in nature and try to define legal relations or concepts. Judges are supposed to comply with these rules except for some exceptions. In these countries, a RBR system is generally used and operated according to rules. It includes a rule base, or a group of if-then rules; an inference engine, or a method of utilizing rules for the solution of problems; a working memory, or a method of keeping the current problem condition; and often, an explanation facility, or a method of demonstrating a user the chain of rules which opens a door to a result (Kuo and Huang, 2011). Each rule characterizes a small portion of knowledge which is united, or chained together, with other rules to deduce conclusions or find solutions (Marling et al., 2002). Hybrid systems can be effective in some situations and CBR and RBR techniques are integrated to resolve a problem to which single system cannot give an acceptable solution, to prompt performance improvements over traditional one-representation structures (Zhang et al., 2010: 338).

The Turkish administrative jurisdiction is mainly based on statute law but courts have to comply with certain verdicts of courts higher in its hierarchy. Judges make a decision according to the constitution, laws, presidential decrees, international treaties and by-laws. A possible legal expert system for the Turkish administrative jurisdiction can use a rule-based legal reasoning. However, a hybrid legal expert system can be more useful for the

Turkish administrative jurisdiction, because the Council of State's decisions on the unification of conflicting judgments are compulsory. This legal expert system should design the way in which judges qualify similarities and differences between cases according to rules by deciding which rules to use in disputes, and what decision to make on the base of that similarity assessment.

Today, AI machines can be utilized and designed to analyze cases by using legal procedures, predict potential outcomes and help the judicial process. Generally, the law is a very popular topic for AI researches for some reasons. The first reason is that the law has a long tradition of analysing its own reasoning process. It means that people do not need to design a highly developed AI machine which does not need to analyse and categorize cases to create its own way. Before judges or lawyer start to analyse a case, they already know where they look at firstly. Knowing where you look is very important because people can solve disputes early by checking right places. For instance, in some types of cases there are times which everybody has to obey. If you do not file a suit on time, you cannot file a suit again, except for some situations. In this situation, the right and easiest move for judges is to reject a case without analysing the case further even if the party whose case is rejected deserves to win. Secondly, the reasoning of the law can be considered as stylized. For instance, in Anglo-American common law, one reasons according to stare decisis[2]. Main parts of the reasoning include analogy and reasoning with cases. In Turkey, every similar decision does not force judges to obey it even if the decision comes from higher courts. Stare decisis do not exist in the Turkish law. But there is the main exception which is that decisions on the unification of conflicting judgments are binding. Third, nearly all the knowledge is accessible and some of the law is clear and carefully codified by lawmakers. Especially this feature of the law helps an AI machine analyse and predict outcomes easily because codes are clear and understandable. The law gives the path to AI to make decisions more easily and precisely. In Turkey, main sources (the written law) of information come from the constitution, codes, regulations and etc. If judges can solve the problem with these rules, they have to solve according to them. If judges do not find any solution by checking main sources, they start analysing secondary sources such as customary law and creation of law

[2] It is a legal doctrine which obliges courts to comply with/take care of historical cases when rendering a decision on a similar case.

by judges. But judges have to use customary law first and if they do not find any solution, they can create law just for the cases which they deal with (Rissland, 1988:45).

Turkey can use the AI technology to improve the efficiency, the productivity, the speed and the accuracy of the Turkish law. The judicial staff and their experience are not enough. Today, Turkey has nearly 3.6 million registered Syrian refugees, these Syrians involve in court cases and this is an additional burden on the Turkish judiciary. The pandemic has disrupted and slowed down the management of judicial activities. Especially, a huge amount of the experienced judicial staff was dismissed due to their relations with the Gülenist Terror Group which carried out 15 July military coup attempt in 2016. Normally this gap takes a long time to be filled. However, at the same time, this can be an opportunity to integrate the Turkish law system into the AI technology. Especially, as a starting point, Turkish administrative jurisdiction can be chosen as a sample, since Turkish administrative jurisdiction have several major characteristics which might help the AI technology to be successful for the prediction and might be a huge aid for judges who are very busy at work and have the serious workload density which affects all the jurisdiction in Turkey. In the Turkish administrative jurisdiction, there is the power granted to judges working in the administrative jurisdiction which is called inquisition without preoccupation which can make categorizations easier for AI machines. Simply, with this, judges do not keep them restricted with the information which is given by the parties and the judges make the required research for the resolution of the case (Evren, 2008). Because the judges should gather information and documents, the system of collecting certain documents can be automated. In addition, the jurisdiction is written and it means that the storage of information and documents is relatively simple and when some necessary documents which are similar to these cases are required by judges, these documents and information can be found easily, with a system, these document and information can be compared with the new case`s documents and information and these make decision-making process less complicated, faster and more accurate. Generally Turkish administrative jurisdiction can be considered as simple and relatively cheap, since judicial system hearings in courts are limited and the judges are inclined to make decisions on cases without the need of any hearing. Hearing witnesses cannot be used in Turkish administrative jurisdiction and discovery and expert witness reports are limited according to the features of cases (Kaplan, 2016).

There are some several problems which should be dealt with to make Turkish administrative jurisdiction easier and faster when AI machines to the Turkish administrative jurisdiction are adapted. The fragmentation of norms, procedures, regulations and laws look like great challenges in the Turkish administrative procedure law. The Turkish administrative law is not a complied code like penal law or trade law (Gözler, 2003:175-176). Although there are some laws in the Turkish administrative law, there are not general principles of law which determine theories, principles and fundamental concepts in the Turkish administrative law. Generally, theories, principles and fundamental conceptions such as contracts, administrative actions and public service have been designed in time and some of them have been decided by courts. This can create flexibility for judges but definitely a big uncertainty at the same time for judges, especially for an AI machine. Law does not like uncertainty which is the room for free interpretation and this uncertainty can affect the decisions of judges, maybe machines in the future. This problem creates another one which is the uncertainty of legal texts coming from the use of general clauses. In the area of Turkish administrative law, there are rough or evaluative concepts which do not have certain meanings and due to the uncertain borders of concepts, sometimes these concepts may be changeable according to cases. Delays and inefficiency of judiciary process, inefficient legal procedures and court processes, the increased length of hearings, insufficient court resources, caseloads and growing demands which affect the quality badly can be called as major challenges along with workloads of judges and the predictability of decisions for the Turkish administrative jurisdiction. Turkey should benefit from the new achievements in AI to the maximum extent especially in the jurisdiction. There are some clear benefits of the use of AI in the Turkish jurisdiction (especially in the Turkish administrative jurisdiction procedures). Advantages can be explained by drawing attention to a part of the technical literature and giving various points of views by giving examples of certain countries. The AI systems are quicker, they can handle multiple cases at the one time, and they can find and analyse pertinent legal documents very quickly. This is not only beneficial for human judges to concentrate on more important cases, but also it is helpful for the citizens what do not want to experience the lengthy, expensive, and stressful litigation process.

Turkey does not have a long experience about the AI usage, particularly in judicial systems. To use the AI system in the Turkish administrative jurisdiction, firstly education, law and government policies should be designed according to the AI technology and preliminary preparations should be done before the implementation of AI for courts. The

implementation of the AI technology influences the administrative jurisdiction in many ways. To make the country and courts ready, these three powers should transform their own policies and implement some urgent actions. Governments set their policies by determining national priorities and strategies to minimize the transformative negative effects of AI and benefit from advantages of AI. Many countries such as the USA, China, Japan, European countries, India and South Korea consider the improvement in the area of AI as main targets. These countries prepared plans for their national AI strategies. In addition to countries that prepare and present their national artificial intelligence strategies, many countries are currently at the stage of preparation for their strategic documents. Many countries have determined their national strategy on artificial intelligence, and some countries have announced that they have started working to determine their strategy. The Industry 4.0 race between Far East and European countries is experienced at the point of determination for national artificial intelligence strategies. Countries determine the goals they want to achieve in the process of data and information development with their artificial intelligence strategies. On the other hand, countries plan their national interests and priorities related to digital technologies and put artificial intelligence applications on the agendas of their countries with legal regulations. In this framework, some countries assign their existing ministries to utilize AI in public services, and some countries form new institutions and organizations to undertake this task (Ulaşan, 2020: 103).

In Turkey, preliminary studies have been launched to create the national AI strategy of Turkey. The "National Artificial Intelligence Strategy preliminary report**"** was issued in February 2020 and the preliminary report is considered as an internal document and was sent to the relevant institutions for their opinions. This report was prepared by the Artificial Intelligence Research Initiative and Door Technology (Demir, 2020), and contains the impact of the AI technology on education, legal preparations, competence of public officials, the effect on labour, adjustments in jobs and sectors, the relations among people and AI, the financial system and development. In addition, human rights are prioritized as an important point roadmap in a variety of fields like ethics and law. The Presidency's Digital Transformation Office, which is the main power behind the national AI strategy of Turkey, is working with the Republic of Turkey Ministry of Industry and Technology. Turkey published its national AI Strategy on 24 August 2021 and this strategy was prepared by the Digital Transformation Office of the Presidency of the Republic of Turkey and the Ministry of Industry and Technology consistent with the 11th Development Plan and Presidential

Annual Programs within the framework of the "Digital Turkey" vision and Turkey's "National Technology Move". This includes some measures and goals in AI for 2021-2025 (Yilmaz, Sozer and Oztoprak, 2021).

Right moves in the education can help the implementation process of the AI systems in law. In 2020, Turkey has a total of 80 law faculties in universities, 36 of them are public university, 34 of them are foundation universities and 10 of them are private universities in the Turkish Republic of Northern Cyprus. Although the number of law faculties is increasing significantly in Turkey, the education quality does not seem to increase and traditional methods are still dominant in the education such as rote learning. In the recent years, some changes and innovations have taken place in the law education to increase the quality of education. However, a more drastic and rooted reform in the field of law education is vital. Law faculties' quotas are still high and the establishment of new law faculties in almost all universities reduces the quality of education. There is a severe deficiency of faculty members in newly established law faculties due to the insufficiency of infrastructure and faculty members are not good enough to teach lessons to students. Creative thinking, reasoning and producing ideas should be used in law education instead of the memorization of the information (Uyumaz and Erdoğan: 2015: 460).

Traditional methods and lessons should be changed with modern methods and new lessons such as information technology law, international technology law, big data, human rights and human security, bioethics, technology and law and law and ethics on robots and artificial intelligence. Lastly, with the law policy, AI can transform the existing social structures and create some regulatory problems, to which legal structures are not ready to provide a direct answer. Therefore, the situations of self-aware machines, machines with limited memory and machines with a theory of mind ought to be analysed deeply in the context of legal status, liabilities, regulation, ethics, safety and etc. Today, the world can design reactive machines and machines with limited memory. Machines with limited memory, to a certain degree, can make autonomous decisions and they can be used in the certain levels of the process of making judgments in courts. However, reactive machines' decisions are a pure reflex of the data provided by their owners, managers, designers or operators and have low to zero complexity and agent-made observations cannot be inserted into the machines' decision-making processes. This means that it is wrong to disassociate their behaviours from the respective designers or owners. These machines can be used as an

assistant to judges and public prosecutors but giving them the full responsibility might be dangerous (Alexandre, 2017:14-21). In Turkey, there are no specific regulations about AI and due to this, the discussion about the legal status and liabilities should be considered according to existing regulations. For Turkish AI algorithms to function properly in the administrative courts, one of the most important things is to work openly and efficiently. AI algorithms can be used to tackle with discrimination in courts by contributing to social harmony. Turkey should protect its data as well as the AI models and algorithms produced with its national data since these algorithms can be prevented (from proceeding) or get stolen. Turkey`s national data that makes this algorithm can be stolen with reverse engineering. Turkey should create a strong system to secure its AI algorithms.

After the preliminary preparations, the implementation of AI systems in the Turkish administrative jurisdiction should be focussed and should be discussed how AI systems can be used in the Turkish administrative jurisdiction and generally in which part of the justice system can be used. The vast majority of AI types are operated with the detailed coding and extremely powerful processing power. Thus, most of today's artificial intelligence types can perform more than one process at the same time only within coding limits due to their strong processing power. The type of AI which is intended to exist in the future is not limited to coding and by the help of ML it can improve itself. There is an important competition in the world in this regard. One of the most effective results in ML is AlphaGo, which was developed by DeepMind and won the victory against the best players of the world in the game "Go". AlphaGo improves itself by analysing the results of previous games played against other types of AI and people, processes the data with the Monte Carlo Tree Search method and determines the moves. In this game, the rules and parameters of the Go game are completely certain. But the AI usage in law is not as easy as the use of AI in this game. Although generally rules are clear and certain, the decisions are not always clear and the parameter is uncertain. It is not unprecedented for judges to make different decisions in similar cases due to only one tiny difference. It is quite common for a judge to have a certain style of interpretation (Önengüt, 2019). Although these problems are serious, with the goal-oriented and dynamic approach the ecosystem which supports AI should be created and due to this, the government should focus on 2 main areas, an automated decision making system and AI systems facilitating AI decision making. Automated decision making systems are normally utilized in 2 ways. The first one includes solely automated decision-making systems and these systems' decisions become effective without human intervention.

Especially, the formation of verdicts, discovery and court investigation, filling a case, preliminary examination and the petition exchange and the modelling of the reasoning process in courts can be implemented according to the Turkish administrative jurisdiction in the basis of the AI systems. The second one is considered as a guide or an instrument for a human decision-maker that finally makes the judgment for the final decision. Judges exercise the judicial power of the state and it means that they might have an authority to imprison people, punish people with pecuniary penalties or indemnification and etc. according to judges` responsibility area (such as administrative law judge and criminal court judge). They take the relevant information about cases and according to the information of cases, they make decisions. In addition, there are some processes to be completed to make decisions such as collecting relevant documents which can take a long time. In addition, traditional courts are very crowded and the judges are very busy. Because of these current issues and challenges, there are some methods, which facilitate the decision making processes of judges and can be used with AI efficiently in the administrative law such as collecting and analysing documents with the help of AI, online courts, arbitration, smart contracts and etc.

1.1. Methodology

Two approaches which are the cognitive and the sociological are very important for the analysis of the judicial process. Additionally, judicial reasoning includes various cognitive skills like evaluating facts, interpreting documents, drawing analogies and taking part in dialectical interactions. The thesis benefits from many disciplines and theories like legal theory, psychology, sociology, legal reasoning theories, organizational theory and decision making theories. The issues of the study include a huge reference in detail to mainly three disciplines: artificial intelligence, public administration and law. The accomplishments in the field of public administration, AI and law become visible, which might trigger the use of a detailed legal examination of AI in the process of the administrative jurisdiction. In this way, the processes, the methods and the structure of the Turkish administrative jurisdiction are analyzed in detail and its availability is discussed through current AI methods and techniques, and examples of the practical AI applications in law.

Basically the literature review is used in this study and the study collects, analyzes and interprets fundamentally foreign researchers` an in-depth exploration of scientific achievements about artificial intelligence by observing what foreign and Turkish experts in

artificial intelligence do and think. The study also focuses on the meanings, definitions, characteristics, symbols, metaphors, and description of the current AI to improve the understanding and build a strong base helping to understand the researches and information in the study.

The research embraces logical and analytical methods like discourse and historical analysis. Document analysis has been used in the study. It consists of gathering data and information from existing documents. Documents are called as concrete materials in which thoughts and facts are recorded such as online sources, books, articles, government records and etc (Pottala, 2018:19).

The following stages are generally used throughout the analysis:

1. Gathering all the information and data in the same format in one document

2. Eliminating the non-vital information and data

3. Categorizing the applications in a logical way

4. Reflecting all the reliable information, applications and reasoning methods on the case study (reasoning with rules, reasoning with open-textured concepts, reasoning with cases, and precedent-citing argumentation, mixed paradigm reasoning with rules and cases, deep models of legal knowledge).

5. Refining and turning the information for better evaluation

This study research nature is mainly exploratory that benefits from following methods;

Case study: The study is a form of qualitative research which is focused on providing a comprehensive account of the usability of AI in public services, especially in Turkish Administrative Jurisdiction. This study focuses on the advantages of legal analysis systems in the Turkish administrative jurisdiction and analyses why and how Turkey should use legal analysis systems in the administrative courts. It analyses which preparations should be made to use robot judges in the administrative courts. Additionally, it proposes the ways of implementation of AI systems for the use of legal analysis systems in the administrative courts. The ways of the use of AI systems are categorized systematically in order to guide

the future inventors and developers of the software/application/ service with AI in Turkish administrative jurisdiction.

Document analysis: Document analysis is called as a systematic procedure which reviews and evaluates texts and documents. By the help of document analysis, the information collected from AI and law will be analyzed and interpreted so as to extract the meaning, get the deep understanding, and increase the level of the empirical knowledge. The analysis includes meetings, background papers, books, brochures, journals, websites, newspapers, press releases, governmental reports, various surveys, public records and etc. The aim is to review the prior literature as the part of the study and incorporate the information in the study. The analytic procedure involves finding, choosing, appraising and synthesising the information found in sources.

Historical research: The research helps people understand past and present developments of the AI based legal technology and permits us to provide probable answers to existing issues and challenges which are the theoretical applicability, usability, possibility of the use of AI in the administrative jurisdiction in Turkey. This study is special for Turkish administrative jurisdiction but this study can shed a light for other experiential researches in the Turkish civil proceedings and penal proceedings in the future.

This study is generally literature review and provides analytic discussions from social, legislative and academic practices in the world. Research materials consist of various sources:

• Legislative regulations and the Turkish administrative jurisdiction;

• Research papers of foreign scholars who specialize in the field of AI, law and public administration under this study;

• Official media sources;

• AI applications/software making decisions about law in the world.

This PhD concentrates on some basic issues to analyse:

• Introduction of AI in legal systems, especially in the Turkish administrative jurisdiction;

• Turkey`s current capacity in AI;

• The advantages of robot judges in the Turkish administrative jurisdiction

• Preliminary preparations to use legal analysis systems in the administrative courts in the government, law and education sectors

• The proposed ways of implementation of the AI systems in the administrative courts.

• Preparation for the introduction of AI in the Turkish legal system on the basis of the comprehensive complex of legislative infrastructure.

• Attempts to regulate AI in law according to current regulations

The analysis of regulatory sources and their interpretations have implemented and the study focuses on some countries which have established the legislative base for AI such as Estonia, Germany, the USA, Russia, and China and make their policies public. The study analyses the main characteristics in determining the legal personality of the AI technology, the basis for perspective legislation, shaped by countries, businesses and professionals. A technique of comparative legal research, generalization and a technique of the interpretation of standard norms are used to regulate AI in law. The study uses techniques of legal interpreting, legal reasoning and modelling to recognize major legal spaces within the structure of the two current paradigms to regulate legal relationship between law and AI and to insert the Turkish administrative jurisdiction into the AI technology (Atabekov and Yastrebov, 2018). One of the aims is to insert the administrative jurisdiction into modern technological reality like AI through particular AI methods and techniques. Current achievements in the field of AI about law should be linked with an in-depth analysis of the Turkish administrative jurisdiction to make applicable AI applications for Turkish administrative courts. Due to that, this thesis can be referred as legal comparative and interdisciplinary research to a certain extent.

1.2. Research Subjects and the Aim of the Thesis

The purpose of this dissertation is generally to analyse the impacts of AI in the public services and the main focus is about the predictability of the use of AI based legal analysis systems in the Turkish administrative jurisdiction. The usage of AI in courts has been

analysed with the examples from American, Netherland, Estonia, Portugal, France, Chinese and Brazil legal systems. In addition, even if the AI systems with the capability of decision-making started working commonly in the future, they would have to be also regulated and designed according to law. This dissertation focuses on possible legal categories and regulations for the usage of AI and observes how the current regulations could be applied or adjusted on AI systems. Generally, to order to create AI systems, ML, DL, genetic algorithms, natural nets and other types of feedback loops which can make random actions should be used. All these things can permit AI systems to control themselves through an evolutionary and adaptive process rather than through a process of engineering design. Some AI systems take orders to reach final aims and design themselves through certain means for the aims given by users. The means may not be predictable by the operator-owners and by the original programmers, because AI systems may learn autonomously. In this way, AI systems can learn by doing experiments or doing other real or virtual attempts for solutions. Therefore, they start correcting errors, check outcomes and carry out better actions in time. AI which is a social-tech system has a co-evolution structure with other social structures, which has an autopoietic and holistic approach; then its sense is the consequence of its co-evolution through others. If humans give them a different definition such as an object, there is a risk to limit the analysis to a conceptual matter, leaving aside its appealing characteristics, such as its functioning. This perspective may help to comprehend the aspects to regulate (Cappelli, 2015).

The main subject of this study is to analyse the potential usage of AI techniques and methods in Turkish administrative jurisdiction. The public services in the AI technology recently have become a topic of extensive scientific discussion among academicians in Turkey. Research on the application of AI tools in Turkish Administrative Jurisdiction at the present stage of developments in this field of science in Turkey needs a wide-ranging approach, which would consist of a systemic examination of the topic studied. For instance, in the administrative jurisdiction, the process which is run in the resolution of cases and judicial matters can be modelled to create an AI system for administrative law judges. An AI system can be developed to guide related parties and judges participating in the proceedings to include rules that encourage actions in certain ways. This system should predict how any of the subjects participating in the process at a certain moment of the process could act. Because the Turkish administrative jurisdiction has many procedural rules in the case process, the reasoning process in the courts can be modelled to use an AI system. In the

process of the administrative jurisdiction, AI should be ready against the possibilities that may arise at any time in the process and should make the improvement of the process more apparent in courts. Because each case has unique features, the AI system which takes these into account should be designed to contribute to the achievement of the goals of consistency and promptness in the judgment by preventing procedural transactions from being incomplete and erroneous, preventing unnecessary actions and averting malicious conducts which try to extend the time of the case. The designer should consider that the AI system should have a structure that allows human intervention at appropriate and necessary times.

1.3. Contributions of Study

The study tries to point out the course of the evolution of the Turkish administrative jurisdiction for the near future. This thesis focuses on the applicability of the AI system in Turkish administrative jurisdiction. The AI systems may be judgment machines (robot judges) which can render judgment in courts and human judges may check their decisions in certain ways or make the works of the judges easier as legal expert systems. Turkey is not ready for judgment machines and AI is not advanced to handle this task for now. However, the AI systems can utilize the information of the domains of judges to assist them to find the solutions. The possible software of AI can help accelerate administrative court proceedings, unite judicial verdicts, distribute court access much easier and decrease court expenses. The thesis can be an urge to start a broad scientific discussion on the possibility and suitability of the use of AI techniques in the Turkish administrative system, and outline the base for new suggestions which can be used by Turkish legislators. In addition, the software of AI instruments should focus on the improved efficiency of justice, the quality of adjudication and the workload of judges with less expenditure (Dijkstra, 2001).

Some AI applications in public services have been used in the world. But inventors of AI applications in Turkey cannot copy them and they should create algorithms according to the Turkish system, because every country has different law systems and jurisdictions. The architecture of the application of the Turkish administrative jurisdiction can provide the background in law and encourage AI invertors to think about the possibility of the AI application in this jurisdiction. The information in the thesis will help designers to notice flaws, shortcuts and the applicability of an AI robot in law, especially in the Turkish administrative jurisdiction. In addition, this thesis can attract the academicians to search for

the applications of AI which can be used in Turkey and help them train themselves for the near future with AI. This theoretical information may help academicians to understand that traditional education and jobs are changing and need to follow the ever-changing world with ever-changing needs.

In the Turkish administrative law, a general administrative procedures law is not available and there are various legal regulations. This means that there are many terms and rules about the same topic and searching for them can be an enormous effort and if people searching relevant rules for their cases are not expert, they may have great difficulty finding relevant rules. The same thing will happen for judges and finding right descriptions and rules will take much time. This can illustrate that browsing for information in legal databases can be highly a time-consuming task with numerous hurdles requiring huge perseverance even about a certain topic. It is hard to choose the accurate terms and rules to reflect your need and unveil the correct solution by removing unwanted information. Sometimes even if people think that the terms and rules they chose reflect their information need appropriately, the terms may not be the same terms utilized in the document or file they search for. Due to all these problems, an AI system can be used instead of human judges or the system can help human judges make more precise decisions. However, even if the governments decide to use AI systems in courts, there are some challenges which come across in the preliminary stage and in use. For instance, the query language people require to utilize with logical operators can be very complicated. The AI system should understand the systematic organization of statutes, because the rules managing a certain subject are regularly spread over various statutes.

This study provides a detailed analysis about the past and present of AI in public services with current applications to understand the advancement in this technology. The study will focus on preliminary preparations such as in education, government policy and law in a detailed way. For the future of AI, robot law and rights, ethical issues, regulations, control mechanism and etc. will be analyzed to provide a prior knowledge for inventors creating applications with AI and humans who will possibly face with them in the future. In addition, Turkish judicial and administrative proceedings will be tried to be categorized systematically in order to guide the future inventors or developers of the software/application/service with AI in the Turkish administrative jurisdiction. This study is special for the Turkish administrative jurisdiction and the study will pave the way for

numerous experiential researches in the Turkish civil proceedings and penal proceedings in the future.

1.4. Scope, Challenges and Limitations of the Study

The objectives of this study are to examine Turkey`s current capacity in AI, analyse the advantages of legal analysis systems in the Turkish administrative jurisdiction and why Turkey should use legal analysis systems in the administrative courts, inspect which preliminary preparations in the government, law and education sector should be offered to be able to use legal analysis systems in the administrative courts and discuss which and how legal analysis systems should be used in the administrative courts. This can occur by measuring the possibility of automating individual stages of the process and analyzing whether AI tools fit to the prime administrative procedure principles and the legal framework in Turkey.

This thesis can guide mainly academicians and computer engineers to comprehend which preliminary preparations should be carried out to be able to use AI systems in the Turkish administrative jurisdiction and can help them to understand in which stages AI technology can be useful for administrative courts by checking where the judges take the initiatives. The aim of this study is to measure the potential usability of AI in Turkish administrative jurisdiction and the architecture of this law is created and is analyzed which preparations should be made to get Turkey and the Turkish administrative jurisdiction ready for legal analysis systems. Creating the application/service with AI and algorithms is not the topic of this study. The main thing which will be offered for readers is the support which can guide people who can create this kind of applications without any law knowledge.

1.5. Overview of Chapters

Chapter 1 (Introduction) explains the significance of AI based legal analysis systems, their examples in the world, the usability of these systems in Turkish administrative jurisdiction, preliminary preparations for the use of these systems and the benefits of these systems in Turkish administrative jurisdiction and possible usage areas of these systems in the Turkish administrative jurisdiction to readers. The chapter constitutes the significance of the study, the subtitles of the scope, challenges and limitations of the study, research subjects, and the aims of the thesis, contributions of study and research methodology.

Chapter 2 starts with the conceptual framework of AI in the light of the previous literature and researches, the definitional issues, deep learning (DL) and ML, risks of AI, the impact of AI in some sectors of public services, the historical development, artificial intelligence strategies and pursuits, the relation of AI with public administration and public services. It advances the discussion on the subject of the viability, challenges of government regulation about AI. In addition, this chapter provides the examples of practical and main AI applications in public services, the notable achievements in the implementation of AI in public services in some countries.

Chapter 3 generally lays stress on law (such as AI`s current applications in law, AI in the practice of law and in the administration of law), the use of AI in legal reasoning, courts, the models for legal reasoning, the legal technology, the regulation of the legal analysis systems, judicial reasoning: the making of legal information, the ways of the knowledge and information representation as well as the description of particular AI methods and techniques which are helpful to back up automated administrative jurisdiction. This chapter provides the examples of practical and main AI applications in law enforcement (such as Taxman, Ross intelligence, Kira systems and etc.), the notable achievements in the implementation of AI in law in selected countries. This chapter discusses the legal relevance of autonomous machines: technology, law and autonomous decision-making in law and the theoretical background of AI in the legal area. It analyses the investment of countries which have the legal technology in the world and Turkey. It inspects the legal reasoning methods and examines which legal reasoning methods can be effective according to various legal systems. In addition, this chapter provides the background about how legal analysis systems can be used in courts and which methods can be used in different law structures of countries.

Chapter 4 generally lays stress on the features of the Turkish administrative jurisdiction (the administrative law and the administrative procedural law), the benefits of AI on the administrative jurisdiction procedures in Turkey, the preliminary preparations of the use of AI on the administrative jurisdiction procedures in Turkey, the proposed ways of implementation of the administrative law legal analysis systems. This chapter analyses the advantages of legal analysis systems in Turkish administrative jurisdiction and why Turkey should use the legal analysis systems in the administrative courts. After that, the chapter analyses which preparations the government, law and education sector should make to use robot judges in the administrative courts. Later, the chapter discusses in which ways the

administrative law legal analysis systems can be used in the administrative courts. This chapter discusses whether the current AI systems are enough to take the role of judges in Turkish administrative jurisdiction by automating the judicial process. This can occur by measuring the possibility of automating individual stages of the process and analyzing whether AI tools fit to the prime administrative procedure principles and the legal framework in Turkey. This can help readers understand in which stages AI technology can be useful by checking where the judges take the initiatives. One of the aims of this study is to measure the usability of AI in Turkish administrative jurisdiction and is to create the architecture of this jurisdiction for the use of AI. Creating the application/service with AI and algorithms is not a topic of this study. The main thing to be done is to support people who want to create this kind of applications without any law knowledge. Turkish administrative jurisdiction is analyzed in a detailed way, Turkey`s current capacity in AI is analyzed, the preliminary preparations which make the Turkish administrative justice ready for legal analysis systems are offered in the area of law, government and education policy and certain processes of Turkish administrative jurisdiction are categorized for the potential AI software to make easier decisions and are analyzed in which processes of the Turkish administrative jurisdiction AI software can be useful for judges.

CHAPTER 2: CONCEPTUAL FRAMEWORK: ARTIFICIAL INTELLIGENCE

2.1. Introduction

AI is a research area that aims to examine and formulate mental functions related to human intelligence by the help of computer models and to apply them to artificial systems. It can be called as one of the key areas of computer science and concentrates on the construction of AI tools which are able to speak, learn, understand, foresee, interact, memorize information taken from humans or internet, improve by itself. The desire of making other entities think, speak and act like humans has existed since ancient times. AI, which emerged with this curiosity of people, has developed through the analysis and mathematical modeling of the human brain and nervous system (Pakize, 2011: V). The common aspect of both efforts is to search and find the principles of rational and human-like processing of the information. It models the human brain in AI researches. However, the human brain performs many tasks at the same time, such as perception, control of internal organs, emotions, and movement. But AI only deals with the intelligence part of the brain. A basic AI system, on the other hand, should show the following three basic features of intelligence: perception, comprehension, action (Yiğit, 2011: 5; Öztemel, 2006: 20-21). In the information processing, a brain has the capacity to record, process and program in 600 units of memory per second in a 60-year life, which means 3,600 bits per minute, 2,160,000 bits per hour, 51,840,000 bits per day. Dr. V. Gray Walter said that more than 300 trillion dollars is needed to make a machine resembling the human brain, and 1 trillion watts of electrical energy is needed for such a machine to work (Pirim, 2006:82; Aslan and Kuşçu, 2015:65).

Table 1: Artificial vs. Human Intelligence (modified)

Artificial Intelligence	Human Intelligence	Characteristics
Robots do not forget any information gained. The information is permanent. But it can be deleted.	The information is not permanent. Humans may forget it due to many reasons such as Alzheimer and long time passed. It cannot be deleted.	**The state of lasting or remaining unchanged for information gained**
The digital information can be easily copied and transferred to other places. The information gained can be transferred totally.	It is not easy for people to transfer what they learn with their own experience and intelligence to others. At the end of the education process, it can transfer to other people. The information gained may not be transferred totally. The quality and limit of the transfer of information can change according to receivers and transmitters.	**Transfer information**
The initial creation of digital information or the creation of the AI system searching, matching and finding the information can be costly, but the cost of copying or the other information coming from the AI system is very low.	It is costly to teach each human individually and takes time. The cost of teaching is changeable according to humans such as age, cognitive capacity and etc.	**Cost**
It is consistent and decisions are always the same under the same conditions.	Decisions can be different. There are numerous factors which can affect humans' decisions such as previous experiences, education, expectations and etc.	**Consistency**
For now, robots do as the robots are told. Robots cannot develop any volition, consciousness and any desire to create (Ballard, 2020).	Humans can reach beyond traditional ways of thinking or acting, and create new and original ideas, objects and etc.	**Creativity**
As far as they learn, they work in a narrow field.	They can benefit from their experiences in other subjects to solve a problem and have a broad perspective.	**Reasoning Power**

Source: (Nabiyev, 2003:94)

AI deals with the creation and improvement of algorithms and techniques which can replicate or rebuild the abilities of the human intelligence. Although AI is called as a branch of computer science with powerful influences from linguistics, philosophy, mathematics and cognitive science, AI has been used in numerous policy fields such as health, law, transportation, public administration and etc (Kurfess, 2004:609). Numerous countries focus to advance their institutions by the help of AI. There is numerous ways and methods which can be employed and categorized as AI mechanisms such as recognition, searching, reasoning, understanding, judging, explaining, making decisions, planning, acquisition, interpreting, synthesis and etc. AI presents a new prospective and methodology for the solution or justification of complicated scientific and application oriented problems and tries to advance the computational power and capabilities of robots beyond the conventional levels. Furthermore, AI can demonstrate many commercial applications like simulation, medical diagnosis methods, robotics, natural language systems, investment planning, databases accessing, computer vision systems, finance analysis and etc (Bourbakis, 1992: V). The figure below illustrates the general information about the capacities of AI in a detailed way:

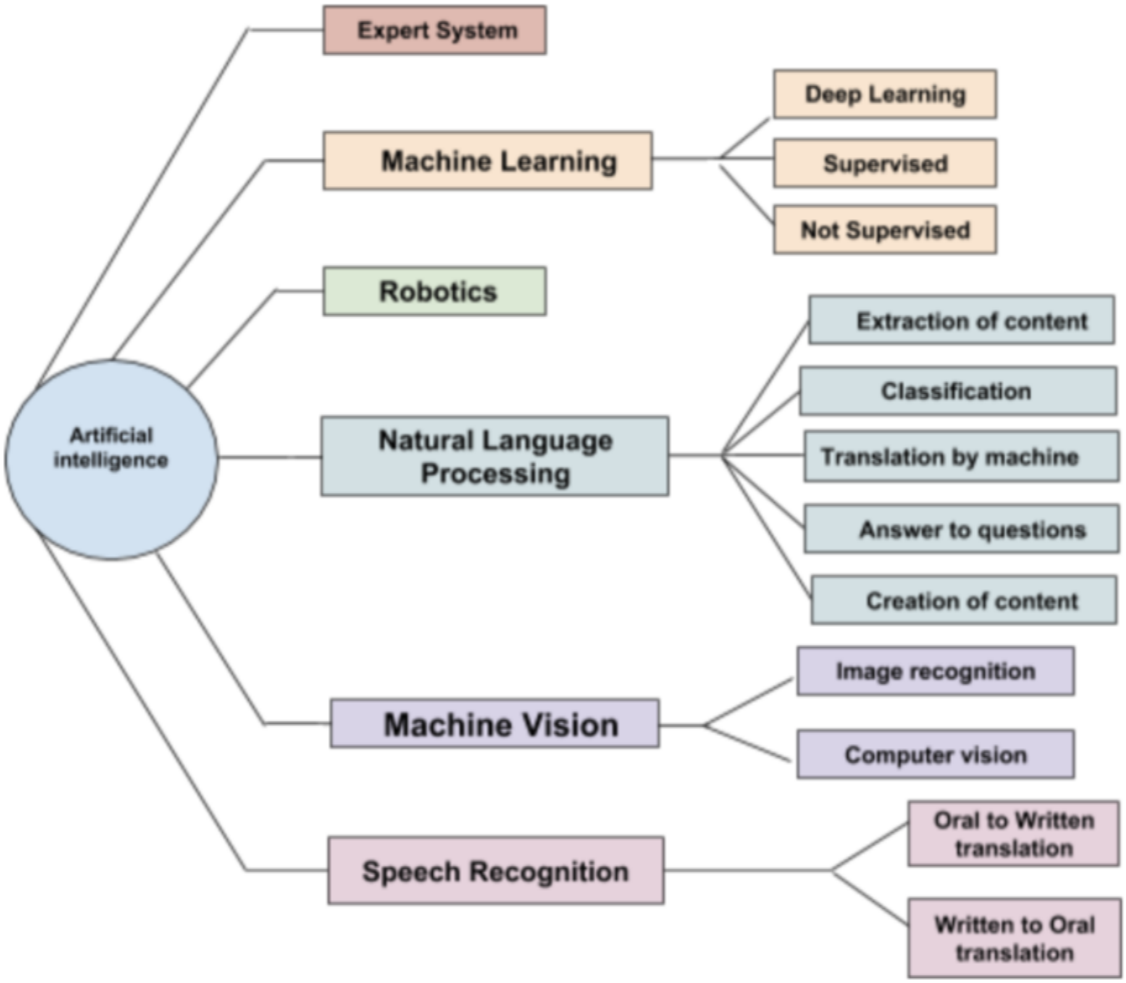


Figure 1: AI Applications and Techniques
Source: (Claudé and Combe, 2018:5)

People are daily interacting increasingly with AI applications such as Netflix, Siri and etc. The one of the most important points is to reduce human effort by speeding up the work process and giving people precise and correct outcomes. The cognitive computing systems basically have some features (Desouza, 2018:7):

- Learning in a frequentative way, from human and data interactions, by means of ML algorithms which constantly take data and create new information and methods derived from the data.
- Interacting with humans by means of NLP.
- Having the context sensitivity with the capability of reminding history and adjusting results in an individualised way.
- Providing confidence-weighted results that can be dealt with by humans.

- Having the ability of adaption to the new situations with the new data and knowledge.
- Personalizing interactions in natural language with people.
- Having the powerful memory which can remember old information and refresh itself.
- Having the ability to solve problems which are complex and need complex levels and steps.
- Providing confidence-weighted responses.

In some areas, AI has already reached the capacity and the power beyond humans` capacity and power. For instance, AI machines have been programmed to complete certain duties like a chess computer program or a go computer program which is programmed to win the opponent. But this program has a very developed system which measures the moves with possible advantages and disadvantages and makes independent strategies like humans. In addition to these examples, there are numerous examples which can be given such as AI question-answering systems which provide answers to questions without human intervention by searching their own data base with the capacity of learning more interactively from humans (from people`s answers) and internet. There are autonomous vehicles which drive independently without human control. Transition systems can translate numerous languages into goal languages autonomously taking account of the fact that some words can have different usages and special meanings in contexts or sentences. Case prediction autonomously has the ability to analyze or arrange very complex data and assist building models so as to find a solution. Facial recognition systems automatically identify people on the spot and adapt to changes in people`s appearances (glasses, cosmetic make-ups and hair styles, growing facial hair). Route finding systems in maps automatically show you the relevant information about places in the areas which are important to individuals according to the need of different individuals, such as businesses, places of entertainment, galleries and restaurants that are trending and recommendations which can match with preferences and much more. However, nowadays nearly all artificial intelligence systems can only achieve predetermined and limited sets of duties in limited and certain environments. They are exclusively allocated to or intended for particular purposes. For instance, the AI system which can do facial recognition is restricted with this facial recognition duty and it cannot do further. Route finding systems in maps help people find directions and places and people cannot expect more from this route finding systems. For now, they are not like humans who can successfully achieve a huge range of cognitive tasks

and duties. But today, the generality in the AI technology is getting better and this can help the AI systems control much more different activities in certain areas. Driving a car can be given as an example in this topic. In order to drive a car, people or machines need using multiple sources of perception and driving skills, which include adopting various weathers, checking traffic, recognizing road signs, keeping a safe following distance, having a route finding system and etc. In specific areas, AI systems have reached the point to surpass humans, even the best humans, in certain areas such as Chess, Go and other games (AlphaZero, Shogi and ATARI games) (Everitt, 2018: 3).

2.2. Definition of Artificial Intelligence

The definition about AI should be used in a legal terminology and the limits of the definition should be predictable and inclusive for the pertinent fields, such as computer science, engineering, statistics, mathematics, logic and etc. Because various fields are involved in AI, the definition should develop corporation and harmonization among fields and should be flexible and inclusive to cover a huge number of different usages and features of various fields on AI and possible future technological advances. Actually, there is no the common definition which everybody can agree on. But even if there is no consensus on it, there should be a useful definition about AI which at least the law can focus on and use. Nilsson (2018:13) explains artificial intelligence as an activity which is devoted to make machines/robots intelligent. In the definition of the intelligence he says that intelligence can be considered as a feature which makes a creature work properly and with foresight in its surroundings. Therefore, humans, animals, insects and some machines can be categorized as intelligent entities. For example, numerous animals and insects are placed at the primitive end of the development chart and even they have various degrees of intelligence. At the advanced end of the chart, there are humans, who can reason, understand, monitor predict, create, learn and teach languages, recognize and reply to sensory inputs, discover and develop mathematical theorems, solve challenging questions, produce and pass information down from generation to generation, create art, craft and music, make, pursue and achieve dreams, recognize themselves. Because making actions properly and with foresight needs numerous various abilities, according to the surroundings, humans obtain some continua of the intelligences which do not have particularly sharp discontinuities in any of them.

The important thing is to focus on the definitional problems such as the conceptual uncertainty of intelligence and its inclusiveness which regulators may have to face in this time or in the future. For instance, John McCarthy (2007:2-3) claimed that the strong definitions of intelligence have to be related with human intelligence because "*we cannot yet characterize in general what kinds of computational procedures we want to call intelligent.*" AI can simulate human intelligence. Humans can learn something about the design of machines/robots by observing and copying other humans' cognitive processes. Although generally intelligence is identified with human consciousness, due to complicated human features which are self-awareness, language and learning skills, reasoning and comprehension abilities, the limits and the basic definition of intelligence are difficult. Norvig and Russell (2010:1-2) wrote Artificial Intelligence: A Modern Approach, which is the prominent introductory textbook on AI and tried to organize definitions as human versus ideal and thought versus actions to give four categories.

Table 2: Various Categories of AI (modified)

Thinking like a human	**Rational thinking**
Acting like a human	**Rational acting**

Source: (Russell and Norvig, 2010:2)

The works of Alan Turing (a pioneer in computer science) on AI occurred at a date earlier than the coining of the name artificial intelligence and his writings can be considered as a typical example of the "acting like human" approach. In addition to this, for Alan Turing, machines for human thought processes were not essential problem. The important point was the potential for digital computers to imitate the external manifestations of these processes. Turing's "imitation game[3]" is based on this main point (Turing: 1950). The Turing Test was proposed in 1950 by Alan Turing and was planned to determine whether a machine could demonstrate human intelligence. If an interrogator (as human) cannot distinguish the answers given by both a human and a machine, the machine passes the test. But for that result, computer should have following abilities (Russell and Norvig, 2010:2-3):

- **Natural language processing (NLP)** in order to make a computer communicate successfully and effectively.

[3] In this game, a computer tries to convince an interrogator into believing that it is human rather than machine.

- **Knowledge representation** to present the real-world information in a form that a machine can understand and utilize to sort out problems.
- **Automated reasoning** in order to utilize the stored data and facts to respond to questions and decide if a particular fact or principle is true according to the information which is given and form new opinions from the information given.
- **Machine learning** to change behaviors and attitudes in order to be successful in various situations and notice, discover and predict patterns.

Although the Turing Test purposely prevents the human interrogator from directly and physically interacting with the computer, there is a Total Turing Test and it has a video signal which give a human interrogator the opportunity to check the machine's perceptual capabilities. A computer should have some features to be successful in the total Turing Test (Russell and Norvig, 2010:3):

- **Computer vision** to notice, recognizes, understand and think of objects in a particular way.
- **Robotics** to use skills in moving and handling objects.

They are very useful in studying artificial intelligence and mainly these principles can give the main structure of the prototype of a machine with AI. AI researchers should focus on the underlying principles of intelligence rather than the imitation of a human. For instance, "artificial flight" became successful when the Wright brothers and others prevented themselves from duplicating birds and began to use wind tunnels and learning about aerodynamics (Russell and Norvig, 2010:3). Definitions for AI have changed and have been modified over time by the help of technological developments. For instance, humans need the certain intelligence to play chess well. Actually, if a human can invent the machine playing chess well, the machine can enter into the hub of human intellectual endeavour (Newell, Shaw and Simon, 1958). In 1946, Turing considered that a computer/machine could show intelligence with the concept of the chess-playing (Hodges, 1986). Turing said that machines should perform certain missions to prove that they can think like humans. But already chess proved that the machines could do certain things by starting playing games by the 1960s and defeating the best chess master by 1997. The researchers did not find it enough to call them intelligence because they said playing chess was not a sign of intelligence (Scherer, 2016: 360-361). Later, researchers thought that if AI has the ability to achieve

goals, this can help define AI correctly. This point of view is considered as rational agent who acts rationally. According to this idea, machines can function autonomously, observe their environment, keep on working over a long time period, get used to changes, create aims and follow them. The aims are to reach the best outcomes (Russell and Norvig, 2010:4). But, the goal-oriented approach is thought to be unusable to define AI successfully for regulatory purposes because it basically tries to cover intelligence with a goal which can be meaningful with the word of intention and self-awareness. This is more about metaphysic than legality (Scherer, 2016: 361).

The definition of "acting rationally" has a wide spectrum which extends from under-inclusive to over-inclusive. For instance, and computer rivals in chess and video games try to reach the best outcome within the limits of the predefined set of rules. It seems that there is no need to any regulation for innocent programs and systems. These rational actions would be over-inclusive or under-inclusive. For instance, while systems with artificial intelligence which have rational actions might not pose any public danger, systems with artificial intelligence which do not have rational actions might pose severe public dangers if the lack of the rational acting makes it difficult to envisage the systems` actions. However, even if the systems with artificial intelligence have rational actions, the maximization of utility functions, the possibility of unfair competition and money-oriented approaches might pose serious dangers. In this way, even rational actions are not an adequate legal definition of artificial intelligence (Scherer, 2016: 362).

2.3. Deep Learning and Machine Learning

DL and ML can be called as key elements to understand how AI functions and they can help people understand the AI systems more easily and in the correct way. ML is particularly about learning such as learning from definitions, from behaviors, from orders and from speeches. Basically, ML can be considered as a branch of AI and ML is called as the study of computer algorithms which gets computer programs to work through experience without being explicitly programmed. ML is considered as a subset of the AI technology because every kind of the ML is regarded as AI, but not every kind of AI is regarded as ML. As an example, symbolic logic-rules engines and expert systems are categorized as AI, and they are not considered as ML. ML depends on working with small to large data-sets, by inspecting the data rigorously to determine their nature or condition and comparing the data

to discover common patterns and recognize nuances. Firstly, ML parses data, learns from the data and uses what they learn in a specific way in order to arrive at an informed conclusion. ML can be utilized in a wide range of areas such as risk management, speech recognition, national language process, web search, biotech, cyber security, computer vision and other areas. There are many successful ML applications such as data-mining programs which have the ability to discover information-filtering systems which can understand and learn users' reading preferences, fraudulent credit card transactions and self-driving cars, which have the capability to drive on public highways, along with some main developments in the theory and the algorithms which create the basis of ML. For instance, if a compute-employing ML detects multiple examples of an object, this learning algorithm can understand and distinguish that object in new and previously undetected forms **(**Mitchell, 1997; Iriondo, 2019).

DL can be seen as a subset of ML and DL technically is considered as ML and functions likewise. DL adapts and learns from huge amounts of data and uses a hierarchical level of Artificial Neural Networks (ANNs) to execute the process of ML. DL describes certain sorts of the neural networks and the associated algorithms which use frequently very raw input data. These neural networks and the algorithms perform on the data by means of numerous layers of nonlinear transformations of the input data in order to determine a goal output. A DL algorithm carries out duties repeatedly and improves itself by making fine adjustments to it each time to reach the reliable result. The learning process is called as DL because ANNs are made up of multiple output, input and hidden layers. The layers include units which modify the input data into information which the following layer utilizes for a determined predictive duty. Due to the system, a machine can learn by means of its own data processing. However, there are some differences between DL and ML. For instance, one of the most important differences between DL and ML is that although ML models are considered to be better progressively, the model should be controlled and supervised at some point. When ML models give you wrong predictions, the programmers of models have to fix problems explicitly made by ML models. However, DL models do not need any programmer to fix problems and the models fix them by themselves such as automatic car driving system. For instance, we can assume that there is a night lamp produced with ML technology. This night lamp works when somebody says “dark”. According to this data, the night lamp will check various phrases pronounced by individuals and will search for the word “dark”. When “dark” the word is pronounced, the light comes. But if people say something different than the word “dark” with the intention of having light from the night

lamp, the night lamp does not work. For instance, when some people says that “I do not see anything and the light is dim”, the night lamp will not work due to the sentence which does not include the word “dark”. However, if it was a night lamp made with DL technology, the night lamp would make light by learning its own method of computing. DL and ML both can be considered as the subsets of AI which is the science and engineering of rendering intelligent robots/tools/programs (McCarthy, 2007). If programmers write smart programs which have the capability to pretend human behaviors or behave like humans, the programs are considered to have AI. If these programs do not have automatic learning capability from many data, we cannot call them programs which have ML. Principally ML focuses on the problem of how programs are made with the automatic improvement and learning capacity (Mitchell, 1997).

DL which is a subset of ML is anchored in ANNs with representation learning. Virtual assistants such as Siri, Cortana, and Alexa utilize neural networks for speech recognition and to duplicate human conversation. DL permits these virtual assistants to detect and recognize the nuances of speech and make a response which feels conversational. IBM’s Watson, which is a pioneer in healthcare, utilizes DL for machine vision to analyse an illness, give medical information and help doctors diagnose disease correctly (Kersting, 2018:2). The IBM Watson system contains ML and natural language processing methods, and has made an important progress in the oncology field. In cancer researches, the IBM Watson made treatment advices same as the physician treatment advices with 99% (accuracy rate) (Lohr, 2016). The system began to produce an effect on actual clinical practices. By means of the analysis of genetic data, in Japan, the IBM Watson system succeeded to identify the rare secondary leukaemia, which is the result of myelodysplastic syndromes (Otake, 2016; Jiang at al., 2017: 241).

When ML, AI and DL are compared to each other, we can consider their relations as the concentric circles with AI first and ML sitting inside (with DL fitting inside both) because ML, in addition, needs writing algorithms which include each eventuality of the learning process. Especially they share the thought of utilizing computation as the language for intelligent behaviour. For instance, AlphaGo beating the world champion and its successor AlphaGo Zero in the Go game include DL and tree search - ML and AI (Kersting, 2018:2).

2.4. The History of Artificial Intelligence

AI has been studied for decades by scientists and scholars and is one of most popular and complicated subjects in this era. To a certain extent, this complexity depends on its huge and vague creature. However, especially today, AI is getting popular significantly in ever more areas of life and the applications of AI are used nearly every way in society. Studies about this field began eagerly soon after World War II, the term AI was coined in 1956 and until this time, the studies have grown notably and the connections with other fields has been various and stronger. AI includes an enormous number of various subfields. These subfields are enormous and seem appropriate for nearly every intellectual job, which proves that AI is recognized as a universal field.

2.4.1. Early Discoveries and Dreams (8th century B.C. –20th century A.D. (1943))

AI studies are not new and have a long history. Throughout the centuries, the human race kept on developing and advancing the complexity and density of automatic inventions in company with the ongoing enlargement of philosophical ideas about the purpose of making the life easy with the intelligence similar to humans. The human ability to imagine AI dates back to the Ancient Times. Even Ancient Greek and Egyptian Myths refer to mechanical men. For instance, one of mechanical men is Talos which is a giant bronze automaton which are made to defend the island of Crete from pirates and rogues and which Hesiod first mentioned around 700 BCE and it can be called as one of the earliest conceptions of a robot. There are the earliest examples which are not mythical. One of them is some form of intelligence which is explained by Heron of Alexandria (10 AD-70 AD) in the book Pneumatica. This work includes some thoughts for mechanical machines and some of them are singing birds, and mechanical machines which basically perform basic and specific tasks (Evans, 2017:4). In the history numerous myths and cultural mechanical machines which seemed like having intelligence similar to humans took place such as clay golems in Jewish myth. The Greek philosopher Aristotle (384-322 BCE) had a dream about automation and probably he knew that automation is just a dream and he replaced it with slavery. In The Politics, Aristotle stated (Aristotle, 1981:65):

"For suppose that every tool we had could perform its task, either at our bidding or itself perceiving the need, and if - like . . . the tripods of Hephaestus, of which the poet [that is, Homer] says that " self-moved they enter the assembly of gods" – "shuttles in a loom could fly to and fro and a plucker [the tool used to pluck the strings] play a lyre of their own accord, then master craftsmen would have no need of servants nor masters of slaves".

Much later, Leonardo Da Vinci was well ahead of his time and designed a humanoid automaton (mechanical knight) around the year 1495. This automaton was considered to sit up, raise its visor and independently move its arms, neck and jaw (Nilsson, 2018:20). By early 17th century the complex machines with intelligence have continued to flourish and Descartes' ideas have influenced the studies of artificial intelligence attempts philosophically. Descartes searched mainly the notions of the body, mind and soul. He proposed that a body works like a machine with material properties. He considered animals as samples of complex machines which do not have intelligence or reason or feel pain. Although the inventors and scientists attempted to build automatic machines with intelligence, the philosophers and mathematicians were interested in the notion of reasoning and logic. In addition, mathematical logic and formal reasoning were considered to be created as a precursor to the AI technology. Blaise Pascal invented the first mechanical calculator in 1640's and approximately 30 years later Gottfried Leibniz improved the previous models to make a mechanical calculator (the Leibniz Calculator) in 1672, which carries out multiplication and division (Evans, 2017:5).

In the 19th century, major landmarks occurred in the field of computational machines and logic. In 1854, George Boole desired to gather several probable intimations relating to the nature and constitution of the human mind (Boole, 1854). He created Boolean algebra which is considered as an essential component of current computers. Charles Babbage is considered to have conceived the first automatic digital computer and Ada Lovelace is credited with being the author of the first computer program (Britannica, 2020).

Writers took the advantage of the dream of intelligent machines for their dreams of intelligence robots and at the same time, inspired numerous AI researchers. Jules Verne and Isaac Asimov are very popular along with Samuel Butler and L. Frank Baum. Baum, who created the Wizard of Oz, wrote about sentient mechanical beings ranging from robots to cyborgs and portrayed Tiktok as a round-bodied mechanical man in 1907 (Buchanan,

2006:53). In the 19th century, the author Samuel Butler thought that machines could gain consciousness and intelligence in the future in his The Book of The Machines (Butler, 1872). In the 20th century, the researches about intelligence machines increased significantly especially in the field of mathematics and computer science. Bertrand Russell and Alfred Whitehead wrote the Principia Mathematica in 1913. This book assisted to establish a foundation for mathematics and especially formal logic and partly tried to explain some symbolic logic rules which can be utilized to obtain every mathematical truth (Irvine, 2016). In 1936, a huge achievement occurred and Alan Turing with his paper on computable numbers caused the thought of the modern computer to appear (Turing, 1937). Turing Machine can compute everything which is mathematically computable. This machine is considered as the origin of the modern computer. Isaac Asimov, which is thought as one of founders of modern science fiction, wrote numerous science fiction novels which had robotics' features and portrayed futures according to the possible impacts of AI.

2.4.2. The Gestation of Artificial Intelligence (1943–1955)

There have been numerous examples on early AI works in various areas of the world until 1943. Following improvements can be called as a milestone in the history of the AI technology. The first work which can be considered as AI came from Warren McCulloch and Walter Pitts (1943) and they thought that the neuron can be called fundamentally as a logic unit. They are inspired mainly by 3 sources: a formal study of propositional logic, the function of neurons in the brain and the information of the basic physiology. Scientists recognized that they could manage any computable function by the help of networks of linked neurons, and each logical link could be applied by uncomplicated net structures. In addition to this, the Canadian neuropsychologist Donald O. Hebb (1949) made a rule to explain the plasticity of the connection between certain neurons which is in an unsupervised way. This rule describes the updating gradient of the connecting weight in ANNs (Liu, Gong and Miao, 2017: 2315).

In 1950, the first neural network computer was invented by Marvin Minsky and Dean Edmonds. This computed is known as the SNARC and it utilized 3000 vacuum tubes with a surplus automatic pilot apparatus from a B-24 bomber to replicate a network of 40 neurons. Afterwards, Marvin Minsky focussed on the universal computation in neural networks. He proved some important theorems which demonstrated the borders of neural network study.

Although there were various early samples of the work which are considered as AI, Turing's vision was possibly the most powerful one (Russell and Norvig, 2010:16-17). His lectures at the London Mathematical Society on AI as early as 1947 were very important and explained an influential plan in his article which is Computing Machinery and Intelligence (Turing, 1950) and Turing test appeared. In addition, Claude Shannon suggested the construction of a chess-playing computer (Shannon, 1950) and this computer could be trained by using a brute-force method or by recognizing and evaluating small patterns of rivals` moves (Smith, 2006).

2.4.3. The Birth of Artificial Intelligence (1956)

McCarthy persuaded Minsky, Claude Shannon, and Nathaniel Rochester to assist him to gather the United States scholars keen on searching, the study of intelligence, neural nets and automata theory. In 1956, for a Summer Research Project on AI, a workshop was planned at Dartmouth College for 2 months. Extracts from a proposal read as follows (McCarthy et al., 2006: 12):

> *"We propose that a 2 month, 10-man study of artificial intelligence be carried out during the summer of 1956 at Dartmouth College in Hanover, New Hampshire. The study is to proceed on the basis of the conjecture that every aspect of learning or any other feature of intelligence can in principle be so precisely described that a machine can be made to simulate it. An attempt will be made to find how to make machines use language, form abstractions and concepts, solve kinds of problems now reserved for humans, and improve themselves. We think that a significant advance can be made in one or more of these problems if a carefully selected group of scientists work on it together for a summer."*

Allen Newell and Herbert Simon had a great invention and they thought that there were popular in this workshop with reasoning program, the Logic Theorist, having the ability of thinking non-numerically. But in the workshop, although some of them are impressed, others were skeptical. After all, this workshop caused no breakthrough expect for the introduction of all the main figures to each other. For the next 20 years, these people, their students and colleagues, who came from Massachusetts Institute of Technology, IBM, Carnegie Mellon University and Stanford University, were dominant in this area. The workshop showed people that the AI area is more different than other fields such as

mathematics and AI should have its own field which has the features more different than the features of other fields (Russell and Norvig, 2010:17-18).

McCarthy said that AI is a perfect name for the things done in this field. For instance, this name differentiates the subject matter discussed in the Dartmouth workshop from solicited papers, titled Automata Studies, co-edited by McCarthy and Shannon, which are largely interested in the esoteric and rather narrow mathematical subject known automata theory (Gaon,2019:59). McCarthy thought that escaping association with cybernetics is importance because its concentration on analogy feedback seemed misguided. The goal of the AI technology is to copy human features such as creativity, self-improvement, understanding capacity, adaptation skills and language use and to make robots which can work autonomously in complex and different environments.

2.4.4. Early Eagerness and Expectations (1952–1969)

Until this time, the works on AI were promising for the future. When people saw the improvement of computers, they started to believe that there was a real possibility for AI in the future. After the logic theory, the General Problem Solver (GPS) appeared and this was the result of their earlier study on the Logic Theorist in which it was rooted in controlling symbol structures (Nilsson, 2018:124-125). GPS was primarily formed to replicate human problem-solving protocols. Partially, the order in which GPS thought about sub-goals and potential moves was close to that in which people considered the same problems. Therefore, GPS may be called as the first system to represent the “thinking like a human” mentality. Moreover, Herbert Gelernter created the Geometry Theorem Prover and this was a big step for AI. The Geometry Theorem Prover could prove some theorems which many math students found it very hard. Arthur Samuel made programs for learning to play checkers. Ultimately he created the program which outlays its maker and became popular on television in 1956. In 1958, McCarthy was highly productive. Firstly, his high-level language Lisp has been a leading artificial intelligence programming language for subsequent thirty years. McCarthy called the AI program as the Advice Taker and this program can be considered as the first complete AI system (Simon and Newell, 1958).

2.4.5. The Standstill Period (1966–1973)

Scientific studies significantly continued until 1966. After that time, according to a report stating that machines cannot translate general scientific texts, and there is no hope for now, the government of the United States government called the funding off for academic translation projects. Although machine translations were improved with the limited and simple success after that year, machine translations are not still faultless. But later when they faced with theorems containing more than a few dozen facts, they failed. In addition to this, there were some primary restrictions on the fundamental structure creating intelligent actions. However, in 1969, the new back-propagation learning algorithms for multilayer networks which gave rise to a huge revival in the neural-net study later appeared (Bryson and Ho, 1969).

2.4.6. The Rise of Knowledge-based Systems (1969–1979)

The DENDRAL program was an influential project in AI (Buchanan et al., 1969) and can be considered as an early example of the computer software expert systems since the program automated the decision-making processes and problem-solving behaviour, assisting organic chemists to recognize undisclosed organic molecules with the help of the analysis of mass spectra and knowledge of chemistry. LISP was used as a programming language (Feigenbaum and Buchanan, 1990). This program is very important because it is considered as the first successful knowledge-intensive system. Later, a big development in the field of medical diagnosis occurred. Feigenbaum, Buchanan, and Edward Shortliffe created MYCIN to diagnose blood infections. It was more useful than junior doctors. Later, Schank and others made some programs (Dyer, 1983) which aim to comprehend a natural language. They focused on representing and reasoning with the knowledge for language understanding. However, there were some problems such as the representation of stereotypical situations, the explanation of human memory organization, and the comprehension of projects and aims. These kinds of applications which focused on real-life problems became popular and numerous various representation and reasoning languages were made (Russell and Norvig, 2010:23-24).

2.4.7. The Industrial Artificial Intelligence (1980–2001)

The first successful commercial expert system which is called as R1 started to work (McDermott, 1982). For new computer systems the system was helpful to configure orders; by 1986, the system saved its company (Digital Equipment Corporation) an approximate forty million dollars a year. Digital Equipment Corporation's AI group obtained forty systems and planned to take more for the future by 1988. DuPont obtained ten hundred systems in use and five hundred systems in development and it saved an approximate ten million dollars a year. Japan declared the "Fifth Generation" project which is a ten-year plan to make intelligent computers which could run Prolog in 1981. The U.S. established the Microelectronics and Computer Technology Corporation for nationwide competitiveness. These examples reflect the hard study containing chip design and human-interface research. Generally, the AI industry increased significantly from a few million dollars in 1980 to billions of dollars in 1988. In the 1990s, moderate breakthroughs have taken place in robotics, computer vision, and knowledge representation. In order to comprehend and deal with the difficulties and their complexity properties, along with improved mathematical sophistication, effective research agendas and robust approaches should be present. Even though improved formalization and specialization make areas like vision and robotics become some things separated from typical AI in the 1990s, this tendency reversed in recent years as instruments from ML specially showed efficiency for numerous problems. From 1995 to 2001, researchers may have been heartened by the advancement in coping with the sub-problems of the AI technology. The study of Allen Newell, John Laird, and Paul Rosenbloom on SOAR (Newell, 1990; Laird et al., 1987) is considered as the prominent sample of the entire agent architecture. Internet has started to become highly popular for the intelligent agents, along with web-based applications, and the "-bot" suffix has gained access to daily life language. Furthermore, AI systems began to be used in many ways like web site aggregators, advice systems and search engines (Russell and Norvig, 2010:24-27).

2.4.8. The Modern Artificial Intelligence (2001–present)

In nearly the sixty-year history of computer science, algorithms have been very important as the major subject of the study. However, several fresh studies in AI propose that for numerous problems, the data becomes more important because of the increasing availability of enormous data sources and what algorithm applies may be less important.

Especially, over the past few years, computational and storage capacity of computers, big data and cloud computing had some huge improvements and have noticeably boosted the power, the accessibility, the expansion and the influence of AI. This advancement is leading to more improved and cheaper sensors, which can take more-reliable data and the amount of data is increasing fast. There are some research fields which have increased their power and impacts (OECD, 2019:21):

- NLP.
- ML and DL.
- Driverless cars and robotic technology.
- Computer vision.
- Language learning.
- ANNs.
- Speech Recognition.

Today, several exciting AI improvements are about health, medicine, biology, finance and law rather than computer. In a variety of ways, AI spread to the world from a few businesses to much larger economies and societies. Economies will progressively more require sector "bilinguals". It means that these are humans who are experts in one field like economics, finance, biology, law or health, but also have enough knowledge about AI techniques and are skilled at AI techniques (OECD, 2019:21). For instance, there are some applications popular today such as artificial general intelligence and this intelligence is formed to achieve a particular problem-solving or reasoning task and can be called as the current state-of-the-art. Generally, to a certain extent, advanced AI systems have the power to generalize pattern recognition. These systems can transfer information taken from the field of image recognition into speech recognition. But, the human brain has many more skills. In artificial general intelligence, autonomous machines may have ability to do general intelligent actions. They may generalize and abstract learning across various cognitive functions like humans. Artificial general intelligence may obtain a powerful associative memory and has the ability for decision-making. It could deal with multifaceted problems successfully, could have the information through reading or experience by learning, could make concepts, could recognize itself and the world, inventive and be innovative, deal with the unpredicted situations in complicated surroundings and predict the future (OECD, 2017).

2.5. Artificial Intelligence Strategies and Pursuits

Today, the humanity is living in the era of digitalization, automation and innovation wherein, AI is playing a vital role. AI is very essential for governmental institutions and they put AI at the top of policy agendas at national levels. In this century, major advances in AI have caused extreme interest coming from governments and the public. AI documents such as rules, frameworks and policy strategies have been created by governments. However, it can be difficult to foresee the exact influence and course of AI-related technologies for the future. These technologies may encourage the transformation of the human civilization such as the invention of steam engines. AI-based tools transform the global economies, mass communication, security risks, interaction ways, communication ways, and transportation vehicles by changing how people interact, think, work and make a decision. AI tools are supposed to work with humans and take their places in some activities. AI is increasing the competition among countries. The expansion of AI, ML and DL relies on factors like data, work forces, computing power, and semiconductors and with these factors, countries can decide on the future strategic efficiency, competitiveness performance and capacity to avoid negative impacts coming from inside and outside their countries effectively (Kırdemir and Kasapoğlu, 2019).

Before countries started to transform their institutions according to AI, countries should be ready for the AI technology in some ways such as infrastructure and data, governance, skills and education, public services and etc. For instance, they can put into practice AI in a way that builds trust and legitimacy by protecting citizens' data. A rational national AI strategy can be a useful means for evaluating the power of AI-focused governance.

Table 3: Government AI Readiness Rankings

Government AI Readiness Rankings					
2018/19			**2020**		
Ranks	**Countries**	**Scores**	**Ranks**	**Countries**	**Scores**
1	**Singapore**	9.186	1	**United States of America**	85.479
2	**United Kingdom**	9.069	2	**United Kingdom**	81.124
3	**Germany**	8.810	3	**Finland**	79.238
4	**United States of America**	8.804	4	**Germany**	78.974
5	**Finland**	8.772	5	**Sweden**	78.772
6	**Sweden**	8.674	6	**Singapore**	78.704
7	**Canada**	8.674	7	**Republic of Korea**	77.695
8	**France**	8.608	8	**Denmark**	75.618
9	**Denmark**	8.601	9	**Netherlands**	75.297
10	**Japan**	8.582	10	**Norway**	74.430
11	**Australia**	8.126	11	**France**	73.767
12	**Norway**	8.079	12	**Australia**	73.577
13	**New Zealand**	7.876	13	**Japan**	73.303
14	**Netherlands**	7.659	14	**Canada**	73.158
15	**Italy**	7.533	15	**Luxembourg**	72.616
16	**Austria**	7.527	16	**United Arab Emirates**	72.395
17	**India**	7.515	17	**Estonia**	69.922
18	**Switzerland**	7.461	18	**Switzerland**	69.219
19	**United Arab Emirates**	7.445	19	**China**	69.080
20	**China**	7.370	20	**Israel**	68.825
46	**Turkey**	5.879	67	**Turkey**	46.010

Source: (Oxford Insights, 2019; Oxford Insights, 2020)

The study named "Government Artificial Intelligence Readiness Index" prepared by Oxford Insights in 2019 consisted of 11 input metrics and was grouped under 4 areas:

1. Governance
2. Infrastructure and data

3. Skills and education

4. Government and public services

194 Countries were awarded with a number of points by looking at data such as government and public services and obtaining these data from various sources such as desk research, artificial intelligence strategies, databases like the number of registered artificial intelligence initiatives in Crunchbase and indices like the UN e-Government Development Index (Oxford Insights, 2019: 5). According to this study, it is seen that the highest score belongs to Singapore. One of the noteworthy countries is China. Although China is one of the countries considered as a superpower in AI, it is seen that it lags behind European countries when it comes to governance and administration. Turkey is 46th in this ranking (Ulaşan, 2020: 117-118). On the other hand, the study named "2020 edition of the Government Artificial Intelligence Readiness Index" was prepared by Oxford Insights in 2020.172 countries were analysed by this study. The study evaluates governments' readiness to execute AI in the delivery of public services to citizens by focusing on capabilities and checking whether countries are ready for the use of AI. In 2020, the study focuses on

- Government willingness for the adoption of AI
- Technology Sector.
- Data and Infrastructure.

The top 5 places in the index are taken by the United States of America, the United Kingdom, Finland, Germany, and Sweden, showing the fact that North America and Western Europe are the highest scoring regions on the whole. The United States of America took the first place from Singapore, which is 6th in 2018-19. China went up from 20th position to 19th position. But, this is a reflection of the distinction between government AI readiness and government AI implementation because China used its own capabilities better than numerous other countries which scored more highly for readiness. However, they could not turn that readiness into concrete implementation (Digital Watch, 2020). In this study, Turkey has the score of 46.010 overall, its rank is 66th from 172 countries and in the region of South and Central Asia, it is 4th from 16 countries. In the government willingness index of the study with the average score of 41.34, Turkey's score is 43.03 from 100 with the rank of 63 from 172 countries and is 4th from 16 countries in the region of South and Central Asia. In the technology sector index of the study with the average score of 32.76, Turkey's score is 35.46

from 100 with the rank of 58 from 172 countries and is 2th from 16 countries in the region of South and Central Asia. In the data and infrastructure index of the study with the average score of 58.64, Turkey's score is 59.54 from 100 with the rank of 79 from 172 countries and is 6th from 16 countries in the region of South and Central Asia. Turkey has a National e-Government Strategy running from 2016 to 2019, and a 2019-2022 National Smart Cities Strategy and Action plan. Due to these efforts, it can be easily said that Turkey shows a willingness to adopt new technologies to advance government and public services. In 2018, Turkey created the Digital Transformation Office of the Presidency, which coordinates the digital transformation of Turkey. In the 2020 eGovernment Survey, Turkey was 23rd in the world, and 2nd in South and Central Asia behind Kazakhstan from the point of online services. This shows that there is a basic digital infrastructure in Turkey into which the AI technology could be implemented. But, according to Turkey's score, it should do something more beyond the basic requirements of e-services and should adopt sophisticated technologies. In recent times, Turkey's start-up ecosystem struggled to access venture capital, partly due to the political instability since the 15 July 2016 coup d'état attempt. However, Turkey has some important research centres which assist Turkey to make technological innovation. The Cloud Computing and Big Data Research Laboratory project was created in 2013, and the AI Research Centre at Istanbul Technical University was established in December 2018. In addition, the Istanbul Technical University has an accelerator, called as Çekirdek, based in its technology park on campus. Turkey funds research and entrepreneurial endeavours through the Scientific and Technological Research Council of Turkey. But, with a score of 21.11 out of 100 for R&D spending, Turkey should spend more for R&D. The Data and Infrastructure seems Turkey's lowest-rank and this is an area for improvement if Turkey desire to build the AI readiness. Turkey is 79th in the world from the point of telecommunications infrastructure according to the 2020 UN eGovernment Survey. Turkey aims to switch to 5G by 2021. Also, its networks have already been trialled in Turkey (Oxford Insights: 2020, 103-105).

2.5.1. National AI Strategies and funds

The priority of AI is rising on the political strategies nationally and internationally. Numerous government institutions try to utilize AI more for efficiency and competitiveness. The priorities in governmental AI strategies are divided into 5 main categories that are factor conditions like AI research capability along with firm strategy, abilities, demand conditions,

supporting and related industries, structure and competition and concentration on domestic governance and coordination. Policy consideration for AI includes some matters like transparency, privacy, law and ethics. For instance, Canada, China, France, Germany, India, Sweden, the UK and the USA decided their AI strategies. Some states such as Denmark, Japan and Korea have AI-based activities within their broader plans. Others such as Australia, Israel, Italy and Spain are trying to develop their own national AI strategies. The goals of these strategies are to boost AI scholars and talented young people, to make stronger AI research capacity and to share the AI knowledge with private sector (OECD, 2019:122). In the table below; there are government AI strategies which have relatively clear funding budgets.

Table 4: National AI Strategies with Funding

COUNTRY	AI NATIONAL STRATEGY	ISSUE DAY	FUNDING
Australia	Australian Technology and Science Growth Plan	May 2018	29.9 million Australian dollars (21.6 million American dollars)
Canada	Pan-Canadian AI Strategy	March 2017	125 million Canadian dollars (95 million American dollars)
Denmark	National Strategy for AI	March 2019	60 million Danish kroner (8.9 million American dollars) designated for years between 2019 and 2027
Estonia	National AI Strategy 2019-2021	July 2019	10 million Euros at the minimum (11 million American dollars) between 2019 and 2021
European Union	Coordinated Plan on AI	December 2018	1 billion Euros at the minimum (1.1 billion American dollars) for each year for AI research and at the minimum 4.9 billion Euros (5.4 billion American dollars) for other facets of the strategy
Finland	Leading the Way into the Age of AI	June 2019	266 million Euros (295 million American dollars) especially for different facets of strategy

Table 4:(continues) National AI Strategies with Funding

COUNTRY	AI NATIONAL STRATEGY	ISSUE DAY	FUNDING
Germany	AI Made in Germany	November 2018	500 million Euros (555 million American dollars) distributed in 2019 federal budget; aim for 3 billion Euros (3.3 billion American dollars) up to 2025
Singapore	AI Singapore	May 2017	150 million Singapore dollars over 5 years (91.5 million American dollars)
Denmark	Strategy for Denmark's Digital Growth	January 2018	75 million Danish kroner in 2018, followed by 125 million Danish kroner per year to 2025 (11.7 million American dollars, 19.5 million American dollars)
Taiwan	Taiwan AI Action Plan	January 2018	36 billion New Taiwan Dollars over four years (1.18 billion American dollars)
Malta	Malta: The Ultimate AI Launchpad — A Strategy and Vision for AI in Malta 2030	November 2019	6 million Euros (6.7 million American dollars) especially for a small number of individual measures
Netherlands	Strategic Action Plan for AI	October 2019	380 million Euros (422 million American dollars) especially for different facets of strategy
France	France's Strategy for AI	March 2018	€1.5 billion Euros over 5 years (1.75 billion American dollars)
EU Commission	Communication AI for Europe	April 2018	Boost annual investment in AI to 1.5 billion Euros before 2020 finishes (1.75 billion American dollars)
United Kingdom	Industrial Strategy: AI Sector Deal	April 2018	950 million Pounds from government, academia, and industry (1.24 billion American dollars)
South Korea	AI R&D Strategy	May 2018	2.2 trillion Won (1.95 billion American dollars)

Table 4:(continues) National AI Strategies with Funding

COUNTRY	AI NATIONAL STRATEGY	ISSUE DAY	FUNDING
Serbia	Strategy for the Development of AI in the Republic of Serbia for the Period 2020-2025	December 2019	90 million Euros (99 million American dollars)

Source: (Dutton, Barron and Boskovic, 2018:5; Kung, Boskovic and Stix, 2020:7)

As seen in the 2017, 2018 and 2019 National AI Strategies table, AI strategies should be considered as important regulations in directing the AI investments and initiatives of the countries. Countries that have created the AI strategy documents are realizing and making the technological transformation in accordance with their national strategies. There are some big initiatives funded to improve AI technologies. Canada is the first country that has published a national AI strategy (CIFAR, 2020: 3). The "Pan-Canadian AI Strategy", detailed in the 2017 federal budget, prepared a five-year, 125 million Canadian dollars' investment plan to invest in artificial intelligence researches and talents. One of the noteworthy countries is Korea. South Korea has declared an ambitious national plan to invest $ 2 billion by 2022 to strengthen its AI R&D capacity and close the distance with the United States (Saran et al., 2018). South Korea has become a global leader in researching and adopting emerging technologies in 2018. The country has come to the top of the innovation index and EIU rankings with its high scores in the innovation environment in smart automation readiness, labour market and education policies. Samsung has established AI laboratories in Canada, Russia, America and South Korea, and has placed South Korea in the third place in the global artificial intelligence patent ranking with 3,188 AI patents in the last 12 years as of 2018 (Saran et al., 2018: 24). South Korea is the country with the highest robot density in the world. This ratio is more than eight times the global average. South Korea was the first country to outline the rights and duties of robots, the rights and duties of users and robot owners. South Korea has developed the Robots Ethics Charter, in which robots are given the right to exist without fear of injury or death, and a life free from systematic abuse. Users and owners have similar rights, such as the ability to control robots, and responsibilities such as making sure that the robot is not used for illegal work. According to the Robots Ethical Charter, manufacturing rules should limit the autonomy of robots through manufacturers and

designers, and it should always be possible for humans to have control over robots (Isong, 2019: 41).

China has worked with national technology companies together as partners to advance AI researches and industrial headship in particular areas of the artificial intelligence technology and planned to construct a 2.1 billion dollars technology park for artificial intelligence researches in Beijing (Walch, 2020). Research analyst Samuel Bendett (2018) says that "*Russia's annual domestic investment in AI is probably around 700 million roubles ($12.5 million) — a paltry sum next to the billions being spent by American and Chinese companies*". The investment of the US was not published in artificial intelligence research and development. In 2016, the report of Research and Development Strategic Plan stated that the investment of the US government was 1.1 billion dollars in the unspecified AI-based research and development projects in 2015. The document of the White House after the May Summit declared that the Government's investment in unclassified AI research and development and similar technologies increased by more than 40 (Dutton, 2018).

2.5.2. The Potential of Artificial Intelligence in the World

It is predicted that AI technology will potentially have an ecosystem of 15 trillion dollars by 2030 and will boost the global GDP by 14% (Manyika et al., 2018). With the effect of artificial intelligence, a 21% increase is expected in the service sector, which includes health, education, public services and recreation, and a 15% increase in accommodation and food services as well as retail and wholesale trade (Önder, 2020: 99). All geographical regions of the world will somehow benefit from the impact of AI on the global economy. In the report of PwC (2018), it is expected that the USA and China, the two countries that invest the most in the AI technology, will gain a total of 10.7 trillion dollars from the economic value to be created in this field. In addition, it is emphasized that this figure will be the economic volume that constitutes almost 70% of the global economic impact of AI.

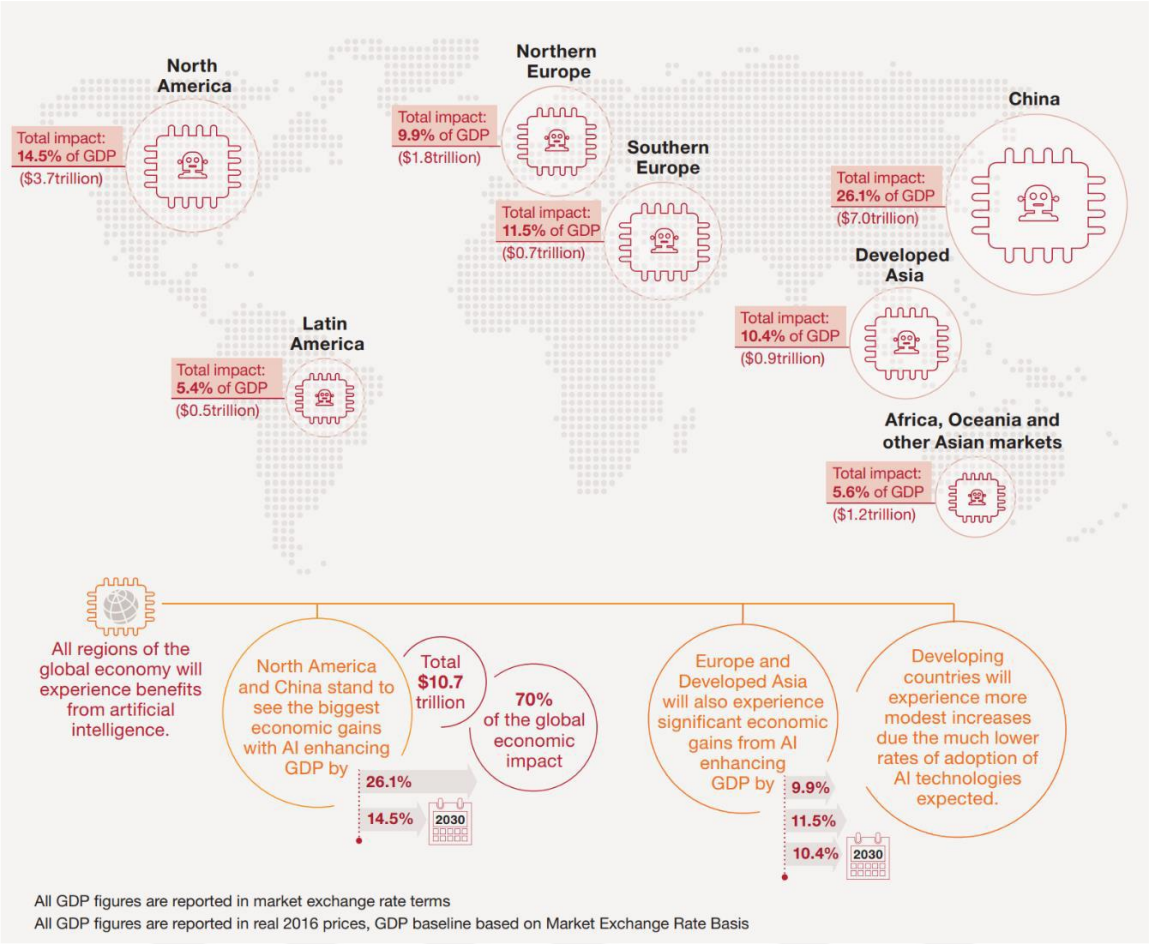


Figure 2: Which Regions Will Gain the Most from AI?
Source: (Rao, 2017: 7)

Some countries can have the opportunity to achieve more than other countries economically in the AI technology. China ($ 7.0 trillion) and North America ($ 3.7 trillion) are predicted to have the biggest gains in AI. All areas in the world economy are predicted to obtain benefits from AI. In addition, Europe and Developed Asia are predicted to have major economic gains from AI. Developing countries are predicted to obtain some decent increases because lower rates in the adoption of AI are expected (Rao, 2017: 6-7). It is seen that the main motivation for the return of AI in the 2030 projection of the USA and China is the leading role of the state and its support to the process. According to the 2018 data of the International Finance Corporation, one of the sub-organizations of the World Bank, Chinese companies raised $ 31.7 billion in the first half of 2018 for AI investments and it constitutes 75% of the total of the global AI investments. It can be said that China's motivation in AI investments is largely strong and it is the result of direct government support, leadership of Chinese technology industry giants and a strong venture capital community (Mou, 2019). In

the USA, it is seen that AI investments are the product of a multi-stakeholder structure such as the university-state in the private sector. The common point of the two countries is that they took pioneering steps in their perspective with AI strategy documents. Strategy documents have an essential role in drawing the national framework of the AI concept and in making investment analysis (Önder, 2020: 99-100).

The effect of artificial intelligence on the economy is increasing, and this effect is transforming the economy every day. Artificial intelligence technologies are expected to contribute to the global economy by 15.7 trillion dollars by 2030 and grow the country's economies by 26% (Manyika et al., 2018: 2). Machine learning technology in particular seems to have a big impact on the economy. The rapid development and employment of artificial intelligence techniques have the potential to transform the financial services industry along with many sectors in the real economy. To the extent that this potential is realized, AI will have significant effects on financial behaviour and prudent auditors. AI has the potential to help supervisors identify potential violations and help regulators better estimate the impact of regulatory changes (Saygılı, 2020:128-129).

EqualOcean | Landscape of AI fundraising in top 10 countries, by funding event*

Country	United States	United Kingdom	China	Canada	Germany
GNI Per Capita (USD)	62,850	41,330	9,470	44,860	47,450
Number of AI Funding Event	488	131	111	57	45
Amount of AI Funding (USD, Mn)	8,328.77	555.30	3,987.97	311.91	212.29

Country	France	India	Switzerland	Spain	Sweden
GNI Per Capita (USD)	41,070	2,020	83,580	29,450	55.070
Number of AI Funding Event	32	32	21	18	17
Amount of AI Funding (USD, Mn)	585.25	57.17	107.93	56.78	21.99

*The funding event mentioned here happened in 2019, as of July 31.

Source: World Bank, Crunchbase EqualOcean.com

Figure 3: Top 10 Countries with Artificial Intelligence Investments
Source: (Shang, 2019)

In a study conducted in China in 2019, it was found that a total of 78 billion dollars was invested in 15,916 AI initiatives worldwide at the end of 2018. China stated that it aimed to create a 1 trillion RMB domestic AI market by 2020 to become a world-leading AI centre with RMB 5 trillion by 2025 and RMB 10 trillion by 2030 (Webster et al., 2017: 6-7). The private sector plays an active role in the field of AI. Three of China's internet giants (such as Alibaba, Tencent and Baidu) and iFlytek, a voice recognition specialist, have formed a "national team" to develop AI in areas like self-driving cars, smart cities, chatbots and medical robots. The US gives priority to AI, particularly in certain industries such as medical diagnostics and precision agriculture, autonomous transport, and national defence. Therefore, the federal budget allocates a very important place for institutions related to these sectors. The Department of Energy allocates approximately $850 million to the National Institutes of Health, the National Institute of Standards and Technology and the National Science Foundation. To have a strong entrepreneurial business environment and developed infrastructure, the USA tries to take advantage of the economic potential of artificial intelligence. Accenture research predicts a significant increase in the growth of the US gross value added from 2.6% to 4.6% in 2035. This increase is at a level not seen since the economic peak of the 1980s. On the other hand, this increase corresponds to an additional $ 8.3 trillion gross value added in 2035, which corresponds to the combined gross value added of today's Japan, Germany and Sweden (Saygılı, 2020: 129). The European Union has announced that it would invest $24 billion to invest in artificial intelligence research by 2020. Some European countries encourage national AI initiatives. The French government has announced that it would invest $1.85 billion to fund research and initiatives (Manyika et al., 2018; 7: Saygılı, 2020: 130).

2.6. Benefits of Artificial Intelligence

AI is vital and very effective in the fourth industrial revolution and we have seen many developments in a range of ML methodologies. Especially, applications of artificial intelligence have played a major role in numerous fields and industries, including financial services, healthcare, marketing and advertising, education, transport sector, and more. AI applications started being the essential part of everyday life nowadays and these applications assist humans in nearly every state of affairs in daily activities (OECD, 2019:16):

- In transportation industry, autonomous vehicles are equipped with high-definition maps, self-driving systems and new traffic routes along with fair price, advanced safety and environmental benefits. For instance, Transportation-as-a-Service allows humans to quickly arrange their journeys using some means of transportation and pay and complete all the process through smart phones and other connected devices.
- Scientific researchers can effectively use AI in order to gather and use large-scale data, assist researchers to do experiments and decrease costs in order to speed up scientific discoveries.
- In healthcare sector, AI can give doctors diagnosis aid and help prevent diseases from starting and eliminate outbreaks in the beginning, help discover new treatments and drugs, offer tailored interventions and increase the use of self-monitoring tools. For instance, AI can help spot infections and reduce medical expenses with fully automated blood cell counts in oncology. AI can help the healthcare sector in the areas of administrative workflow automations, virtual nurses, robot-assisted surgery and health monitoring.
- In criminal justice, AI is used for criminal sentencing according to the probability of offending law and predictive policing. In the future, AI may have the enough potential to become the piece of criminal justice system, giving the investigative aid and helping criminal justice experts enhance public safety and privacy.
- Digital security applications take the advantages of artificial intelligence to automate and make the detection stronger and more accurate and help give the effective response to dangers at the right time.
- In agriculture sector, AI applications help do crop and soil monitoring and foresee different environmental effects on crop yield. Autonomous robots can be programmed to deal with important agricultural works like harvesting crops in a faster and more effective way.
- The finance industry already started integrating with the AI systems and AI can help this industry to make fraud detection faster, make cyber-security stronger, and assess customers' credit worthiness to determine their financial risk, reduce customer service costs and increase profits, get more accurate and faster credit rating, support trading and legal compliance with the AI technology.

2.7. Risks of Artificial Intelligence

AI is a controversial area and represents positive and negative features. Some people call it a perfect opportunity for humanity, while others say that it is a highly dangerous technology which put humanity in danger by taking over and dominating humanity. Actually AI has had growing effects on people`s lifestyles both directly. Every new technology is a source of both pessimism and skepticism. Especially, artificial intelligence can be seen risky from different points of views. Some of them are general threats which do not belong to the essence of AI specially. They are problems which are faced in the situation of nearly every change and they are some concerns which derive from the danger of unemployment and come from the possibility of the malicious usage of AI. But there are more complex threats which could be risky even for the humanity. AI may create new forms of cybercrime, political disruption, physical attacks and autonomous weapons. Some experts warn that if the government does not do anything to regulate the new technologies and takes them under control, the result can be highly destructive. During an interview at MIT's 2014 AeroAstro Centennial Symposium, Elon Musk said that (Graef, 2014):

> *"I think we should be very careful about artificial intelligence. If I had to guess at what our biggest existential threat is, it's probably that… I'm increasingly inclined to think there should be some regulatory oversight, maybe at the national and international level, just to make sure that we don't do something very foolish".*

New developments in AI cause new problems in the current laws and regulations and create severe ethical problems. The density and sphere of influence of AI increases significantly and continuously and regulations are needed to put this technology under control. Regulations are possible to be very effective and carry many risks at the same time. Regulations should be carefully analyzed and should be implemented according to a control system which protects humans' rights when everything goes bad (Lenardon, 2017). Moreover, significant developments in AI such as robotics and autonomous technologies have triggered serious moral questions. For instance, who will be liable when some bad results happen because of AI systems or can humans and AI systems can share the responsibility (Peters, 2020:14)? The European Group on Ethics in Science and New Technologies made a statement on Artificial Intelligence, Robotics and 'Autonomous' Systems in 2018 (European Commission (European Group on Ethics in Science and New Technologies), 2018:5):

"Advances in AI, robotics and so-called 'autonomous' technologies have ushered in a range of increasingly urgent and complex moral questions. Current efforts to find answers to the ethical, societal and legal challenges that they pose and to orient them for the common good represent a patchwork of disparate initiatives. This underlines the need for a collective, wide-ranging and inclusive process of reflection and dialogue, a dialogue that focuses on the values around which we want to organise society and on the role that technologies should play in it."

In addition, there are some specific threats coming from AI directly (Harkut and Kasat, 2019: 1-2):

- Building trust: Information pollution is very common in this area and people can be deceived easily. Humans do not know the capacity of AI and are not aware of difficulties of AI because AI is a new technology.
- AI human interface: AI needs an enormous manpower which has data science and data analysis skills. In this time for AI, the lack of skilled professionals is a big problem. New fields about AI have been emerged in universities and the popularity of AI has been increased enormously. But there is still a huge shortage in this area. Especially big businesses and countries should be fast to train their professionals to get the benefits of AI.
- Costly Investment: Artificial intelligence is a very expensive technology which every business or country cannot invest money into. Even after the extensive speculation and consideration about the social and economic implications of increasing or weakening artificial intelligence for humanity, AI is still a vague area for companies and countries to make start-ups.
- Non-invincible: Researchers consider that at least in the near future, artificial intelligence will have certain limitations and it means that they cannot do everything unlike humans.
- Data security: AI applications need the enormous quantity and quality of the classified data, especially highly sensitive, personal and vulnerable data. For instance, AI machines have the capability to scan palm prints, fingerprints and retina correctly. Storage capabilities, and data collection of AI applications has increased

rapidly. These things can make AI risky for data breach, identity theft and cyber-attacks.

- Algorithm bias: Artificial intelligence is based on data and algorithms. Accuracy and correctness of the decision-making process in AI are determined by the quality of data. There is a serious danger about whether algorithms which replace people in decision-making may present us the same biases of race, ideology, class, gender, and beliefs which are destructive to humanity. Bias does not belong to AI algorithms and they belong to humans. If data training is related with gender, ethnic or racial biases, machines can make unfair and unethical decisions for humans.
- Data scarcity: Generally, AI systems rely on the correctness and relevance of labelled and supervised datasets which are utilized for training and learning. The main problem can be called as a shortage of quality-labelled data. Even if there are numerous efforts like deep learning, unsupervised learning and active learning, that is not enough to solve the problem.

2.8. Artificial Intelligence and Public Service

The public sector is the largest and oldest sector in the world. But, complaints about the operation of this sector are increasing in almost every country. Negative thoughts about the public administration are gradually increasing in the public opinion. The effective and efficient work of the public administration and quality service directly affect the entire country's economy, justice, education and health and other services (Akçakaya,2012:189). Due to this, countries should update themselves all the time and should use the latest technologies in public services. For instance, AI-driven systems are very common in this century and the speed of the development in technology has been never seen before in the history of mankind. Many types of technology like the internet of things, big data, ML, DL and AL, are affecting humans in nearly every way such as job opportunities, new jobs, and new skill requirements. Public administrations in states should be ready to deal with non-incremental and exponential changes and difficulties effectively. Many current government instruments and approaches which were developed in the previous centuries can be inappropriate and useless due to the speed of technology in the future. This means that for the future the public administrations in the world should reconsider their approaches and policies to serve the public in a best way. Although the AI technology can decrease the

workload, boost efficiency, usefulness, speed and accuracy in health, transportation, security and numerous similar public services, there are some risks which public administrators should avoid when the sphere of the public administration changes such as privacy, information store problem and the harmony problems with the AI technology.

AI machines assist people to deal with complex systems in transportation system, law, defence industry, medical treatment, public administration and politics. Especially machines can be used effectively in public administration to help humans and sometimes replace them. Due to that, in public administrations, humans using AI can have numerous benefits. For instance, AI machines are designed to advance decision making processes in order to prevent the conflict of interests from taking place, permit to process a great deal of data at the same time. Although there are numerous benefits, the use of AI may give rise to numerous problems. For instance, today`s current law and codes were designed to regulate the behaviors of humans and not robots. Therefore, in the future current codes may not be enough for robot and there may be a possibility to modify codes for robots and change them completely. It can be suggested that the decision of choosing a way for robots in the subject of designing or modifying codes for making robots comply with current laws will be discussed intensively in the near future (Mikhail et al., 2018:682). After the research of the U.K. government, Deloitte proposed that AI technologies, along with automation, could replace approximately 861,000 public sector jobs by 2030 and this would save £17 billion yearly in wages compared with 2015. It is supposed that automation could save 96.7 million federal hours yearly, with a possible reduction of $3.3 billion and even this could increase to 1.2 billion hours and a possible yearly reduction of $41.1 billion (Eggers et al., 2017).

2.8.1. The Use of Artificial Intelligence in Public Services

The aim of the creation of intelligent machines is to simplify human life, gradually to reach the humans` brain level and to surpass humans over time with cognitive computing methods requiring huge volumes of data. At the same time, AI always contains some threats within itself. The rising ubiquity and speedily growing potential of AI has changed the way of to the investment by the public and private sectors intensively. Driverless cars are used legally for road operation in some places of the world such as the District of Columbia in the USA. Their entrance on the consumer market might transform road transportation in the world. Autonomous machines can carry out even complicated financial transactions, point

out terrorists with the facial recognition programs, and carry out document review (Scherer, 2016: 354). News stories were written and published by Wordsmith as an artificial writer in 2016 (Miroshnichenko, 2018:1). The New York Times employ AI and it is stated that (Adams, 2018):

> *"They (New York Times) turned to Perspective, a free tool developed by Jigsaw and Google that uses machine learning to make it easier to host good conversations online. Perspective finds patterns in data to spot abusive language or online harassment, and it scores comments based on the perceived impact they might have on a conversation".*

AI has considerable technical dimensions, it is expected to create many social impacts and directly or indirectly have influence on political life and public administration and policies. For instance, ML can be useful in the government institutions by dealing with a huge amount of information rather than employing excessive staff. ML can handle routine processes which are automated by machines, help the reduction of administrative burdens and the solution of resource allocation problems, and assist government workers to deal with highly complex works. The AI technology is able to be used in some ways below to help reduce governmental problems. On the other hand, AI in public services can create negative impacts which cause many challenges, shortcomings and limitations. These problems can come from procedural, epistemological and organizational misinterpretations about capacities of AI, restrictions of social contexts and contemporary technical limitations (Hagendorff and Wezel, 2020: 355).

Table 5: Types of Governmental Problems Suitable for the AI Tools

Types of Governmental Problems Suitable for the AI Tools	
Resource Allocation	• To carry out tasks fast, Administrative support is required. • Inquiry response times are long by reason of deficient backing.
Huge Datasets	• Efficient work is not possible with excessive datasets for workers. • Internal and external datasets should be united in order to augment inputs and outputs. • Data is extremely organized with years of history.
Experts Shortage	• Simple questions can be solved by AI and it gives workers extra time. •Niche issues can be learned by AI to assist specialists in their researches.
Predictable Scenario	• Situations can be foreseeable by way of historical data. • In foreseeable situations, time-sensitive answers will be useful.
Procedural	• Tasks are generally repetitive. • Inputs and outputs obtain binary answers.
Diverse Data	• Data contains visual or spatial and auditor or linguistic information. • Quantitative and qualitative data should be summed up frequently.

Source: (Working Group on AI., 2018: 63; Mehr, 2017: 4)

Throughout the world, public servants have been testing AI tools. Generally, government institutions employ documents connected with citizen inquiries and related data. Citizens typically face long response times on calls and in-person visits in government institutions. AI tools can help citizens find their answers instantly, and help citizens prepare forms and guide them effectively. Case studies in public services can be categorized into five parts as answering questions, filling in and searching forms and files, sorting out requests, translating foreign forms and documents, and preparing preliminary versions of forms and documents. Interactive voice response tools on calls and the automation of routine computer works can be handled by AI machines. If AI is useful, AI can reduce expenditures and administrative burdens, advance human experience and improve citizen satisfaction and engagement (Mehr, 2017: 5-6).

2.8.2. Artificial Intelligence and Public Services: A Close Look at Current Applications

Artificial intelligence can be defined as a group of technologies which simulates human cognitive processes such as reasoning, understanding and self-correction. There has been an increasing interest in the potential usage of AI in private and public services. The dominant argument in applying AI technologies in public services is that it can improve human decision making processes and actions, and in some cases even replace them. While this ability provides many opportunities to use human resources in more meaningful and less repetitive tasks, it increases productivity, reduces errors and divides costs into slices and facilitates the improvement of new models, tools and forms, system architectures and technology systems (Li et al., 2017: 87). In fact, there have been many publications in the academic and popular media regarding the potential of AI to date on how public services can revolutionize the way they make transactions and interact with the public. Opportunities to apply AI in the public services have been extensively documented in many early studies. They range from chatbots to the interaction of citizens about procedures and other forms of inquiry and to the use of sophisticated techniques to the detection of frauds and to the use of self-driving vehicles. This shows that the public sector can take advantage of such technologies in many ways when applied to core activities within their responsibilities (Mikalef et al., 2019: 267-268).

Table 6: Potential AI Applications for Public Sectors

AI applications	Features	Examples
AI-Based Knowledge Management Software	-Generation and systematization of knowledge – gather, sort, transform, record and share knowledge. -Expert systems support the codification of the knowledge of knowledge management. -Use of neural networks help to analyse, distribute and share knowledge with others.	Clinical documentation by AI.
AI Process Automation Systems	-Automation of standard tasks; perform formal logical tasks with unpredictable conditions in consistent quality -Complex human action processes (formal logical or dangerous. tasks) can be transferred to automation systems, which can support humans in performing tasks. -May include rule-based assessment, workflow processing, schema-based suggestions, data mining, case-based reasoning and intelligent sensor technology. - Robotic process automation leverages the ability of software robots or AI-driven workers to mimic human interaction with user interfaces of software systems.	-Faster and higher quality request processing for immigration application forms. -Automated image diagnoses. -Human-computer interaction for repetitive tasks like data entry.
Virtual Agents	-Computer-based system that interacts with the user by means of speech analytics, computer vision, written data input but may include real-time universal translation and natural language processing systems and affective computing. -Software that can perform tasks for humans. -Sub-areas are chatbots and avatars.	-Task allocation according to the respective area of responsibility of a specific agency (smart human resources services). -Virtual nursing assistant. -A chatbot for helping refugees that seek asylum to fill out and search documents.
Predictive Analytics & Data Visualization	-The analytics are based upon quantitative and statistical analysis of data. -Processing of big data for reporting, prescriptive analysis and predictive analysis. -ML as a technical sub-area based upon algorithms learning from data.	-Control and performance monitoring public places for police departments to determine terror threats and crime spots for preventive actions. -Determining high crime-risk to secure public transportation. -Forecast model to predict water levels.

Table 6:(continues) Potential AI Applications for Public Sectors

AI applications	Features	Examples
Identity Analytics	-Systems used together with big data, advanced analytics and identity access management to control the access to IT systems and automate risk-based identity checks. -Might consist of DL and ML, affective computing and artificial immune systems.	-Facial recognition software to check or identify criminals in public places. -AI fraud detection to protect governmental data.
Cognitive Robotics and Autonomous Systems	-Systems with higher-level cognitive functions which involve knowledge representation and learn and respond. - In connection with affective computing to determine and adapt human behaviour and respond to respective emotions.	-Electric-powered autonomous vehicles for public transport. -Robot-assisted surgery.
Recommendation Systems	- Information filtering systems. -Software-based systems screening personalized information to foresee people' preferences.	-E-service for government offices to give personalized information to employees.
Intelligent Digital Assistants	-Software rooted in speech analytics. -Providing an intuitive interface between a user and a device to look for information or finish easy tasks.	-Uniting federal programs with Intelligent Digital Assistants to make public service information available for customers. - Intelligent Digital Assistant-Amelia to assist humans to locate information and finalize application forms by the help of speech analytics and affective computing.
Speech Analytics	-Systems for intelligent recognition and processing of languages. -Understanding or responding to natural languages. -Translating from spoken to written languages or from one to another language. -Might involve real-time universal translation and natural language processing software.	-Real-time universal translation (Microsoft 2018) to translate speeches and texts in face-to-face communications in public service settings. -Administrative workflow assistance with voice to text transcription.
Cognitive Security Analytics and Threat Intelligence	-Additional applications for cognitive technology to analyse security information through NLP and ML. -Interpreting and organizing information and providing reasoning.	-Applications such as Watson for cyber security to boost human security analysis in the public sector.

Source: (Wirtz et al., 2018)

Ten AI application areas are represented in the table above and in the range of the analysis; public services are keen to test AI systems in the world but have a difficulty keeping up with the pace of private sector. Specially, there are AI application pilots in the public sector which concentrate on boosting public service delivery and aids for people. The AI application areas above "AI Process Automation," "Predictive Analytics," "Identity Analytics," "Virtual Agents," and "Cognitive Robotics" are very important and show huge benefits for public services. These AI applications might boost efficiency and cause cost reduction by automating procedures, helping resource allocations and lessening waiting time and administrative loads (Mehr, 2017; Wirtz et al., 2018). In the table just below, there are some case studies which can represent some pilot applications and theories to the real life and can explain which benefits they have.

Table 7: Examples from Country Practices

Countries	**Institutes**	**Applications**	**Outcomes**
Australia	Taxation Office	Chatbot/Virtual assistant	-Obtaining over 3 million conversations. -Resolving 88% of queries on first contact.
Australia	Department of Human Services	Chatbot/Virtual assistant	-Answering general questions about family, job seeker, student payments and related information.
Canada	Surrey Municipal	Chatbot/Virtual assistant	-Helping the residents of the city have answers to questions related to municipal infrastructure.
United States	Atlanta Fire Rescue Department (AFRD)	Predictive Analytics	-The accurate prediction of 73% of fire incidents in the building.
United States	Department of Energy	Solar Forecasting	-ML based forecasts is as much as 30% more accurate than ones created utilizing conventional approaches.
United States	New York City Department of Social Services (DSS)	Machine Vision	-Digitization of documents is accomplished.
United States	City of Pittsburgh	Automated traffic optimization	-Scalable Urban Traffic Control is linked with a network of nine traffic signals in 3 major roads in Pittsburgh.

Source: (Dilmegani, 2021)

2.8.3. Benefits of Artificial Intelligence in Public Services

With AI in public administration and policies, it will be easier for public administration and public servants to keep up with the digitalizing world. Aims such as ensuring the sharing of data owned by public institutions and organizations, integrating data centres, increasing the reliable statistical results and the implementation of the big data applications in the public are of great importance in public policy implementations (Önder and Ulaşan, 2016). Governments which have the power to help citizens to reach policy makers for their needs through big data transactions, accountability, and the pursuit of transparent public management are among the main contributors of AI to public administration and policies. Because AI does not have any emotion, desire and bias, AI technology can treat citizens more fairly. AI has the power to learn and utilize other public databases and large public databases on the internet and can reach citizens for a problem, answer questions, respond people in various ways. In the figure just below, it summarizes the benefits of an extended usage of AI in public services.

Table 8: Prospective Benefits of Artificial Intelligence in Public Services

Prospective Benefits of Artificial Intelligence
Improved Information Processing: AI improves the magnitude, scope and speed of information processing which yields an efficient and sustainable allocation of public resources such that the subsequent tasks can be performed better.
Accelerated Processing of Cases: AI speeds up processes of handling cases (e.g. by AI-guided submission of application forms) by improving submission and forwarding of requests while achieving an improved standard of quality with a decreasing error rate due to DL algorithms.
Improved Case Assignment: Routine tasks which require only a low level of expert knowledge are performed by AI; special cases requiring high-skilled decision makers and quick decision-making are assigned to appropriate human staff.
Workforce Substitution / Cutting Red Tape: AI gives the opportunity to substitute human labour by machine processing, reduce the workload of public authorities and to create options for a sustainable reduction in bureaucracy

Source: (Wirtz and Müller, 2019: 1087)

The use of AI to inform decision-making rather than the current public practice that tends to focus on service delivery will provide public institutions with an important opportunity for greater profits and wider social assistance. With the transition of many

governments to e-government, it is clear that this technological development will be more efficient and beneficial to the provision of services, and this will significantly increase the value of the public sector. There have been numerous attempts to put a number on the value of big data and ML to governments. According to the Policy Exchange as a UK think-tank, about 24-48 billion dollars could be saved when the UK government employs AI and big data, which amounts to about $365-735 per capita gains (Tito, 2017: 10-11).

State institutions to respond to the questions, problems and requests of the public through the web sites much faster than the public employees working in the institutions, producing solutions is a step that will ensure that the society is peaceful and happy, and that the public employees get rid of unnecessary workload and perform more important services. Artificial intelligence-based applications can potentially reduce business savings, cost, resource constraint, save employees from ordinary tasks, increase the veracity of projects, intelligently design processes and systems, and predict fraudulent transactions, identifying criminals and suspects by face recognition and achieving the most comprehensive results in a short time and achieving some things that humans cannot do alone. Robots and cognitive automation permits robots to imitate human actions and decisions, preventing humans from carrying out ordinary tasks and giving time for humans to do tasks which require unique human skills. Automation applications can redistribute resources and optimize the workforce, meaning that the right resources are allocated to the right tasks. AI tools equipped with sensors and cameras enable organizations to monitor and report essential information. With the use of artificial intelligence such as ML and NLP in all fields of public administration like health, safety and education; application models can be identified and guided by providing effective answers to problems; uncover the neediest people in health crises or find the roots of foodborne diseases (Önder and Saygılı, 2018). In the future, AI will be used commonly in public services. Potentially, AI could learn independently and could have their morals and aims. In addition, AI might have the power to make subjective and political decisions in the future. Future AI systems in the hands of public administrators will be questioned highly about administrative responsiveness, accountability and reasoning process (Barth and Arnold, 1999). Generally, main benefits in the public administration can be explained in 4 categories.

2.8.3.1. Impacts on the citizens´ quality of life

With the transition from the welfare state to neo-liberal policies, the New Public Administration approach, which marks a major break from the Traditional Public Administration understanding, has dominated a new paradigm in the field of public administration with radical reforms. As a result of this, naturally, there have been changes in the understanding of public service delivery, and these changes have directly affected the understanding of citizenship. The importance of the concepts of public service and citizenship in terms of state and public administration is obvious. As a matter of fact, the public services are an essential element of the public administration and naturally citizenship is an essential element of the public service (Akçakaya and Aksakaloğlu, 2017: 42). Due to this, governments should use the AI technology to improve citizens' quality of life such as saving humans' lives and extending humans' life spans with high quality. For instance, AI for crisis management is mainly about rescue operations and emergency situations and is equipped to give support to decision-making processes at state and international level. Dynamic and strong modifications in economy, politics and culture, with simultaneous random variations, can cause various crisis situations such as economic crisis, plane crashes, nuclear disasters, revolts, terrorist attacks, natural disasters, wars and etc. Dangers and risks might take place anywhere in the world and might have an effect on people`s behaviours and activities, cultures, nationalities and huge groups in various ways. In order to maintain stability and peacefulness, the states should prevent some dangerous situations from taking place and they should make provision against potential disastrous situations (Stanek and Drosio, 2012:279). For instance, a Hybrid Decision Support System for Crisis Management mainly focuses on helping and supporting crisis management centres. It is considered to spot and discover potential dangers as early as possible, which has the power to avoid any crisis from taking place or to alleviate its unpleasant consequences. Also, the well-organized integration of the multi-level structures constituting a crisis management system is possible with a tool of the computerized decision support platform. Taking into account the existing improvement of information technology, states can make a platform making the vertical integration of a crisis management system possible and effective (such as semantic ontology techniques and knowledge bases) (Stanek and Drosio, 2018: 181, 187-188).

Public transportation safety is very important for the public, the public administrators should make provision against risks and possible dangers in transportation and they should

control transportation management effectively to prevent risks from taking place to advance the transportation. A mixture of spatial clustering techniques and ANN models can be employed to forecast high crime risks for transportation fields. Geographic information applications can be utilized to carry out spatial analysis in order to recognize and classify areas which have highly crime incidents. The AI technology can be utilized to construct ANN predictive techniques. The techniques can be assessed by employing the Mean Squared Error to choose the best predictive methods. The optimal predictive model is utilised to foresee transportation districts in terms of high crime risks. Basically five stages can portray AI tools in public administration in the prediction of high crime risk transportation districts in urban areas such as data collection and preparation, spatial clustering, neural network predictive models` formation, testing the optimum neural network model and high crime risk transportation fields forecasting. First of all, experts should understand which areas are dangerous and where they should get information to comprehend problems. Due to that, they should get information about the situation of transportation and crime. However, information about crimes taken from certain areas such as streets, sidewalks and bus stops does not include the prediction system. Only spatial layers of bus-stops and district borders are gathered to inspect spatial data effectively. Secondly, spatial analysis of crime data is evaluated to locate areas with enlarged concentration of crimes. Thirdly, AI generally is utilized to make and compare neural network prediction techniques to locate the best neural network technique for these circumstances. Fourthly, the best neural network technique is used to foresee the riskiest transportation stations for the crime risk estimation. Finally, the forecasted crime main places are interconnected with transportation stations` spatial aspects to foresee the high crime risk transportation regions (Kauziokas, 2016: 467,469).

The decision making or support can make problems for the public administration system and the public. AI robots may have their makers` prejudice or societal prejudice implanted in the data employed to feed AI robots. In addition to this, AI machines can learn numerous information and if there is a little prejudice in some subjects, that can affect all the decision-making processes and the control of it and the extraction of the prejudice look too hard theoretically for now. However, there is a strong assumption that AI systems can be necessary in designing actions in important and emergency situations. The usage of AI as an option for public needs is discussed highly and some of governments try using AI systems in the various forms (such as smart government, smart city and etc.). For instance, the New Zealand government utilizes an integrated data infrastructure to help target social investment

by employing the past information to foresee highly possible actions, moves or qualities of different groups. Especially, some objective information about people makes the probability of them requiring social assistance deeply higher. The studies drew attention to many features which can reflect the prediction of poor results such as early contacts with government agencies like the ministry of family and social policies, social status, geographic location and initial results in the education system. They are utilized to measure risks individually and to spot and recognize the volume and features of risk groups of the young generation at various ages (McLeod et al., 2015).

In public administration, AI decision-making prediction systems can generally be deemed as open data. Thus, in private sectors, a worker can know and accept data processing or reject it, while in the public sector, the systems are typically prearranged by codes and regulations and a worker does not have any power to object it and he does not have any power on data processing (Reis et al., 2019). One of the most important issues can be considered as the problem of humans' confidence to AI systems. Although today the fields of the employment of AI systems for public objectives look inadequate, the fields can employ AI systems in many important social areas to deal with some important problems such as unemployment, scarcity, crime and etc. AI machines which will be used in all these areas should gain the trust of humans because machines can make all important decisions on crucial social problems. Maybe in the future, humans may think of the authorization about giving decisions by AI machines on the level of electoral procedures (Mikhail et al., 2018:683). Already, citizens start to live in urban environments significantly and it is predicted to reach five billion by 2030 with the intense use of smart devices (Albino et al., 2015:3). In 2018, United Nations stated that between 1950 and 2018, the urban world population rose from an approximate 800 million to an approximate 4.2 billion and predicts that the world population might reach 9 billion by the year 2050 and above 66% of the population will start living in cities owing to birth and migration from rural areas (Hussein et al., 2018:306; United Nations, Department of Economic and Social Affairs, Population Division, 2019:9). This means that rapid improvements in AI transform public services intensely and in the future, nearly all people can live in smart cities with the control of AI which governs public services.

The AI systems should find solutions to the problems of humans in the future. Today nearly all resources are consumed in cities worldwide and these cities help the economic and

environmental performance highly. In 2008, United Nations stated that cities could spend energy between 60% and 80% in the world and could cause huge shares of greenhouse gas emissions (Albino et al., 2015:3). Cities which are key instruments for economic development and job opportunities can have key impacts on global warming and environmental difficulties (Hammer et al., 2011:8). The formation of cities normally contains the input of goods and the output of waste with steady negative externalities. Since cities are dependent on excessive external resources, the dependability will increase gradually and definitely it will not decrease any soon. In some ways, maintaining sustainability can be elucidated with the backing of natural capital stocks. The other way of maintaining sustainability can take place by the help of the strategy which is that cities need to satisfy humans` requirements by means of sustainable ways for social and economic facets. The smart cites generally are designed to cope with new problems by means of sophisticated transportation webs, varied land uses, advanced urban services and etc. Smart cities consist of varied and interconnected elements continually exchanging information and easing enhanced living for citizens. When humans solve one problem, they face the other one which are the problems of cyber-security attacks and digital forensics on smart cities. Generally smart cities include four main elements and they are called as building automation systems, smart vehicles, smart grids and unmanned aerial vehicles by the help of Internet of Things sensors and the Cloud platform. There can be dangers and criminal abuses in smart cities which are more and more heterogeneous and noteworthy (Baig et al., 2017:3). The growing integration of various technologies cause some security related difficulties because security tests of technologies are not enough and the connection of other tools with the security system is not strong due to the massive communication. Huge complexity and huge interdependency and dense communication cause cyber-attacks (AlDairi and Tawalbeh, 2017:1186). When cyber-attacks take place, some systems should be used to spot, recognize and establish concrete evidence to ease forensic investigation processes. To prevent these attacks, forensic preparedness and detailed examination can be used to defend the smart city against any future incident and danger (Baig et al., 2017:3).

2.8.3.2. Electronic Government Services

It is an inevitable reality that information technologies affect human life. However, concepts such as e-government, internet of things, artificial intelligence, Industry 4.0 are now included in human life. The way of making transactions and accomplishing task, which

emerged as a result of the transformation of public services and defined as the electronic government, is a symbol of the transformation which governments experience. This process can be explained with concepts such as customer / citizen satisfaction, total quality management, networks and unions. In this way, states aim to enable citizens to easily access services while providing public services. States have aims to reach a better point in matters such as in transparency, efficiency, effectiveness, participation, information sharing and savings thanks to these rapid developments (Kanlı and Kaplan, 2019:397). As a result of more and more rapid developments in NLP, ML–based voice recognition systems reached the accuracy at the rate of 95% in 2017 which was a very promising score for AI. Especially, in some samples, 99% accurateness in low-noise environments was claimed. Now, the NLP system is ready to upgrade from selective use to large-scale consumer adoption because of trust coming from tests (Agarwal, 2018:919).

For instance, Alexa is one of the best examples for NLP. Alexa is considered as Chatbot and has the ability to manage complex processes and interactions about the streamlined business just employing NLP. The capacity of chatbots was limited with customer interaction with restricted capacity of conversation in the past due to the rule-based system. However, now NLP with the help of ML and DL can deal with various fields such as law, public administration and health care. There are some important examples of NLP in different sectors (Gill, 2019):

Spam Detection: Governments would like to employ NLP to categorize, organize and filter out the emails that are considered as spams. This system functions with an automated process that categorises the emails as spams and prevent spam emails from going into inbox.

Sentiment Analysis with the use of NLP: The public services focus on the various ways to get to know their users well. The sentiment analysis has the capacity to give a great amount of information about the users' behaviours and preferences.

Conversational Framework: Alexa, Siri and Ok Google can be considered as the best examples of the AI technology. They can answer, search and find anything you request such as some websites on the internet and finding restaurants by means of NLP.

Cognitive Analytics and NLP: NLP can create the conversational frameworks that can take directions or orders by the medium of text or voice. The teamwork of cognitive

analytics and NLP methods can cause an automated process of dealing with technical problems in an organization or offering answers to technical issues for customers.

NLP used in Recruitment: NLP can be employed to search right candidates for jobs and decide the steps of occupation recruitment. Actually, chatbots can be utilized to deal with the occupation-related questions at initial level that consist of spotting the necessary skills for a particular occupation and dealing with various level tests and exams.

NLP used for health care: Medical services that are utilized to detect clinical concepts have the power to deal with meditation sessions and observe the outcomes from clinical text notes. With the help of NLP, systems can predict various diseases employing pattern recognition techniques by means of patients' communication and health records.

People can explain themselves better and feel comfortable because humans have communicated mostly by voices until this time. Beginning from 1990s, states started using the internet on the desktop in their services. This was a long process because states were not used to new things and this technology required experts hired by states. After the states generally were used to internet services, the smart-phones were invented and the services have been integrated to mobile platforms as applications. Today, mostly the traffic on the internet is carried out with mobile phones. Although states started to change their ways according to today`s world needs, states are not totally ready for this transformation in serving the public via mobile applications. The integration of voice to the services is supposed to push the states` limits. Because the states do not have enough experts for voice services, states need time to overcome this difficulty. The experts hired by states need to create new voice platforms. They cannot take existing ones because they are proprietary. Voice services must be created separately for each platform. There is an alternative way too and that is the transfer of know-how from private sector. This can be fruitful partnerships. However, if this process is managed poorly, this can cause outsourcing and this makes states lose the control of the services. States should be hurry because there are some fascinating scenarios about NLP. Firstly, this technology is supposed to advance the relations between humans and computers from interaction to conversation over time. This means that people will start to think that the conversation between human and computer is proper and humans will feel that they speak with computers. Secondly, biometric advancement is supposed to be present in the future. This advancement contains body language, gestures, and facial expressions. This means that from human`s gestures and emotions, the computer can

understand humans` conditions. They can understand the hidden meanings in the sentences from gestures, emotions or the volumes of the words. The last level is the Humanoid robots. They are like humans and they can touch, see, hear and touch. Maybe in this level the robots will have bodies with programmed artificial souls and express themselves with some movements, postures, and expressions.

2.8.3.3. The Replacement of Human Labour with High-Value Work

Cognitive automation technology and robotics permit robots to imitate human behaviours, acts and judgment mind-set, saving humans from doing repetitive works to carry out some tasks which need exclusively human skills. For instance, instead of humans, robots can perform data entry through automatic handwriting recognition, schedule and plan works and utilize speech recognition, NLP, the capability of answering questions to serve users more effectively and productively. These features can highly possibly help governments focus on and solve widespread problems which are resource constraints, paperwork burdens, and backlogs. Even today, robotic process automation helps governments a lot especially in doing daily tasks and facilitate their works. Robotic process automation contains bots which automatically carry out the different types of tasks humans typically do on their own such as following basic orders, filling in forms, cutting and pasting information from one page to the other page and reaching numerous databases quickly. In addition to this, creating bots is easy, they do not require many wide-ranging skills and there are some tools in these days which help producers create bots. While creating bots is relatively easy and cheap, the gains the governments will obtain are huge. The governments do not need any redesign process in the structure completely and some modifications are enough.

Table 9: Main Functions of Bots

They can open mails and attachments and give certain answers.	They can copy and paste some documents, text, sentences, words and etc.
They can fill out forms, surveys and documents and send them to certain addresses.	They can use web.
They can read some documents or write on databases.	They can make calculations and use them in certain places.
They can move some files and folders to some place from some place.	They can collect statistics.
They can choose certain information from documents and texts.	They can guide humans to comply with rules.
They can help humans understand texts and documents and make documents readable easily for humans.	They can connect interfaces and applications.

2.8.3.4. The Management of Resources

The use of resources intelligently is very important for public services as they are the most high-priced investments of public services. Furthermore, public services spend much time and cost in making the right talent pool. When skills and competencies reach their maximum potential, they improve the efficiency and profitability (Mansinghka and Negi, 2021). AI generally aims to reduce resource consumption, reason about transient resource availability, trade off resource consumptions for accuracy. In 10 years, big breakthroughs took place on AI from computer vision to NLP. When the comprehension of modelling problems has advanced, AI developments transformed AI applications which obtain enabled high-dimensional model training on a huge amount and density of data, running a huge number of simulations at the same time, and interfacing AI methods with user-facing tools to gather more data. The AI researches concentrated on scaling-up and scaling-out to deal with problems as accurately as possible in a much smaller time (Krishnan et al., 2019: 1).

Cognitive automation has the power to carry out tasks and duties at formerly impractical scales, paces, and sizes. This automation helps both resource redistribution and workforce optimization in using the suitable resources in the suitable tasks. As an example, the use of an electronic relevance assessment application and process decreased the possibility of missing pertinent documents and texts by more than 90%. Although electronic

document discovery completed more than 95% of the relevant documents, the humans reached nearly 51.1% of the relevant documents. Sophisticated technologies can be employed to check documents which are thought as relevant information with highly improved efficiency and deceased costs (Kershaw, 2004). For instance, in order to make financial disclosure and campaign contribution data public for elected officials and people running for office, Georgia prefer using Captricity's hybrid system as a data-capture system, which merges ML with human intelligence to digitize a multiplicity of forms and some of these forms are handwritten. The reports are gathered by Georgia Government Transparency and Campaign Finance Commission and the commission makes reports accessible online in a database. When Georgia tested the system, the structured data which was returned by Captricity was 99% accurate, even for handwritten forms. The commission took nearly 7,000 e-faxes, numerous of them 10 or more long pages. The commission was supposed to deal with nearly 40,000 pages every month. Especially, Captricity's shredded procedures to analyse documents guarantee the privacy and the safety of documents' contents (Walker, 2014).

Humans produce enormous information every time on internet with social media, web sites ant etc. All the information is too much for people to deal with alone. For example, NASA's Sensorweb is considered as a network of low resolution and high coverage sensors which make closer observations possible with high resolution tools. High resolution tools permit people to find and record just-in-time images of volcanoes, blizzards and lake freezing. The tools allow Google Earth to make visualizations of key information. Automation can facilitate humans` efforts and discover appropriate data easily (Eggers et al., 2017).

2.8.4. Problematic Areas of Public Services in the Use of Artificial Intelligence

Machines are getting complicated and sophisticated significantly and start to take information and knowledge autonomously and make their own decisions. Because the AI technology is a greatly profitable field, the new comers in AI are serving for states and private sectors rather than the academic research. Designing some machines as a software designer is so much important that even buyers who buy your products are in need of knowledge even after they buy your products, since buyers do not take care of how the products work and they just focus on whether these products serve their purposes. These

things make designers and practitioners vital for controlling products and give too much responsibility. Especially practitioners can be highly important in the future and can be a privileged class. In particular, public administration is a significantly dangerous and appropriate area for this privileged class. This place is appropriate because they use the power of states and are selected limitedly with some certain tasks. This place is dangerous because one of the most important tasks for states is accountability and they will experience some problems with the public in the subject of accountability due to the complexity of AI and some sensitive information which should not be spread out. In the figure just below, it summarizes the prospective risks of an extended usage of AI in public services.

Table 10: Prospective Risks of the Public Artificial Intelligence

Prospective Risks
Technology Obedience & Loss of Control: AI for public management needs a densely connected computer system operating with several thousands of algorithms. While data input/output gains centre stage, knowledge about what happens inside the system is lost due to ML algorithms being elusive and its results getting out of human control.
AI Dominion & AI Legitimacy: AI judges and evaluates human behaviour within its applications. Applied to a public authority, AI is given the right to set rules for social coexistence without being part of it. Thus, AI oversteps its limits and acts as decision-maker without being authorized to do so.
AI Paternalism & AI Decision-Making: AI enters all areas of daily life and human decision-making is gradually replaced by autonomous systems. Human role in decision-making is getting very narrow and even important decisions, e.g. ethical issues or moral dilemmas are transferred to AI.
Cyber-Security & Violation of Privacy: AI-supported public authorities need to collect a wide array of data touching the citizens' private sphere in manifold ways in order to put AI to work. The system is highly sensitive to malicious attacks for assessing and misusing the data.

Source: (Wirtz and Müller, 2019: 1087)

Generally, citizens in a state suppose public administrators and government workers to make decisions by thinking what is best for the public according to the information taken from some certain and proper channels. These sources are considered as congressional inquiries, public opinion polls, public hearings and other works for taking public opinion. Moreover, the public wants these public administrators and government workers who are experts make decisions and they are hired according to their backgrounds such as

universities, working experience, skills and etc. The same things which public administrators and government workers can do can be done by AI machines with ease, more accuracy and speed. But the choice of right machines is vital. Due to that, if people want to check the quality of an AI machine, they should check its premises which can give enough information about the ability of the programmer and the decision making logic. Their controls or rules should be very tight and proper on the formation and improvement of the AI machines. The selection of the right AI machine is much harder than the selection of a human. Measuring the quality of individual human minds is relatively easy compared with machines and the machines` capabilities and skills such as huge databases, speed, limitless attention and accuracy cannot be compared with humans` capabilities and skills (Barth and Arnold, 1999:346-347). Government workers can correct an individual`s mistake because the individual has the certain job, the limited responsibility and the power to decide and some workers can understand the mistake of the individual. But the AI machines will have much more responsibility and power to decide and there will not be many people to check the accurateness and correctness of the machine because of the complexity and density of decision making processes. States have to consider how they measure the capacity of AI minds and they may use some strategies by modifying the check of the quality of human talent.

AI is developing significantly around the world and is affecting the workforce in the world. Current changes made by AI are just the beginning and in the future AI will change numerous things which even today people consider impossible to be changed or modified by AI. Even today PwC predicted that 7 million current occupations will be replaced by the AI technology in the United Kingdom between 2017 and 2037. However, the AI technology can create 7.2 million occupations in the world. There will be huge impacts of AI on economic, legal, administrative, environmental, political and regulatory areas of states such as the issues on the crashes to humans by autonomous cars, the problems of the effective controls of robots, the availability of ethical and legal boundaries to robots and the privacy problems (Marr, 2019). Especially in the public administration, there are/will be some problems made by AI which can affect public administrators. Generally, main problems in the public administration can be explained in 5 subtitles:

2.8.4.1. Occupations, Financial Systems and Social Safety Nets

The AI technology is expected to affect some occupations and work gradually. Common robotic platforms having reliable techniques and sophisticated instruments which deal with primary perception systems, navigation tools, and manipulation techniques successfully have an effect on numerous fields. In terms of socio-economic parameters, the robotics technology is supposed to become one of the fastest rising fields in fifteen years and is supposed to reach a double-digit growth with the help of the prevalent usage of these machines in production, transportation and logistics, service, education sectors and home care industries (Rajan and Saffiotti, 2017).

One of the most obvious fields which are supposed to be affected is considered as the transport sector in case of use of self-driving vehicles. For instance, Say (1828:800), the prominent French economist, talked about the possibility of use of vehicles instead of horses in 1828 and he stated that no machine today or tomorrow can overcome horses in the case of carrying humans and goods to some place from some place. Say could not image today`s technology such as autonomous vehicles, pilotless airplanes, super computers, smart phones and intelligent machines. Makridakis (2017:48) said that technologies which looked like a pure science fiction in the past are possible at this time and some such as autonomous cars will in all likelihood be used widely in the next 20 years. There are various new systems such as AI assistants which can advise practical solutions to some problem and robot workers in some sectors like robot anchorman which can perform the work of humans. In this case, the problem of the loss of jobs will appear in the world and new jobs will appear in the future. But today AI can help humans solve some problems to a certain extent. For instance, India can utilize AI to deal with some of its biggest challenges like lack of healthcare facility and low quality of education. Even if India uses conventional methods successfully and push the limits, India cannot reach the aim of giving good healthcare or quality education successfully. The number of doctors required to provide good quality healthcare is so huge that it cannot be accomplished in several years. However, using the technology as an alternative, India has a good opportunity to accomplish the aim (Dhanabalan, and Sathish, 2018:843). Also, McKinsey Global Institute issued a discussion paper stating that the Chinese government needs to invest in the AI-based education system and various research projects, redesign and adjust the Chinese education structure especially according to recent innovations and digital technologies and develop its immigration policy to create a centre of

attention for global talents and the Chinese government should be proactive discovering the prospective or new automated occupations and guarantee that its new programs are created and function well with these occupations. McKinsey Global Institute recommends the China government to neglect scholars' predictions who say that high unemployment rates are highly possible because of human replacement and technological improvement (Reis et al., 2019).

Even though public administrators are very careful about innovation and new things, AI-based public services show a great success and look highly efficient and productive. When technology develops fast, the public would like to take the advantage of the high technology in the public services. This pressure coming from the public forces the government to adopt the new technology. The public has a vote power in the election times (local or national elections) and this pressure is highly effective for nearly every government. The governments and companies can accomplish the great governance with the high improvement of service quality, the automation of simple procedures and the cost reduction with AI. But at the same time, universities should adopt the wide-ranging curricular policy which includes many fields of AI, robotics, ML, DL and etc. They should help students prepare for new technology and they should be educated and trained for private and public sector needs in the future. Simply the governments need the educated workforce to serve best and keep pace with the technology easily.

In the future, AI machines are supposed to take over numerous occupations, which do not require much skill and have low-end knowledge work. Provided that this scenario happens in the future, the humans should be ready and should make plans for the future from now. Numerous communities started testing the idea of universal basic income, where states provide each person with standard, liveable, and unconditional amount of money and this system will not check any requirement to pay money and this payment will become totally independent of other revenues. The origin of this plan appeared in 18th century and this plan gained momentum with the concept of AI. Provided that people lose their jobs in the future and do not find another job due to AI robots, this problem will be seen as an income distribution problem. When the robots do mundane and repetitive works in first place, who will take the income by robots? In this scenario, robots can offer us limitless prosperity and abundance. The distribution of prosperity and abundance should be on the basis of the fundamental belief that humans have equal rights and chances. The distribution problem can

be solved by reducing the workweek. Before the Industrial Revolution, 70 to 80 hours working in a week and child labour was acceptable. Later, the suggestion of 40 hours in a week was accepted. In order to achieve 40-hours workweek, numerous sacrifices were made. But today humanity has enough experiences and knowledge to prevent bad situations from taking place (Agarwal, 2018:919-920).

2.8.4.2. Income Deficit

Deloitte Insights declared that in the United States public sector will lose approximately $251 billion in a year if there is no income coming from transportation sector (fuel and vehicle sales taxes, public transportation and registration and licensing and parking fees and tolls). This means that AI will affect the economies badly. For instance, licensing and parking fees will degrease highly due to the increase of autonomous vehicles (Corwin et al., 2015). Provided that the other sectors are added, humans should find the new system to take incomes. Today an aging society is a danger for humankind and requires a rising amount of services and safety net resources. To overcome the loss of income, the idea of taxing robots should be used. For instance, the EU considered some rules to tax robots to fund worker retraining. However, this idea was rejected. Sofia has been recognized with citizenship by Saudi Arabia and it is the first robot to take citizenship from any country in the world (Sini, 2017). If giving citizenship to a robot is possible, robots paying taxes may be possible in the future.

2.8.4.3. Citizen Protection

There is a common argument about whether AI can have a neutral entity. This does not seem acceptable and appropriate for now because AI robots can have societal prejudices and the same prejudices as their makers because of the data inserted by makers to train robots. These robots learn by means of data. Provided that the data includes current prejudices, the machines have the same tendencies. Suppose that a person trains an AI robot and shows it pictures of bus drivers, for instance, a job that is 95% male. With probabilistic models, robots can be extensively prejudiced in thinking that all bus drivers are male. 95% of nurses are female and the system will think that nurses are women. Similar prejudices can be found in a large amount of historical data such a gender, skin colour, race, nationality, religion, culture and etc. For instance, ironing and cleaning are connected with women, while

repairing and carrying are attached to men. ML trained with these datasets does not show same prejudices alone and at the same time, it enlarges them. Provided that the robots are not designed carefully, the robots can continue to enlarge the prejudice or maybe can make new prejudices of their own which we cannot forecast. For instance, recruitment robots with these datasets can think that women are good at housework and they are not good at beck-breaking jobs. In 2017, AI Now Institute report advised that vital public agencies which are in charge of justice, health, wellbeing and schooling ought not to employ black box artificial intelligence and algorithmic tools because they contain the un-reviewed or invalidated usage of pre-trained models, robots are licensed from third party vendors, and algorithmic processes were made in-house. One of the works of the AI tool employed by courts and departments of corrections assesses whether a defendant commit a crime again and the AI tool contains a huge controversy as to whether the AI tool is prejudiced or not (Agarwal, 2018:920).

2.8.4.4. Privacy

Every electronic service provider gathers inputs from users` interactions and transactions and employs the data to produce outputs. Some firms use this method such as Instagram, Yandex, Facebook and etc. They basically collect the data of users with various methods and use them for marketing aims. It can be understood that data is called as an asset because they have a market value. Unlike physical assets, data is different. They can obtain unlimited copies. By using the AI technology, they can profile people with astonishing accuracy and the personal privacy receives a severe blow. To prevent the leaking of personal data, people should be given the right to choose not to accept or to choose to accept the capture of personal data (Agarwal, 2018:920-921). The step of the EU was very promising about the General Data Protection Regulation. This regulation is created to help people to have the stronger control on their personal data and gives the guidance on profiling and automated decision-making and users have the right to prevent data transfers (European Parliamentary Research Service, 2020: 81).

2.8.4.5. The Decline of Human Public Administrators and the Rise of AI and Programmers

Especially in democratic states, the one of the most important features is a diverse and representative public administration system. People desire to see that public administrators consider their opinions and take care of them. The representation of citizens can be done actively. This means that public administrators can have the same interests and desires as the citizens` desires and interests and the citizens` needs will not be neglected in the decision-making process. The concept of the representative bureaucracy was first used by J. Donald Kingsley (1944) in her work "Representative Bureaucracy" and he stated that "*a public workforce representative of the people in terms of race, ethnicity, and sex will help ensure that the interests of all groups are considered in bureaucratic decision-making processes*" (Bradbury and Kellough, 2011: 157). Public administrators should measure public opinion in the matter of public services and recognize people`s key dissatisfactions and in this way, governments can rearrange its priorities and stay away from unpopularity or conflict. In democratic states, public administrators and bureaucrats directly or indirectly can be affected from elections and they feel obliged to satisfy the public. The media pressure can force public administrators and bureaucrats to work for the public and keep them satisfied. In order to achieve this goal, firstly public administrators and bureaucrats should employ citizens from particular groups like women and minorities (Bradbury and Kellough: 2011). Mosher (1968) stated that *"it (bureaucracy) employs minorities and women in numbers proportionate to their shares of the population or at least proportionate to those parts of the population with the qualifications necessary for employment"* (Gade and Wilkins: 2012:269).

The technological advances started to change conventional methods, business manners and jobs. When the history, features and the structure of automation are analysed, it is easily observable that in the future the AI technology will decrease the need of the government for workers in analyst positions (Kouziokas, 2017: 467). But AI can result in less representative public administration and this can have some risks in understanding humans` needs and their characteristics. Day by day the capabilities of AI and the tendency of humans for AI are growing. In the future, there can be a serious decline of public administrators and sense of responsibility in effectiveness and vigour and there can be some problems between humans and AI. For instance, the system does not permit public administrators to carry out some

tasks and AI may not have same thoughts as citizens` thoughts (Barth and Arnold, 1999: 348).

By the help of static rule-based systems, it is easy to spot and discover the program being used and test the assumptions made. Everything is known before and there is nothing unexpected. In these systems, programmers do not have critical roles because users know what will happen. But, AI which can learn independently provides the programmer with the very important position and the undisputed domination. This domination can help the elite group which consist of programmers appear. Particularly in sensitive fields like economy and military giving the full control to programmers can be a big threat for national interests. It is easy to understand whether the system works or not but very difficult to comprehend how it works. The area of public administration can be considered as a brilliant example of the possible threat of elitism due to the primary value of accountability. Public administrators have some degrees and proficiency about what they do. The equivalent for AI systems can be the degree and proficiency of programmers, since the only way to measure the value of the data made by AI is the premises on which the robots make the decisions. To comprehend decision making, the premises should be comprehended, even same for the AI technology. There should be extremely strict control systems or codes on the creation and improvement of the AI technology with the capability to learn such as humans who have the accreditation and credential necessities for high education (Barth and Arnold, 1999:346-347). In the future, humans should be very careful of giving the certain power to artificial intelligence because these systems can be stronger owing to the capacity of the vast databases, speed, and limitless attention. It is always very hard to control something which is stronger than you even if they surpass humans just in certain areas.

CHAPTER 3: THE USE OF AI IN LAW AND COURTS

3.1. Introduction

In today's world, computers and other technological devices are developing more and more with new types and many new features. People are available to reach and use the technology more easily. At school, home and work, technology is constantly evolving in every aspect of social life and intensely influencing human life. Evaluating technological advances with the industrial revolution enables us to better understand the changing mode of production and the mechanization (Önder and Saygılı, 2018: 631). Since the first industrial revolution, radical changes in production have taken place from steam engines and long-distance telephones to smart phones and self-driving cars. In the first two stages of the industrial revolution (Industry 1.0-2.0), mechanization and electrical machines took part. Later, information technology and computer technology (Industry 3.0), which are developing in the modern era and aiming to facilitate human life, has increased the development of automated intelligent systems which have an impact on every point of daily life. The last phase, the 4th generation industrial revolution (Industry 4.0), is the stage where the production of intelligent systems competing against the human mind takes place in different disciplines such as autonomous robots, big data, augmented reality and the internet of objects. AI is changing the world rapidly and it has already made an impact on multiple fields to eliminate traditional work styles and jobs along with people`s points of view. AI-inspired systems have been very popular and have been applied almost in every field, such as healthcare, law, education, public safety, economy, public administration, international development and arts. In the public administration, the management and practices of a state's affairs concerning society can be analyzed and steered effectively by the help of the AI technology. There are many reflections of AI on key administrative issues such as managers' decision-making stage and the workload in institutions. AI technology in law might assist the legal process to be faster, cheaper, and more predictable.

Turkish administrative jurisdiction has some main features which may help AI systems become popular and useful in Turkey. Firstly, in Turkish administrative jurisdiction, inquisition without preoccupation is used and this can make categorizations easier. The information can come fast from certain sources by the help of AI. The courts check some documents and may decide some decisions on them fast without further research. This check

may be more systematic by AI and the processes may become clearer. This jurisdiction is written and it means that the storage of documents is easy and when some necessary documents which are similar to these cases are needed, these documents can be found easily and decision-making processes become less complicated with careful categorizations of documents. Especially, Turkish administrative jurisdiction is designed to be simplified and relatively cheap. Due to that, in this judicial system, hearings in courts are limited and the judges are inclined to make their decisions without any hearing. Hearing witnesses are not possible in this system and discovery and expert witness reports are not used regularly (Kaplan, 2016). All of these may make AI software possible in Turkish administrative jurisdiction. Turkish administrative courts normally are in charge for making judgment about public administrations' acts and actions. These courts refer to a judiciary branch aside from civil and criminal courts and they have 3 tiers (administrative courts and tax courts as first instance courts, regional administrative courts as appellate courts and the Turkish Council of State as a supreme administrative court) (Akbulut, 2016: 103).

With the huge capacity, potential and recent improvements, AI can be very useful in human life and AI has so much potential that it can make unbelievable and significant social impacts, directly or indirectly on political life and public administration, policies and law. First of all, AI in public administration can be used in multiple ways. The improvement of artificial technology has made a massive influence on the efficiency and policies of the public sector to serve public-service users. Generally, AI tools create big impressions in some fields of the public sector such as health, transportation and security services (Kaevats, 2017). Especially, OECD countries have their common aims to make effective and fast solutions for the requirements of citizens such as the well-organized and improved management of resources which help civil servants deal with the task of customer support and administrative duties much more quickly than before, and improves the efficiency and quality by the help of AI. AI can help citizens become more active and interactive in the service design and decision-making processes and AI can be very useful in public sector reforms, public sector productivity and even social welfare plans (OECD, 2019:70). For example, in the UK, the AI technology has helped the government detect the large-scale corruption and fraud which cost extremely large losses. In the UK, the Department of Work and Pensions lost about £ 2.1 billion in 2016, a rise of £ 200 million only in a year. To cope with the fraud, AI has been used to track down and check fraudulent claims. AI started analysing phone numbers, writing styles and etc. When a claim is considered as suspicious

by AI, human investigators start working on it and try to decide if the claim is fraudulent. By 2035, it is predicted that the UK economy will be stronger with £630 billion added by AI (Marr, 2018).

Not only public administration, but also the legal world has been influenced by new advances caused by AI and these advances and potential advances have the capability to facilitate access to justice and help the jurisdictions become more efficient, faster, unbiased and neutral. Especially AI has made an impact on some areas of law such as criminal law, law of obligations, trade law, competition law, patent law, data protection law and legal issues of many different fields coming from various products and services. Although some of issues caused by AI need new regulations, some of issues caused by AI can be solved by existing regulations. But there are some problems which are about the AI system itself such as citizen participation, stability, transparency, accountability, privacy and participation. For instance, AI in various states of the criminal procedure is getting very popular and lawmakers are interested in some advances which are about justice administration and law enforcement. The advances range from envisaging where crimes might take place, results of criminal procedures and making risk assessments on the accused to assisting more competent management of the process without wasting time, money and energy (OECD, 2019:64). Criminal procedures are so sensitive that law enforcement made by algorithmic techniques which is not thought carefully may affect trust relations between governments and citizens because wrong people may be unduly imprisoned and penalized by prejudiced data mining[4] activities (Barocas and Selbst, 2016:692). Basically, the criminal law utilizes AI to recognize and analyses patterns to make statistical predictions about potential criminal activities in the future. AI has the power to connect manifold datasets to each other to have the better prediction and carry out complicated and more detailed analytics. For instance, automatic license plate readers, cheap data storage and ubiquitous cameras can give police officers major information including criminal suspicions caused by different behaviors on numerous citizens and help them to do their duties more quickly, effectively and accurately. In the UK, in 2012 Greater Manchester Police made its own predictive mapping software and this software can predict the likelihood of crimes in certain places for a certain time (OECD, 2019:64-65).

[4] Data mining can be called as an action of querying, collecting and deriving insights from the huge quantity of data.

Utilizing sophisticated language processing methods, ML and data analysis capacities, some researchers have made tools to build models predicting the results of cases with high accuracy by identifying patterns in cases. For instance, researchers at various universities in the UK and the USA made an ML algorithm which can predict the results of cases heard by the ECtHR with 79% (accuracy rate) on average (Aletras et al., 2016: 2). Some studies found that AI robots could predict decisions more correctly than experts at law could do at Supreme Court. These claimed that AI could foresee the justices` behaviors and mind-sets. For instance, in 2011, in certain cases, a project utilized the votes of any 8 justices between 1953 and 2004 to foresee the vote of the ninth with an 83% accuracy rate. In 2004, a study was made to predict the future and the study utilized verdicts from 9 justices that have worked in the same court since 1994 to foresee the verdicts of cases in 2002 with a strong accuracy (75%). For each year between 1816 and 2015, researchers made a ML statistical model which is called as a random forest. The machine model used its methods in order to analyse all prior years, tried to find relevant associations between the features of the cases and the verdicts of the cases and checked characteristics of each case for that year and made predictions about verdicts. Verdicts contain the information about the reverse of a lower court's judgment and the vote of the justice. The machine model kept the previous decisions in its database and it transformed itself into the more improved machine model which could modernize itself and learnt new information. From 1816 to 2015, the model accurately forecasted 70.2% of 28,000 decisions made by the court and 71.9% of 240,000 votes given by the justices. In 2004, a study stated that predictions of knowledgeable legal professionals had a 66% accurate rate. It means that the predictions of the model are better than the predictions of knowledgeable legal professionals. Lawyers with AI prediction models can recognize which information should be used to improve the chances of winning (Hutson, 2017).

In civil cases, the popularity of AI is increasing gradually in this time such as legal research, drafting contracts, reviewing documents and due diligence. The AI technology advances the effectiveness of document analysis for legal use and algorithms can be programmed to assess documents formally with the purpose of instituting change if required, highlight them as useful for certain cases and gather relevant documents to help make correct outcomes, by sorting through documents much more quickly and accurately than humans without wasting time, money or energy. For instance, ROSS Intelligence tries to use NLP to maximum advantage to help the review documents. Because the traditional due diligence

process is time-consuming and expensive for lawyers, AI systems can be used to help legal support experts carry out due diligence with more productivity and accuracy (Marr, 2018). A study found that each lawyer finished to review the five contracts in the study in 92 minutes with an 85% accuracy rate in his/her recommendations for changes. On the contrary, the LawGeex AI software finished to analyse five contracts in 23 seconds, and had a 94% accuracy rate in its recommendations for changes (Dysart, 2019). Wevorce[5] which claims that divorces will be amicable gives married couples the faster and affordable out-of-court solution (online) at a cheaper price. Applicants describe possible results which they desire and AI system shows them 5 modules and important choices which require to be rendered for certain situations. AI has the capacity to analyse data to predict the results of legal proceedings for clients and lawyers such as "if I file a lawsuit, how likely can I win?" or "Should I settle?" (Marr, 2018). There are some robots with AI which can help people file a law suit in certain issues. For instance, in the UK, the DoNotPay application is called as an AI-based robot lawyer, gives legal support more than one thousand fields of law and was used in 250,000 cases. The application successfully dealt with 160,000 by appealing over 4 million dollars of parking tickets (Mannes, 2017; Gibbs, 2016). In Russia, AI based machines have been created. For instance, Sberbank created an AI-based machine which can file claims for applicants and GlavstrahControl created an AI-based machine which can resolve insurance issues (Atabekov and Yastrebov, 2018:774).

Especially when people create AI which can imitate humans much more sophisticatedly and particularly in some platforms such as military industry and autonomous vehicles in the future, one of the biggest problems, even today discussed by scientists, will be ethical issues. These questions include some rules about robots` moral status about the banning of harming all morally relevant beings (such as humans) and other robots. Assume that a bank gives AI the responsibility to analyse and decide if costumer loans` applications are acceptable. Later, an applicant who is rejected claimed that the machine was biased and discriminated him racially in the court. In this kind of situations, the bank called any discrimination impossible due to the nature of algorithms and saied that intentionally the algorithms were made to treat applicants equally. But judges found that the treatment for an African person was not first and in the same circumstances, the machine accepted all the applications except for the applications of African people. In this situation, the right solution is very important. Firstly, the machine learner can give information which is that it

[5] Wevorce is a robot lawyer which allows couples to go through a collaborative divorce.

categorizes people according to the address information of applicants (the condition of past and current neighbourhoods where they live). One of the most important things in AI technology is to make AI transparent and accountable to inspection. To carry out the cognitive duties which have social dimensions needs, AI needs to know the social requirements and have the complicated chains of reasoning. The responsibility issue is very important. In this kind of situation, who will take the responsibility? Companies? Programmers? End-users? The autonomous machines? Today, there is no solution that all countries are united on. But according to the features of machines, laws and technologic advancements in the future, the responsibility can be changeable among companies, programmers, end-users and the autonomous machines (Bostrom and Yudkowsky, 2014:1-2). For instance, Tesla cars have a certain degree of automation with autopilot features. Due to American laws, even if you start the autopilot, the usage of autopilot is possible as long as the Tesla cars should check you with their own methods in certain times which makes the cars to be sure that you are on the wheel and are paying attention to the road. If anything bad happens such as accidents, the responsibility belongs to the car owners definitely (Tesla, 2016).

In law, predictability is very important and according to the case law, judges are obligated to follow some specific previous cases to make verdicts on similar cases. On the contrary, engineering does not stick to the past and it follows the speed of the technology. Due to this, although law systems want to create a predictable environment which can help people optimize their own lives, for engineering the predictability is not important at all and it transforms itself into the technologic improvements much more quickly and effectively. In this situation, the major issue is whether law and engineering which have different priorities and mind-sets can work together to get used to the future advancements for the wellbeing of state and humans (Bostrom and Yudkowsky, 2014:1-2).

Rather than eradicating human intervention, computerisation has the impact on alleviating workloads, by making them free from the labour of highly repetitive tasks or tasks which gives insufficient intellectual stimulus. The AI technology in law can be a chance to unchain the potential of the people concerned and judges, public prosecutors or advocates can reassign them to jobs that cannot or should not be carried out by humans. This chapter focuses on law (such as AI`s current applications in law, AI in the practice of law and in the administration of law), the use of AI in legal reasoning, courts, the models for

legal reasoning, legal technology, the regulation of the legal analysis systems, legal technology, judicial reasoning: the making of legal Information, the ways of the knowledge and information representation as well as the description of particular artificial intelligence methods and techniques which are helpful to back up automated administrative jurisdiction. It gives the examples of practical and main AI applications in law enforcement (such as Taxman, Ross intelligence, Kira systems and etc.), the notable achievements in the implementation of AI in law in some countries. It discusses the legal relevance of autonomous machines: technology, law and autonomous decision-making in law and the theoretical background of AI in the legal area. It analyses the investment of countries which have the legal technology in the world and Turkey. It inspects the legal reasoning methods and examines which legal reasoning methods can be effective according to various legal systems. This chapter provides the background about how legal analysis systems can be used in courts and which methods can be used in different law structures of countries. This chapter examines the current status and development of the AI technology in the legal field.

The scope of computer applications in the law is highly broad. One of the most popular applications is an application which is used to deal with problems coming from law. Generally, legal AI systems are separated into 2 groups which are legal retrieval and legal analysis. Legal retrieval systems permit advocates to sift through databases, including statutes, codes, regulations, past cases and etc. Legal analysis systems get a group of facts and decide the possible results of the facts in a specific field of the law area. Later, McCarty (1980) discovered a third group of legal AI systems as integrated legal systems such as computerized title registration systems that render decisions about individuals' rights and liabilities. Mehl (1959) said that there was no essential distinction between first two groups. However, Shannon and Golshani (1988) said that the distinction is that text-retrieval systems do not comprehend any field of law. This PhD thesis will be based on legal analysis systems (Popple, 1991:11).

In the world, these systems can be used as an assistant or helper in judicial decision-making. They may make judges` work easier or can deal with easy work for judges. In the world, AI systems already have helped doctors diagnose diseases, understand scans and recommend accurate treatments. Also, the AI system has been used as a judge to predict numerous cases in the ECtHR. It has decided the same decisions as judges in almost four in five cases. An algorithm checked English language datasets for 584 cases according to 3

articles of the European Convention on Human Rights which are article 3 (concerning torture and inhuman and degrading treatment), article 6 (protecting the right to a fair trial) and article 8 (on the right to respect for a private and family life). The logic behind the use of 3 articles was that they gave the largest data set. The algorithm was used to discover similar patterns in documents. To avert prejudices, researchers chose an equal number of violation and non-violation cases to analyse. The result showed that the most trustworthy dynamics for the prediction of the judges' verdicts were languages, topics and circumstances in documents. The circumstances part of the documents consisted of data about the factual background to cases. At the rate of 79%, the AI verdicts were accurate to judges` verdicts (Allan, 2016). Judgments made by ECtHR are greatly linked to non-legal facts. The judges can be called as 'realists', rather than 'formalists' in the terminology of legal theory.

3.2. Artificial Intelligence and Law

The relations of AI with law can be highly productive and vital for the humanity. Basically, the concept is that AI and law engage in computer tools and mathematical methods to render law more comprehensible, predictable, controllable, helpful and available. The considerations about machines working in law date back to Gottfried Leibniz in the 1600s. He considered how mathematical formalisms could advance the law (Sartor, 2005). Since the mid-20th century, ideas about the usage of the AI technology in law have started to increase. Basically, the AI technologies applied to law mainly started focusing on rule based legal systems and knowledge-representation. Especially nearly all the studies took place in university laboratories along with numerous activities in Europe. Numerous early AI projects in law concentrated on modelling legal arguments and legislation and legal rules between 1970s and 1990s (Bench-Capon et al., 2012). Since 1987, the International Conference of Artificial Intelligence and Law (ICAIL) have established conferences demonstrating AI machines in law (ICAIL, 2014). But since approximately 2000, AI and law have changed their ways from knowledge-representation methods to ML based methods. Recently, in AI and law numerous tools have belonged to legal-technology start-ups utilizing ML to make laws more competent or helpful in different ways (Farris, 2018) and other sophisticated advances took place in interdisciplinary university law-engineering research places. Humans can utilize the AI technologies in law effectively in three groups. They are administrators of law (such as judges, public persecutors, legislators, administrative officials, police and etc.), practitioners of law (such as lawyers), and entities that are

managed by law (such as citizens, companies, organizations and etc.) (Surden, 2019:1327-1328).

3.2.1. Artificial Intelligence and Law: A Close Look at Current Applications

Lawyers` tasks can be various such as measuring the power of their side` position and the opposite party, keeping away from risks, making contracts and dealing with other documents, pursuing lawsuits, and etc. Is it possible that the tasks which are carried out by lawyers can be done by automations machines? Litigation discovery and computer-assisted review are very important to help the AI technologies in law to be used efficiently. Litigation discovery can be considered as the process of acquiring evidence for litigation. In modern business litigation, generally it is about acquiring and analyzing a large amount of documents and files. Document review can be seen as conventionally a duty carried out by lawyers who rapidly read documents (Larson, 2017).

In the mid-2000s, by the help of the coming of the electronic discovery, supposed predictive coding and computer-assisted review came to existence. Predictive coding can be considered as the wide-ranging concept for a set of computer-assisted methods of the document review. Between litigation-discovery documents which are pertinent or not pertinent, these methods try to make a distinction automatically. In recent times, these predictive-coding tools have started to utilize AI methods like ML and knowledge representation, to assist the automation of this activity. A few ML e-discovery software systems are trained on sample documents such as emails, texts and database files which are supposed to be pertinent to the range of the lawsuit. The automated-review software systems are essential for the growth of e-discovery, as documents and information connected to the certain litigation started rising into millions that are exactly beyond the power of human ability and even any manual capacity. But there are some restrictions for automatic predictive coding (Surden, 2019: 1329-1330). Computers do not have the enough capacity to make an ultimate decision about the relevance of documents automatically for now. Users make a decision about if the documents are pertinent to cases. To a certain extent, humans can consider a predictive-coding software system by utilizing patterns and heuristics in order to remove documents which are not highly possibly pertinent to the case. Therefore, instead of having human lawyers who struggle with tons of possibly unrelated and inappropriate documents, a predictive-coding software system is used to remove irrelevant documents to

make lawyers` time more for documents that are pertinent (Yablon and Landsman-Roos, 2013).

Basically, it means that the sophisticated AI software still needs the human assistance in the loop. In the field of law or legal practice which contains verdicts, the existence of human will possibly be hard to replace taking the existing status of AI systems into account. The litigation discovery example has another vital point. Within numerous documents, there are regularly obvious and primary heuristics which are recognized by algorithms. Provided that a person has a lawsuit connecting with hate crimes, the person can train the software to search for keywords which are possibly become visible in video recordings and e-mails, or the system can utilize the data which it has found in preceding hate crimes` documents about actions and words which highly possibly come out in e-mails and video recordings. Numerous existing methods need problem fields which obtain primary formations or patterns. Even though that may apply to certain subsets of advocacy like document review, there are numerous advocacy tasks which contain conceptualization, abstraction and other cognitive tasks which recent AI technologies are not great at. However, ML can be used in settings and in tasks which are conventionally carried out by advocates such as reviewing contracts all together (for instance, in a merger due diligence setting). Some AI systems can provide a pattern document for a lawyer or emphasize problems for a lawyer to be alert. However, in more complicated circumstances, eventually the AI software systems classically do not produce the ultimate product like a total, written and absolute merger contract. This means that people should make important decisions for complicated, multifaceted and advanced tasks. ML can be used in the practice of law for the forecast of results such as assessing the legal position of the client and the power of client arguments in a court case. Progressively, lawyers and others paying attention to the result of legal cases utilize ML systems to predict the result of cases and ML helps measure their success rate in a case (Marr, 2018). AI technologies are highly possible to automate legal tasks only if there is several formations or patterns which it can control. On the contrary, the greatly abstract concepts such as abstract thinking, human emotional intelligence and big picture strategy are beyond the capacity of AI for now (Surden, 2019: 1330-1332).

Table 11: Current Applications of AI Used in Law

Application	Descriptions	Software/ Firms
Due Diligence	To unearth background information, litigators carry out due diligence with the help of AI instruments. It helps to recommend clients on the options available in legal situations and generally this section contains contract review, legal research and electronic discovery.	Kira Systems, Leverton, eBrevia, Ross Intelligence, JP Morgan, Thought River, Law Geex, Judicata, Legal Robot, Casetext's CARA.
Prediction Technology	With the help of AI systems, the software can forecast litigation outcomes.	Everlaw, DISCO, Catalyst, Exterrro, Brainspace discovery, Intraspexion, Premonition.
Legal Analytics	Advocates can employ information taken from past cases win/ loss rates, previous case law and judge's history. The information is utilized for the comprehension and interpretation of trends and patterns.	Lex Machina, Ravel Law
Document Automation	To fill in documents on the base of data inputs, system patterns are employed by law firms.	The report, perfect NDA
Intellectual Property	Advocates employ AI instruments that lead them to check huge IP portfolios and to draw insights from the context.	Trademark Now, ANAQUA Studio, Smart Shell
Electronic Billing	Legal AI assists advocates to compute advocates' billable hours automatically.	Bright flag, Smokeball

Source: (Dabass, J. and Dabass, B.S., 2018)

To assist humans to complete the contracts, the AI technology in law checks and inspects legal agreements which are like leases and commercial contracts to find out the proper information from them, and/or analyse them against current codes/ regulations. One of the simplest soft computing methods which assists people to make a decision is called as

a fuzzy rule-based system and this method is rooted in the natural language. It functions properly when handling the vague computer information. It transforms the human solutions into fuzzy dependency and common language employing fuzzy if-then rules. NLP is more precise and quicker when it checks contracts in comparison with human advocates. For instance, SmartShell designed with AI and NLP supports users in reviewing documents, identifying issues and making legal claims. Lex Machina has the ability to provide exceptional insights and information with users such as judges, lawyers, parties and firms by searching millions of pages of litigation data and predicts the approximate percentage of winning or losing cases. It gives information and tendencies about case timing, resolutions, damages, remedies, and findings and is employed by successful lawyers to foresee the results of their lawful approaches. With this system people can predict how long it will take for your case to reach important places, like the time of the summary judgment, class certification, trial, termination and decision time. The system inspects the results and findings given in parallel cases to yours. The system is helpful to analyse your opposing law firm and the legal team you compete with by checking their past performance, understanding their strengths and weaknesses and their action plan, learning about other cases against them which are similar cases to your case and assessing your opposing party`s behaviour (Lex Machina, 2018).

Even though hybrids are popular in AI contract review process, there are mainly two product varieties. One of them is called as volume contract review and it inspects many legal documents to hunt for certain details to provide the overall picture to clients. The important thing is to assist users to catch differences which are noticeable for more legal research. Secondly, the contract assistance which is beneficial for users who are not lawyers and helps them notice important clauses, re-check and put some clauses more on the contract in accord to standard domestic/international rules/codes.

Legal documents consist of images of witnesses, areas and texts. DL looks appropriate for image recognition that is employed for identifying like facial identification, motion recognition. In addition to this, DL assists in detecting lane, roads, cars, parking slots and other pertinent information in an image. In the subjects of criminal justice, criminal investigations and law enforcement, video and image analysis can be utilized to acquire data and information concerning humans, places, and actions. The examination of videos and images looks highly sensitive and humans who work in the analysis of video and image

should be professionals especially due to the fast changes in the technology. The recruitment can be highly expensive for countries. But, AI algorithms have the power to deal with these imagines and videos easily and successfully. The algorithms can recognize weapons, knifes and other objects, and detect faces and complex situations (Rigano, 2019:2-3). In the subject of the image classification, a conventional neural network is utilized to increasingly extract more-sophisticated representations of the image content (Bhatt, 2019). Basically, it can be called as a popular DL structural design which repetitively takes the knowledge from constructive attribute demonstration, straight from picture data.

The use of the AI technology cannot be confined to contract reviews only and AI goes far beyond contract reviews. There are two broad braches which are knowledge systems (legal research along practice lines) and predictive systems (case outcome prediction according to particular issues and/or litigation situations rooted in court verdicts). Legal research and litigation prediction systems, including rules, case law, regulations and case verdicts, do not only focus on contracts but also analyse the information taken from the practice of law and from rules/codes (Tromans, 2017).

Knowledge system is considered as the codified experience of agents. This experience is the source of data for dealing with difficulties and problems and the knowledge is seen as formulated, recorded and designed. Knowledge is mainly based on experiences and the AI software with knowledge system can improve itself over time by learning from examples (Stefik, 1995:294). The objective of this knowledge system is basically to obtain the knowledge of human experts to support the decision-making process. Examples of knowledge systems consist of expert systems. A knowledge system might differ according to its problem-solving techniques or approaches. This approach utilizes laws as the knowledge representation for the information in the system and is thus referred to as a rule-based system. Another approach, which is called as case-based reasoning, can substitute cases for codes and laws (Moore, 2018). The predictive system includes a group of methods and instruments which are employed for the examination of historical information, the choice of most suitable modelling formation for the computation of predictions, model variations, improvement of predictions and observing and modifying of predictions. Prediction is the process of making statements about situations whose results did not appear. This prediction style can be used in many areas such as health, law, environment and business. Generally, prediction methods are. For instance, in 2004, some professors from

Washington University used their system to check the accuracy of the algorithm in predicting Supreme Court verdicts on 628 cases in 2002. These professors matched the algorithm's decisions with experts' verdicts. The algorithm was more accurate by rightly predicting at 75% success compared with the experts' 59% success. Between 1816 and 2015, Prof. Daniel Katz and others made a study on case verdicts of the Supreme Court in 2017 and attained success at 70.2% on the result prediction. In the same way, Nikolaos Aletras at University College London and his colleagues employed ML to inspect the case document of ECHR and attained success at 79% on the result prediction (Faggella, 2020).

Various companies and organizations employ some special AI instruments to make burdensome legal tasks simpler (Faggella, 2020):

- **Kira Systems:** It is great at spotting, extracting and inspecting documents in contracts. It has the power to recognize and examine in detail almost any provision in any contract with the outcome of customer-reported time reduction of 20-90%. Basically, Kira Systems robotically interpret and analyse contracts for specific provisions (e.g., change of control, assignment, term), extract its findings to summary charts, and contains workflow instruments to assist users to purify and clarify outcomes. It is originally designed for mergers and acquisitions due diligence where advocates have a great difficulty in organizing numerous documents. The system is programmed to recognize and extract any required provision from nearly any contract. For instance, just in 2015, Kira was showed confidence by more than $100 billion of mergers and acquisitions transactions. Users gave details about savings of 20–60% or more time on contract review projects, even when they used it for the first time. It can automatically spot and take out a pertinent language from contracts in nearly any format. Summaries can be produced in seconds, and analysis which usually can take weeks of preparation can start in just some minutes (Kira Inc., 2017).
- **Leverton:** It is considered as an AI-powered data extraction platform and extracts relevant computer information like costs, dates, requirements, rents and obligations from a huge number of files and texts, arranges them systematically on a computer program that is utilized for prediction, collect leases in real estate transactions. This platform is equipped to analyse contracts at high speeds in twenty languages. With the help of optical character recognition and DL technology to inspect and spot the

huge amount of computer information from numerous resources such as PDFs, scanned paper. This platform produces information sets which give a clear and precise image of the company's investments (Leverton, 2017).

- **eBrevia**: It asserts that its software employing ML and NLP has the ability to inspect precisely more than fifty documents in less than 1 minute. Legal representatives have difficulty in checking numerous and complicated contracts and they might miss vital points which can cause legal issues afterwards. The system carries out automatically the diligence process on the buying or selling part by rapidly checking numerous contracts for problematic or missing provisions and produce diligence reports in different formats. The system has the power to follow and report contract expiration dates, auto-renewal, liabilities and obligations. It can help contracts obey changes and adjustments in codes and law (eBrevia, 2019). Basically, eBrevia utilizes NLP and ML to take out pertinent information from legal contracts, texts and documents in order to help legal representatives in the subjects of due diligence, lease abstraction and analysis. The system converts the information of the scanned documents to a searchable document. eBrevia sums up the papers which are taken out into a report which can be put into various formats (Faggella, 2020).
- **JPMorgan Chase:** It spent numerous money on AI technology in law and produced a Contract Intelligence (COiN) which is chatbot created to inspect and examine legal documents in a detailed way and take out main data points and clauses from tons of documents in 2017. It asserts that their program which is called as COIN can get 150 attributes from 12000 commercial credit agreements just in a few seconds that is equal to 36000 hours of work by lawyers and their employees (Sennaar, 2019).
- **ThoughtRiver:** It is an AI tool in law which deals with contracts, portfolio reviews and explorations for enhanced risk management. This system was made to carry out automatically the synopsis of the high-volume contract review. When an individual using this tool starts reading content findings, he/she can at the same time read the meanings of clauses. This tool has the capability to flag risky contracts robotically. The system can automatically determine which properties are appropriate for your contract type, can choose contracts by analysing the meaning of clauses, can confirm contracts within predefined policies and propose techniques for revising and approval by merging document analysis, legal knowledge, ML and etc. It employs

the AI technology and ML to alter legal contents into numeric forms to unearth issues on documents.

- **ROSS Intelligence:** It assists users to answer questions after sifting through millions of documents. To a certain degree, every file and court case needs diligent legal research. But there are tons of documents to read, memorize and take a note. This process can make advocates tired and too busy and lawyers have the limited time to focus on each case. The ROSS Intelligence system is designed to answer users` questions and give users information like recommended readings, connected case law and other sources.

- **Casetext's CARA:** It is considered as an AI research tool which analyses a brief and complaint, and predicts the outcomes cases which are constructed on the same facts, matters, and etc. It notices untrustworthy and negatively treated cases.

- **Judicata System:** It inspects legal briefs to assess their advantages and disadvantages to give a point separately for a brief rooted in disputes, arguments and contexts. It employs a combination of AI techniques such as NLP, citation mapping, ML and human editors to recognize legal concepts in case law, and illustrate the relations among the legal concepts. It employs the computer information to produce instruments which inspect the power of legal briefs.

- **LawGeex:** It asserts that it can validate contracts provided that they comply with predefined procedures. Provided that they do not meet the procedures, the system offers advices for some changes and approval. Generally, the system can offer solutions including the process of ML, text analytics, statistical benchmarks and legal knowledge. It is predicted that the users can reduce costs by 90% and decrease the contract analysis and the approval duration by 80 %.

- **Legal Robot:** It is mainly about contract analytics. Software is created for automatic contract reviews. This system has the ability to modify legal contents into numeric form and it created a legal language form from thousands of texts and documents. It can give a score to contracts rooted in language complexity, legal phrasing and enforceability. With the matters flagged by the system, it gives advices on enhancing the contract's readability, consistency and compliance by assessing it on finest practices, risk factors and dissimilarities in jurisdiction. Generally, a legal advice needs the careful analysis of the codes and regulations and shows the application of

recommendations on particular issues. It offers data created by automated analysis of documents and texts in connection with other legal documents and cases. The system employs ML and DL to make abstract representations of the language in legal documents. The system focuses on English language contracts coming from public and private sources in the US, Canada, UK, and Australia. In general, the algorithms identify the way users use legalese in English, under common law (Legal Robot, 2019; Faggella, 2020).

- **Loom system:** It has the capacity to feature win/loss rates and judge ruling information. However, this system is just available in some chosen Canadian provinces. Using various algorithms, the Loom system inspects information, performance and actions and gives the operations of the information technology the continual insight. By modelling how humans examine digital information, the system merges analytical capabilities with computational speed to replicate and improve the whole data analysis cycle (Pegnato, 2017).

- **Everlaw:** It is called as a cloud-based e-discovery platform with the use of AI and ML which helps advocates manage and sift through tons of texts, emails and documents exchanged between parties before a trail (Sandler, 2018). It employs the predictive coding quality to make prediction models rooted in as a minimum 300 documents which were categorized as relevant documents or irrelevant documents by humans who use them. The prediction model's outcomes are said to assist users to decide which documents are most pertinent advices and actions.

- **DISCO:** It has the ability to show faster outcomes employing the cloud technology for document exploration on huge data volumes by finding pertinent documents faster, boosting review speeds, and constructing improved, more precise quality control protocols and utilize the prediction technology to propose which documents look relevant or irrelevant to users. It gives points on tags (from -100 to +100) to enhance the predictability of outcomes. DISCO demonstrates search outcomes with each document's score. It proposes which material can be helpful for users.

- **Exterro:** It states that E-discovery depends on seed sets and a part of documents that the human reviewers choose from among all the documents to be analysed. Human reviewers tag the documents as "responsive' and "unresponsive. The system counts on this seed set to develop an algorithm that decides on the responsiveness of

documents. The outcome is constantly defined by users, by coding and inputting in sample outcomes until wanted outcomes are taken. Finally, the system can be appropriate to all the documents (Lee, 2019).

3.2.2. Intelligent Interfaces

Intelligent interfaces are designed to give right answers which are modified to users` needs. The intelligent interfaces utilise converging exponential techniques in order to comprehend clients profoundly, improve operational effectiveness, and make greatly individualised services and outputs. They normally use the drop-down set of selections and checkboxes to shift clients all the way through a sequence of steps because the true and the accurate information can be found, for instance in answer to a definite legal inquiry or be employed to seal in the misplaced factors of a set manuscript. These can permit lawyers to design the capable system according to their needs and/or help them complete a formally allowed manuscript. The interfaces are planned to help reply to an assured form of job quarrel, or to help insert in information to a particular type of the official document (Dabass, J. and Dabass, B.S., 2018).

Even if intelligent interfaces are useful for humans and facilitate their works in numerous areas such as law, they have some risks which people should be careful of (Berman, Cook and Dajee, 2019):

- **Ethical risks:** Big organizations, corporations, firms and countries can manipulate citizens, detect and monitor people for their own interest, and discriminate people with biometric data. In some communities, minor groups can be detected and maybe in some ways can be criminalized purposely.
- **Privacy**: Data and interfaces can be used against some people in the community. With the help of these systems, especially today a great amount of information in numerous areas can be taken and the information can be delicate and important for people`s lives.
- **Security:** Today, intelligent interfaces employed by organizations, firms or states contain a great amount of information and data. But, provided that the data is not protected well, the data can be stolen such as a fingerprint or personal information.

- **Regulatory**: This area is new and too wide and the use of intelligence interfaces has improved significantly. Sometimes law may fail to cover this area wholly.

Triage/customer-directing interfaces are present in a very basic way at a few law companies and their aims are to cope with the public and request clients to do some works such as writing an email to explain their issues or disputes. AI applications can be utilized to assist guide clients to reach the right results and comprehend their questions and answers employing NLP. By the use of ML, the triage services can advance its replies to certain kinds of client question over time. The AI can directly connect the data given via the triage system to the organization's own research into the types of case worth pursuing, and connect to the organization's customer relationship management system (Tromans, 2017). For instance, Microsoft employs Extern software to perform e-discovery exertion of law officers and it saves money at 95% (Dabass, J. and Dabass, B.S., 2018). Most of advocates highly possibly know bots but just a few of them think how they employ bots in the legal area. For instance, LISA is a legal intelligence support assistant which is the production of an advocate from Yorkshire. The objective of this assistant is to assist parties to make a written agreement and in this way they may pay less because they do not need to go to expensive, slow and adversarial human lawyers. For the 54% of small businesses which do not have advocates, this assistant is very efficient tool which can assist parties to reach agreements, decreasing their costs and the risks of the court case in the future. There is a famous bot which is called CaseCrunch made by Cambridge students. Their initial 'lawbot' assisted people to determine if they had been the victim of a sexual offence. Also, it is said to foresee the result of nearly any legal issue with 71% accuracy. It employs the Facebook messenger platform and users speak with it by using normal language. The bot requests some answers from users about their problems and make a Win/Lose prediction (Jones, 2018: 19-20).

3.2.3. Artificial Intelligence in the Administration of Law

In recent years, as a result of the development of the AI technology, the increase in the processing power of computers and the storage of millions of data with cloud computing, it is seen that AI studies have increased rapidly. AI systems which find solutions with the data obtained in the field of law are a new concept. The use of the legal data by means of AI systems can be seen as the completion of more accomplished tasks such as the analysis of documents, the prediction of cases and routine tasks in a shorter time.

In the world, there are some successful results in law by the use of NLP, which is a sub-branch of AI. The systems with NLP reduce the workload of people working in this field by analysing labelled legal data, enabling processes such as file classification, petition or report summarization to be performed in a short time. In addition, in simple legal processes, it enables information to be obtained through the software platform without going to the legal units. AI systems that try to predict the results of the case are popular and used widely in the world. The most important element in the outcome of the lawsuit emerges as the data set. In countries where legal data are shared, it has been observed that AI studies have developed and progressed faster

3.2.3.1. AI for Judges and Administrators in Decision-Making

The use of the AI technology in the administration of law contains government officials who utilize techniques about the use of AI systems to give important legal or policy verdicts. Sentencing or bail verdict by judges to criminal defendants can be a great example. For instance, when judges make verdicts about whether to release criminal defendants on bail pending trials, they have to make risk assessments as to the risks of the defendants with regard to reoffending. Nowadays, judges more and more use AI systems to give a score which tries to measure a defendant's danger of reoffending. This software generally uses ML algorithms which employ past crime data and information and try to finish the case by making predictions about the defendants before the judges. Even though judges do not have to obey the automated risk assessment scores, these scores may affect judges (Kehl et al., 2017).

Government agencies can obtain the AI software which can decide whether applicants should be accepted or not. The public sector is interested in searching for applications to advance services and cognitive systems can transform every side of government functions. U.S. Citizenship and Immigration Services created a virtual assistant which is called as EMMA and this virtual assistant has the ability to give answers correctly to questions such as approximately 500,000 questions each month. EMMA can take lessons from its own experiences and the more questions it answers, the more intelligent it becomes. With customer feedbacks, EMMA can understand which answers can help customers and can increase its accuracy (Bahal, 2015). At present, cognitive technologies have the ability to follow 1,900 aircrafts at a time by analysing their destinations, speeds, departure and arrival

times. For instance, En Route Automation Modernization (ERAM) boosts capacity and advances effectiveness in the sky. En Route controllers can follow 1,900 aircraft at a time. In the future, the AI technologies may produce big transformations in the public sector, renovating the working types of government officials, eliminating some jobs, redesigning others, creating totally new jobs.

Cognitive technologies can be highly useful and effective on the government work. AI technologies can potentially decrease backlogs, reduce costs, deal with resource constraints effectively, develop the accurateness of projects and predictions and cope with numerous other tasks which people have the difficulty in such as forecasting fraudulent transactions, detecting criminals by using facial recognition systems, and checking tons of documents in the fastest way for the most pertinent contents. These systems are employed as efficiency tools to permit civil servants to more rapidly and efficiently deal with applicants. But it is essential to highlight that the AI software usually includes automated computer assessments which either completely lay down the result of the verdict or, at least, influence users along with recommendation.

3.2.3.2. Artificial Intelligence Used in Policing

Policing is related to the administration of law and the usage of AI can increase the efficiency of policing in the administration of law. Law enforcement started turning to AI to augment officers and agencies (Walch, 2019). Numerous police departments have already used AI to help foresee and spot suspicious people and areas. Advanced computational power and a huge amount of data may help police officers make better decisions about violence and threats and AI can provide numerous benefits to police forces as they deal with crimes and enforce the law as a part of the administration of law (Joh, 2018:1139). Police forces are largely employing AI systems in two main contexts. The first part includes predictive policing and is called as the usage of the ML system to spot and distinguish patterns according to previous crime data to try to forecast the time and place of possible future crimes. Police forces employ the information to adjust their resource such as staff and materials and try to be in the crime scenes before crimes happen. For instance, in 2018, INTERPOL held a worldwide conference on the benefits and dangers of robotics and the AI technology in law enforcement. This conference demonstrated that, even though AI is considered as a new concept in law enforcement and there are some doubts to use AI in law

enforcement, numerous government intuitions in various states are discovering the AI-based applications to tackle with crimes effectively. Even though countries do not use a national predictive policing programme, predictive policing instruments was made and organized in some cities globally. In the US, the Palantir Technologies has created and tested predictive policing applications in some cities of the US such as Los Angeles, Chicago, New York and New Orleans, and PredPol (the tech company) created a predictive policing tool and has been sent in about forty agencies across the US since 2012. Predictive policing tools have been used in various countries such as in China, Japan and the UK locally. For instance, Japan has declared its aim to use the system in the run-up to the 2020 Tokyo Olympics and the system was accepted in the UK which could be employed in all national police forces soon. In addition, exploring improvements in machine vision like facial recognition in relation to predictive policing have been highly popular. This mixture could help improve the capacity of policing to avoid crimes because this mixture can recognize when and in which police forces should be and at the same time, check recordings gathered by means of various cameras and drones to recognize criminals even in a crowded place or even forecast the potential offender according to facial expressions which may point out guiltiness (McCarthy, 2019).

AI in law enforcement has a bright future about facial-recognition technology. Facial recognition is very functional across different industry verticals. Nowadays, this technology helps news organizations recognize 3D logos in their products, giving secondary verification by way of mobile applications. This technology helps in indexing image/video files for media and entertainment businesses, helps organizations or groups recognize and save human trafficking victims, is used in image analysis to sift through millions of records in seconds and help smart surveillance cameras embedded with AI for facial identification become quicker and more correct under all conditions (Gupta, 2018). Police forces can scan crowded places or try to recognize potential criminals by comparing photos or video scenes with databases which include photos of people known by the government or law enforcement. For instance, the FBI has 2 systems which employ the facial recognition software. One of them is called as the Next Generation Identification System, employs a repository of mug shots (the Interstate Photo System). The system detects a potential suspect from a set of photos. Another one is called as the Facial Analysis, Comparison, and Evaluation Services Unit and a 2016 report from the Government Accountability Office states that it has the power to analyse 411 million face with mug shots, photos in the federal

and state databases and the Department of State's database of passport and visa applications (Andone, 2018).

3.2.3.3. AI and "Users" of Law

The term of users is citizens, firms and businesses which need to know law and employ the law instruments. Numerous businesses employ business logic policy techniques to help these businesses obey the law such as private expert systems which include computer-based and general rules about business activities which highly possibly comply with, or not comply with, different governing instructions. Expert systems are employed fruitfully for design, diagnosis, and observing in a variety of industries from computers to accounting. Perhaps the most famous business application is known as XCON (for eXpert CONfigurer). It has various computer components which constantly modify and can be configured in a huge number of ways (Leonard-Barton and Sviokla, 1988). A business might have to handle complicated import/export regulations. To guarantee obedience, they may imitate pertinent codes employing knowledge representation and logic methods to assist the internal processes to keep away from actions which breach pertinent codes. Users utilizing AI methods must make computable contracts which are electronic legal contracts in the computer-understandable type. Numerous securities contracts where the trade contracts are stated in the computer understandable type which permits the system to mechanically perform the essential trade logic behind the contract can be seen as very good examples. The last example is can be legal self-help systems such as the "Do Not Pay" application which give regular users answers to basic legal questions (Surden, 2019:1334-1335).

3.2.4. Contemporary Issues in Artificial Intelligence and Law

Today, the relationship of AI with law is getting stronger day by day. However, there are some essential contemporary issues which should be dealt with such as the potential prejudices and discrimination in AI based systems. The accountability and legal standards in AI-based decision-making processes have not made a progress at the same speed or rate at which the AI technology have made a progress. There are various algorithms such as policy-neutral algorithms, which are short of an active editorial hand, and policy-directed algorithms, which are purposely structured to advance a designer's policy agenda. In several cases, policy-neutral algorithms can be affected by social and historical bias. By way of

active social engineering, businesses can select to deal with these problems. Amazon confronted controversy about its algorithm which does not provide same-day delivery with low-income neighbourhoods. Policy-directed algorithms are deliberately designed to cope with obvious prejudices and favouritism or to improve a policy agenda. Businesses should offer transparency, clearness and public accountability about source codes, the editorial nature of the algorithm and certain aims of their editorial strategies. Provided that a search engine chooses to delete the results of opposite opinions, it ought to inform users because users should know that they watch a trimmed version of the searched results. Provided that a service makes the most effective use of outcomes for financial intention without warning users, it may violate the Federal Trade Commission criteria for disclosure (Tene and Polonetsky, 2017: 125-126).

When government workers employ ML or other AI systems to give essential decisions which can have an effect on human life or freedom (such as criminal sentencing, detention or arrest) they should be sure that the decisions of the computer models are fair and equal for people. There are some possibilities that some groups can be hurt due to the data of computer systems which might be prejudiced against some groups (Tene and Polonetsky, 2017: 131-132). These biases should be controlled regularly and transparency and accountability should be the priorities of people, companies and countries making these systems. There can be trickier issues about giving the right decisions. Suppose that a system which employs ML to forecast recidivism makes a predictive system according to previous police records. If the police have bias against some groups, the police arrest them at an unreasonably higher rate than others for same crimes. Because this rate appears in the records of police arrest data, ML software makes decisions by using the police arrest data with bias. The mechanisms of some AI-based tools cannot be interpretable for anyone. But the decisions should be supposed to be explainable, interpretable, or transparent. The power of innovation and competition for ML force analysts and data scientists to think new methods and ideas and focus on algorithms which are more predictive. These algorithms contain of neural networks, random forests and gradient boosted groups. They are characteristically more precise for forecasting rare phenomena, nonlinear or faint (Hall, 2016). The explanations as to why they made the decisions can be highly useful to understand the thinking way of the software and the possible mistakes can be eliminated. This level of interpretation will permit developers and even users to fully comprehend the flaws and mistakes with both the training data and compute architecture of the algorithm. For instance,

safety critical software must not make any mistake and due to this situation, they must be explainable. However, Neural Networks perform very well with accurate results, but they fail at logical and consistent answers and explanations. Autonomous vehicles have become highly popular and we need to understand how vehicles make decisions, particularly in case of an accident (James, 2018).

An AI-based decision making system can mislead judges with its disproportionate objectiveness and accurateness. Provided that a judge accepts a report of the AI system which shows that the accused can commit a further offence at an 80.2% rate, this forecast is considered to include infallibility and neutrality. But judges (or other government employees) might inappropriately comply with this false accuracy, failing to analyse the limitations of the model correctly, doubts and subjectivity. Even if the model is precise, still with the scores of 2 times out of 10 the accused possibly will not commit a further offence again (Surden, 2019:1335-1337). Government agencies usually do not make their own algorithms and they acquire algorithms by paying money to private companies. This means the algorithm looks like a closed book except for owners and purchasers in a limited way. There is not any institution or agency which regulates rules or observes AI machines. Without suitable and appropriate safeguards, these machines risk eroding law and weakening individual rights (Tashea, 2017).

3.2.5. Law as a Body of Rules

Dating back to ancient Rome, legal formalism can be called as a type of legal consideration which stresses logic function. Legal systems can be called as a closed system which is able to provide what is necessary without the help of others in logic and it supports syllogism reasoning logic model. This means that legal norms are used as major premises and particular case realities are used as minor premises. After these, verdicts are deduced. In this way, a robot can make a fair decision by complying with the logic of legal reasoning. In the use of AI in the legal world, legal formalism provides theoretical basis for AI's judicial application.

Legal formalism stated that judges can be thought as adjudicators who are considered as machines in nature and they function by means of algorithms with codified forms. These machines make verdicts without the feeling of favour, hesitation, fear or etc. for issues. Law is considered as a store of regulations and laws and creates algorithms which make

automatically verdicts about cases by the help of a proper logic. By means of this thought, first generation legal expert systems appeared like Taxman (McCarty, 1977) and these systems created new options for various approaches on robot regulation. For instance, after a violation takes place, the machine puts into practice the representations of pertinent law in the machine`s program (Schafer, 2016:57-58).

3.2.6. Law as a Body of Exogenous Factors in Society

Legal realism is essential to understand the AI usage in law and can be called as a legal movement which occurred in U.S between 1901 and 1951. The legal realism approach can give the theoretical assistance for AI Simulating Judge's thinking. It supports legal techniques to bring the assessment of social interests into the standard of legal argumentation. This means that judges live in the society and they are influenced by social experiences. Judges take care of many conditions such as abstract rules, public policy and interest and value judgment when they make verdicts. American jurist Oliver Wendell Holmes Jr. thinks that law does not live in logic but it lives in experience. Definitely, this approach says that legal rules have some roles in judicial-decision making, but exogenous factors have more important roles. The stress of the approach on subjective judge and legal reasoning flexibility transforms AI research modifying from simulation of the external logic of legal reasoning to the constancy and the generality of judicial experience and the exploration of the inner thinking formation of judges (Cui, 2020:35).

The practice of law can be called as a vastly social activity taking place in the compound environment of legal practice before going into compound social communications and direct involvement in courts. The legal realism thinks that legal information is broader than law and fact. It is created through society and functioned through dynamic processes in the broader legal world that are compound, complicated and depends upon social circumstances in methods that it is hard to visualize information and communication technology capturing (Morison and Harkens, 2019: 630). In the situation of judicial decision-making, realists have 2 general ideas. The first one of them is that judges obtain some opinions about a decision of the case given by them even before they check the case according to current laws and this means that these decisions regularly come from non-legal backgrounds such as sense of justice, facets of parties (rich claimants, underprivileged defendants, ethnic groups, sects, government), religion, public policy, political ideology and

judge's character. Secondly, judges can provide an explanation in legal rules for their preferred result, since the legal system is complex and frequently contradictory. A judge is influenced by other rules and other factors and makes a verdict before reading law books for a preferred solution. Firstly, the judge determines their party's position and after that, searches for legal materials to support his idea. Secondly, because there are generally opposite legal grounds for nearly any position, judges can find some cases, statutes, maxims, canons, regulations, authorities, principles which can give a good explanation for their preferred result (Tumonis, 2012:1367).

3.2.7. Law as a Body of the Mixture of Rules and Exogenous Factors in Society

The open texture of the law does indeed mean that there are areas of behaviours that need much to be developed by the courts or authorities that strike a balance between competing interests, varying in weight from case to case, in light of circumstances. However, the life of the law is to a very large extent consisted of guiding both officials and private persons by specific rules, which, contrary to the application of variable standards, do not require a new judgment from them to case-to-case. This striking fact of social life remains valid, even if there are uncertainties about the applicability of any rule (whether written or communicated by precedent) to a concrete case (Hart, 2012: 135). However, there may be some problems which should be solved in the development of the legal AI applications such as in the development of legal expert systems. For instance, McCarty's taxman project (1980) aimed for the field of corporate tax law. Fundamental facts in corporate cases were captured in a comparatively simple representation. Below this level was an extended representation of the meaning of different units such as a security interest with regard to their constituent responsibilities and rights. Above this level were the codes, laws and regulations that categorize transactions as non-taxable or taxable. McCarty says that legal analysis is a straightforward substance of the use of legal rules to facts. He believes that some of legal concepts are open-textured, which renders them very hard to represent. Moles (1987) think that all legal concepts are open-textured. Provided that each legal concept is considered as being open-textured, making legal expert systems can be impossibly complicated. A legal expert system maker has to select an arbitrary level of abstraction above which a concept might be open-textured, and below which a concept has to be thought to be completely defined (Popple,1991:13).

On the other hand, legal formalism can be considered too mechanical and legal realism can be seen too vague. However, "Open Texture" understands the restrictions of logic and highlights its value, and refuses judges to make verdicts totally based on their own intuitive experiences and admits the existence of judicial discretion. Open texture approach can give theoretical innovation for the deeper and wider tool of AI in the legal world. Rules are utilized to deal with simple and easy questions screened out of complex and difficult problems. It is essential to utilize the non-case knowledge, like regulations, the statements of two parties and common sense, to get the preliminary solutions, and evaluate various cases to test the rightness of the case. This approach affirms the ration of legal formalism and maintains the continuous developmental vitality of judicial practice, rendering it possible for AI to make the most effective use of the correctness and accuracy of judge's verdict (Yadong, 2017). For instance, continental legal systems are much distant from the notion of rationality such as the French Civil Code in 1804. There are a huge number of sources which do not fit together completely and which relate to some rules whose meaning remains undetermined, which Herbert L. A. Hart labelled the open texture of law (European Commission for the Efficiency of Justice, 2018: 35-36).

3.3. The Use of Artificial Intelligence in Courts

Today, many legal systems in states in the world seem inefficient due to overcrowded prisons, backlogged courts, and overburdened public. For example, German courts` decisions about asylum applications can take about 2 years. About 2.3 million individuals are in jail in the US and about 540,000 of them are not convicted or sentenced (Van Hooijdonk, 2019**)**. This can demonstrate that some legal systems in the world have serious problems and governments started to change their directions to AI for help. In the area of law, AI is becoming a rising star. Generally, AI in courts is thought to be more efficient than humans. There are 3 clear advantages which robots have in the legal world. Firstly, AI robots can give more and faster decisions than humans about simple cases in which the general terms seem to require no interpretation, in which the understanding of examples is straightforward and in which the rules applied are clear and give time to human lawyers to focus on complex and complicated cases. The members of the judiciary under increasing heavy workload and the current systems becoming unable to keep up with the changing conditions of the age necessitate a transformation in courts. Judgment machines can accelerate the small claims process and can deal with the accumulation of cases (Gluckstein,

2019). Secondly, the robot judge can be seen as more objective judges than human judges because robot judges are thought to be more impartial and make decisions without favouring any of the parties due to their personal relations, lack of empathy, inappropriate empathy, forelock-tugging and etc. Since they are robots, they do not own any favour to any person and others do not feel any doubt about discriminative actions to themselves owing to close relations and kinship relations. Thirdly, the robot judge can perform without miscalculations. The software can be designed and all amounts can be calculated without the risk of human error (Nakad-Westrate et al., 2015: 65). Robot judges do not do any mistake because of tiredness, lack of knowledge, lack of experience, family affairs or money problems.

States began to look for new technologies like AI in the legal world. Especially, China aims to use the new technology such as AI, ML and big data in every way to advance their system in various fields. China aims to complete the transformation of legal systems by using the AI technology. China has tested many tools from voice-assisted robot assistants and internet or mobile courts to virtual judges and digital legal systems. It already started to use some of them. Today, AI is modernizing Shanghai court judicial system and its capability. In 2017, in Beijing a court used a judgment machine for the explanation of legal terms and legal advices. In the eastern city of Hangzhou, China created a "cyber court" and its hearings have been performed in an online way and evidence is kept and protected with blockchain technology. In the near future, they are planning to utilize robots to put case notes into written forms, find similar cases and use digitised evidence (Dai, 2020).

3.3.1. The Legal Relevance of Autonomous Machines: Technology, Law and Autonomous Decision-Making in Law

AI has a huge influence on nearly all professions and industries such as driverless cars, instantaneous translation, robot decision-making models, search engines, drafting documents and robot anchormen. AI tools have begun to influence law in various ways, including the prediction of verdicts or legal advices. AI tools needs to cope with new challenges in law because law is a complicated and huge area. However, the opportunities which come from the help of AI tools might be enormous for the legal world. AI technology can propose more productive and transparent and well-organized dispute resolution systems, highly developed access to justice, more efficient, faster and reliable information to clients.

By means of AI, advocates can work more fruitfully, intensify and extend their knowledge and can be more useful to their clients (Alarie, Niblett and Yoon, 2018: 106).

The deep understanding of the technology and the profound legal analysis are not enough to explain relations between technology and law totally. The legal analysis can unearth the limited part of the technological fact and other disciplines should escort the legal analysis (Izzo, Macilotti and Pascuzzi, 2013:1). Especially in recent years, technology has developed significantly, but this speed has made technology more complicated in some ways. Absolutely technological improvement is much faster than law. But, this is kind of advantage for law which gives law time to comprehend the transition phase and law can have the enough time to observe the impacts on society and culture and transform itself according to the new environment at the certain level and in the right time. Apparently sufficient regulations on technology need detailed and particular elements which are flexibility and the prevention of strictness in rules. For instance, in 1995 in the European Union, the General Product Safety Directive (2001/95/EC) became active. The rules and principles ordered by scientific and technical organs and certification procedures helped to prevent a continual updating of law at the same time as the technological development. Law becomes soft law (the principles of good behaviour) and this makes the usage of the technology easier for the adaption of law. One of duties of law is to regulate technological developments and the use of them. Technology is utilized for safety regulation and regulatory tools and they should be integrated into law. The density of technological advancements highlights the necessity to lawyers and judges to obtain the essential technical concepts of these advancements. The nature of aspects of technology is more different than the nature of aspects of law. The improvement of technology is changeable and hard law can make the technological progress slower. The fundamental values of humans should not be violated by the scientific improvement. For instance, the technological negative impact on the environment cannot be accepted (Cappelli, 2015:11-14).

It is very hard to play roles of judges for machines. In order to achieve this, it needs case management, compound relations with humans, social commentary, disagreement resolution, certain education programs and decision-making processes which may be carried out with other jurists. Some judges might be more ‘responsive’ than other judges and other judges might express more emotion and compassion or have a certain tendency to procedural justice. All the information given makes the things hard for AI in the judicial role. But, in

the future developments, AI may have the possibility to take the roles of human judges when we look at the past developments in 20 or 30 years. Although improvements in 'Robot Judge' are insufficient and the use of technology by advocates might not instantly conduct a transformation of the judicial role, there are some promising steps for 'Robot Judge' (Sourdin, 2018: 1114-1115). In USA, predictive coding systems were tested to find out if the rate of recidivism was in criminal incidents and to help make verdicts about sentencing (Liptak, 2017). Although AI might influence jurists by taking certain tasks from the hands of jurist, these developments are not enough to transform the judicial role of human jurists. However, some AI systems transform judicial decision making processes by making predictions about the outcome of court case (Schubarth, 2016).

3.3.2. The Use and Practical importance of Artificial Intelligence's Application

In a case law or statute law state, huge cases and a huge variety of laws, rules and judicial interpretations need time and energy to retrieve, sort, analyse because humans' brain cognitive and memory ability have some limits. Thanks to great storage capacity, retrieval and analysis power, AI can surpass human`s intelligence and energy. This can set significantly judicial officials free from repetitive works and permit them to use more energy and time for more complicated legal reasoning, investigation, verdict and discretion that seriously advances the quality and effectiveness of law. Since the judicial workforce consists of various people having subjective initiative, there can unavoidably be some differences in implementing the unified standard of law and this can cause inconsistent law implementation and different verdicts about the same case. AI can solve this problem and can offer relatively unified judicial reasoning and evaluation standard. AI can give judges similar cases, codes, rules and judicial interpretations and judges can firmly go after the rule of evidence and procedure, which decreases judicial arbitrariness and efficiently protect against unfair, false and flawed cases, advancing the judicial justice. Since AI do not have material desires and feelings, AI do not experience external disturbance and erosion. Due to this, AI can get rid of human factors and reduce significantly practice favouritism and unjust judicial phenomenon. Utilizing NLP, speech synthesis and recognition, it is vastly fused with litigation services to offer people "all-round, all-weather, zero distance, barrier-free" litigation service, which can efficiently deal with big difficulties humans face such as problems in case query, litigation consultancy, making contacts and waiting for litigation outcomes. Big data and "AI+" can be called as the driving forces of scientific decision-

making. For instance, Shanghai court intelligent auxiliary handling system possesses numerous practical actions like similar case push service, evidence standard, guidance on rule of evidence, sentence reference, articles of law push. This can automatically push the similar case, match procedural and substantive legal norms for the personnel according to the features of the case. On the basis of the "Internet +", Shanghai court owns 12368 hotline lawsuit service platforms with AI. Shanghai court utilizes "Internet +", and "AI +" to create the "Shanghai court lawyer service platform which is open to advocates nationwide and offers online query, online case registration, online case files and other litigation services. Advocates can accomplish litigation procedures at home. Shanghai high court maximizes the use of AI along with natural language understanding, ML, image and character recognition identification. It created twelve judicial service platforms such as trial process platform, judgment document platform, execution information platform, judicial trial live platform, online judicial auction platform and the judicial supervision platform. It made an all-around, multilevel and interactive and intelligent open judicial platform, and an open, dynamic, clear and suitable sunshine judicial apparatus to guarantee humans' rights to comprehend, participate, express and oversee, making justice obtainable, observable and evaluable. Shanghai court issued 830 information items of 112 aspects to people, and released 23.5 million messages with more than 40,500 daily visits. Shanghai High People's Court created the first provincial "new judicial think-tank". By means of judicial big database and "AI+" technology, it created the intelligent analysis platform of trial elevation, civil, commercial, financial, criminal, execution and other trial big data. This platform can inspect and find trial law from the huge collection of trial data, which can improve the capability of data analysis and processing, knowledge discovery and auxiliary decision-making. Moreover, it can advance the technical decision-making of the court, advance its management level, and facilitate social governance and building of Shanghai in safety and the rule of law (Yadong, 2017).

3.3.3. The Technical Principles of a Possible Intelligent Auxiliary Case Handling System

Thanks to the big development in Internet, the online data started to be very abundant, huge and accessible. The multi-sources, immediate, rich and multi-types data can offer realistic estimations from various viewpoints and set the base for AI, and can make an AI algorithm model with the numerous data. AI can be supported with a strong source of

information and data resources and store a criminal cases' big data along with the evidence standard repository, electronic files, cases, judicative documents, judicial interpretation of codes and rules, case-handling business record and other branch records with information resource sharing network platform of 3 public security authorities' criminal cases handling**.** Especially, making a united application standard of evidence in criminal cases and giving the application the logical thinking capacity and experience judgment through the in-depth learning algorithm of AI is very important. Through Automatic Extraction of Judicial Elements, Intelligent Speech Recognition, Optical Character Recognition in AI, Judicial Entity Identification, NLP, Entity Relationship Analysis and intensely exploitation, analysis and refinement, judicial information resources, ML of the collected classic cases, and cases-handling knowledge of public security authorities, governments can attain the intelligent identification, information extraction and logic checks of different proof with guaranteed evidence standard, evidence rules and evidence models as the fundamental follow-up, to discover and make you remember the conflicting evidences and procedures, the current faults in evidences and disagreements among evidences in the system's cases, therefore fake and unfair cases and arbitrary objectives can be blocked. By the help of the fast improvement of cloud computing and chip processing, numerous applications can be utilized for parallel computing, particularly the improvement of Graphics Processing Unit, Field-Programmable Gate Array and AI specific chips can produce the structure to computing competence for AI's landing to render AI which is similar to the algorithm model of human's deep neural network a reality (Yadong, 2017).

3.3.4. Selected AI National Pursuits for Legal Services

Some countries concentrate on the usage of the AI technology in legal services. The policy landscape for the AI technology is a rising matter in legal worlds. Since early 2016, numerous states and governmental institutions have national AI strategies, AI researches, action plans, drafts and policy papers on the AI technology in law.

3.3.4.1. Portugal

Portugal published its national AI strategy document with the name of AI Portugal 2030 in June 2019. The aim of our "AI Portugal 2030" strategy is to promote a collective process that mobilizes citizens in general and especially main stakeholders, towards

building-up a knowledge intensive labour-market with a strong community of forefront businesses creating and exporting AI supported by research and innovation communities involved in brilliant high level research (Portugal, 2019:10). The presence of AI encourages regulatory efforts to produce a frame, structure, general rules and principles with the aim of creating, advancing and utilizing AI tools. Regulatory, ethical and legal structures are necessary for the creation and the improvement of basic principles in AI about matters of transparency, accountability, liability and ownership. Due to these reasons, the strategy recommends the formation of an ethical commission for the artificial technology to identify and organize general rules for ethics of AI, should assist the creation and the improvement of the regulatory and legal structure, decide on legal responsibility issues in the event of disagreements due the participation of AI and help businesses and regulators discover suitable legal structures (European Commission- Country report – For Portugal, 3:2020). In Portugal, a legal assistance tool is planned to be used and this tool carry out some researches on requests and increases its knowledge due to these requests and researches. It may be utilized to foresee the results of a judicial process in the future (Gesley, 2019:1).

3.3.4.2. France

In March 2018, Emmanuel Macron published the national AI strategy (AI for Humanity) to help France became in a leading position in AI. Ethical standards making the utilization of AI systems fair and transparent are fundamental aims for the French AI strategy. The ethical principles for France in AI are designed with following policy advices (European Commission- Country report – For France, 3:2020):

- Making ethical consciousness effective from the design period and ethics should be active in the training of AI researchers and engineers;
- Ethics should be supported in businesses (such as creating ethics commissions, spreading of sector-specific good practices, modifying old rules of professional conduct, predicting ethical rules for researches).
- Producing a national platform to inspect algorithms and make sure that legal and ethical structures boost transparency and decreases the possible misuse of the AI technology;
- Creating a universal organization for the AI technology such as a statement signed

with Canada to begin a project on the formation of a global artificial intelligence study group about making AI accountable.

With these ethical frameworks, it is necessary to make rules to organize the borders and performance of artificial intelligence applications and obstruct any types of breaches. Due to this, this strategy predicts the following laws (European Commission (Country report–For France), 3:2020):

- Creation of the Digital Republic Act: A code to release public data, to make stronger the security of citizens' rights and data privacy and to make sure that the opportunities owing to digitalisation are distributed equally;
- Execution of the cyber security directive for the security of network and information systems as a national cyber-security strategy. This was executed in February 2018 in France.

Predictive assessment applications are normally utilized in common-law states. But, in 2017, 2 French appellate courts in Rennes and Douai were requested to check the use of the predictive software. The software was just used to calculate the amount of redundancy payments in dismissals without a "real and serious cause". However, the purpose of the predictive application was to decrease the intense variability in judicial decision-making to make sure that the fairness among people is protected with a decision-making application. The software analysed just one piece of the court verdicts and "*it was unable to gauge the subtle differences in the head notes or to reckon with the compensation awarded under out-of-court settlements*" (Gyuranecz et al., 2019: 7).

3.3.4.3. China

In July 2017, China published the "New Generation Artificial Intelligence Development Plan" (Future of Life Institute, 2020). By 2020, China planned to maintain competitiveness with certain powerful countries and made the most effective use of the development environment in AI. This plan encouraged China to make a domestic AI industry with almost 150 billion American dollars. It aimed to create ethical standards, strategies, and guidelines for crucial fields of the AI technology. By 2025, it plans to attain a 'big breakthrough' in the basic artificial intelligence theory and to become the leader in certain tools. In addition, it seeks for a growth in its core AI industry to more than 58 billion dollars,

and aims to make codifications in the law system and ethical rules for the artificial technology. By 2030, it aims to be the world's AI-based innovation centre. By that time, the increase of the core AI industry is anticipated to over double and is anticipated to be worth 147 billion dollars, and additional improvements and developments in the rules are anticipated, to cope with rising problems (Roberts et al., 2020: 60). There are some developments in China and China have produced robots which can make verdicts and predict potential sentences. For instance, the formation and function of the Same-Type Case Reference system can be comprehended, to some extent, by means of China's AI-based judicial systems. This contains making software which digitalizes, directs, and creates judgment machines by means of legal research services and statistical analysis and comparison techniques. The AI technology permits the software program to propose verdicts, estimate potential prison terms for particular actions, and sum up classic compensations. As an instance, a judge uploads electronic complaints and hearing records and the software can analyse and compare them with previous judgments to reach the same-type case reference files. These systems are trained by means of almost 40 million stored verdicts and have the capacity to match recent complaints with old complaints. After that, the system chooses same-type cases. When the accurate same-type cases are determined, the software can produce initial verdicts depending on previous complaints, old records and results from same-type case verdicts (Deng, 2019:226).

Xiaofa is a robot and is present in Beijing No 1 Intermediate People's Court, giving recommendations about law and assisting people to describe legal terminologies well. She can help and answer over 40,000 litigation questions and handle 30,000 legal issues. There have already been 100 robots used in China. Some of them have various proficiencies like commercial law or labour matters. They are paving the way for a transition to autonomous justice. Robots can find the histories of cases and past decisions and in this way the workloads of judges and court clerks are lessen. Especially, courts in China use AI systems to check comments on social media platforms and private messages which are used as evidence. This can be very helpful for judges and public prosecutors. Especially public persecutors which deal with cyber-crime can use this system to cope with cyber-crimes more easily and file an indictment more quickly. Traffic police is utilizing facial recognition system to spot criminals. Chinese civil law system utilizes case law to decide on the outcomes of trials. 120,000 judges need to handle 19 million cases a year. Due to that, the Chinese Supreme People's Court wanted local courts to use neural networks, big data, ML

and cloud computing in order to make the jurisdiction more efficient and faster. An application called as Intelligent Trial 1.0 reduces judges' workloads by assisting them to check material and generate electronic court files (Harris, 2018). In Chinese courts, AI assistance has already been employed since early 2019 just for the presentation of case-related evidence and research aid for now (Pillai, 2019). The purpose for the AI assistance, rooted on intelligent synthesizing technologies for speech and image, is to assist judges` repetitive basic tasks, such as litigation reception, and therefore give time to professional practitioners to concentrate on judicial trials. The judgment machine which has a female image, a voice, facial expressions and behaviours looks like a human. The robot can give people litigation guidance in real time and assist people to use online litigation platforms (Young, 2019).

3.3.4.4. United States

In February 2019, the United States signed an Executive Order initiating the American Artificial Intelligence Initiative and stated that the Federal Government helps to make artificial intelligence research and development easier, advance confidence, train humans for an altering labour force, and protect national security, interests, principles and values. Whereas the Executive Order highlights the American leadership in the AI technology, it needs to improve cooperation and partnership with other countries (HolonIQ, 2019). This initiative is generally established on 5 standards (Future of Life Institute, 2020):

1. Steering technological drastic discoveries or developments,
2. Steering the improvement of suitable technical principles,
3. Educating employees with the abilities to expand and use AI effectively,
4. Protecting national values along with human rights and privacy and promoting citizens` confidence in AI,
5. Protecting its leading position in AI and give more environments nationally and internationally for innovation.

In Palm Beach County, Florida, courts utilize ML supplied by Apopka, Florida-based Computing System Innovations and optical character resolution to scan and classify e-filed documents and robotically docket cases. The courts began with 3 low risk/high volume case types, gradually increasing the diversity and density of cases as they expanded knowledge with the robotic process automation. The tools categorize e-filings, extract information from

certain areas, and docket them in courts' case management systems. In 2020, sixty-eight case types which represent almost a third of the entire Palm Beach County's e-filed documents are docketed robotically (Joint Technology Committee, 2020: 3, 7).

Intellidact software robotically can separate, analyse and categorize e-filed documents by type and docket code and extract data particular for each docket code, changing unstructured documents into structured contents. After that, it performs data entries, updating in courts' case management systems. It can process 75%-80% of documents filed in case management systems without human intervention. In addition, it automates Tyler Technologies' Odyssey File & Serve portals, which deals e-filing, reduces file processing duration and renders documents instantly obtainable and accessible for parties and courts. The first Intellidact projects under Tyler went live in U.S. courts such as in Texas and Tarrant County, Stanislaus County and California. In addition, the Superior Court of California in Los Angeles County rolled out the LACourtConnect as an AI tool in June 2020 to automate the first level of aid for remote hearings. Utilizing Microsoft Azure Cognitive Services, the aim is to make the advanced service quality in answering users' questions and decrease the quantity of calls to support agents. The New Jersey Courts started to use an AI tool in 2019 named as the Judiciary Information Assistant. The courts fed it with Q&A, website FAQs, manuals, operating procedures and other court information to collect over 10,000 question-and-answer pairings. It utilises AI to answer popular queries by guiding users to particular courts and legal subjects such as attorney registration, tax and etc. on the courts' home pages (Roque-Doherty, 2021). Parties communicate with the system via chat mode messages, both through desktop computers and mobile devices. The system is available on a 24x7. Today, the system fields around 2,000 public questions every month and the accuracy rate is currently at around 75% (Reinkensmeyer, 2020).

In the United States, the government is using the AI-powered system to tackle with crimes. In the United States criminal jurisdiction, for certain situations, judges can utilize risk assessment tools which measure the probability of the recidivism, recommend rehabilitative services and decide the necessity of jailed pending trials. In theory, data-driven verdicts should lessen prejudices. But they take predict recidivism information from historical correlations among variables, which do not have to represent causal relations. Thus, provided that prejudices have an effect on correlations, discrimination involves into the tool (Berryhill et al., 2019:113). COMPAS is popular among risk assessment tools in the

US and this tool was created particularly for courts. The goal of this tool is to help to make data-centric verdicts by means of the assessment (derived from 137 questions answered by a criminal in an interview and on the information taken from the criminal's history) and to eventually lessen recidivism and to boost the public safety. By means of measuring previous rap sheet and criminological factors like economic status, job, salary and family background the tool gives a report containing a calculated risk score on a rate of 1 to 10, classifying the criminal as low/medium/ high risk on 3 bar charts (pre-trial, general and violent recidivism) and has an impact on the decisions of courts about bail, sentencing, and parole (Gyuranecz et al., 2019:5-6).

3.3.4.5. Estonia

Estonia's national AI strategy was published in July 2019 (Government of the Republic of Estonia, 2019:1). Estonia's national AI strategy contains policy measures, deadlines, aims and budget predictions. The aim is to completely control and utilize the potential of the AI technology by advancing and executing policy measures in some fields. For instance, the government should support the utilization and improvement of AI tools in the private and public sector. It should directly support researches, develop the pertinent abilities and develop a legal environment to make the understanding of the AI technology easier. The Estonian strategy predicts adjustments in law to make easier the improvement and understanding of the AI technology. Estonia published voluntary procurement directives which intend to provide an outline of frequent matters and possible solutions in a data science project. Today, Estonia is focusing on a self-assessment questionnaire for the AI makers which are derived from the Assessment List accompanying the Ethics Guidelines for Trustworthy AI (European Commission- Country report – For Estonia, 1-2:2020). Estonia is making an AI powered robot judge which will deal with a backlog of small court cases. This robot will analyse cases by means of relevant legal documents and texts before making a verdict. The ruling will be lawfully binding. However, verdicts given by robots could be appealed to human judges. The robot is considered to deal with disputes of less than €7,000 (£6,000/$8,000). This system is seemed to be in its infancy but Estonia is eager to use the robot judges in the courts in the near future (Pinkstone, 2019).

3.3.4.6. Netherlands

In October 2019, Netherlands published its strategic action for AI. Its aim is to support Dutch competitiveness in AI on the global market through a variety of initiatives and action plans. The strategy focuses on societal and economic factors: plans promoting the adoption, utilization and improvement of the AI technology in the private and public sector and advancing the utilization to deal with societal problems. The AI policy should support education and improvement in the AI technology. The strategy aims to foster AI researches and improvements, advancing the digital infrastructure and making easier the access to qualitative data. It aims to make actions about ethical issues like confidence, basic rights and freedoms, consumer protection, and the safety of humans. The strategy stated in annex that the annual governmental budget to AI researches and innovations is guessed as 45 million Euros. The supercomputer has been created and funded by the Ministry of Education, Culture and Science with a cost of 18 million Euros (European Commission-Country report– For Netherlands, 1:2020).

The first online private court was created with completely digitalized court proceedings for the Netherlands in January 2010. However, verdicts appeared as human reasoning processes` products. As a particular sort of verdicts, e-Court verdicts adopted by default in debt collection proceedings have been made only as the product of the AI technology since 2011. Software engineers searched the possibility of the court case in debt collection designed by recognizing the necessary parameters measured in decision-making processes. A research decided 3 various fields in determination of these parameters: the claim (addresses of the parties, interest date, due date of the claim amount, interest over the claim amount, legal names and birth dates of parties), the costs of debt collection (cost of debt collection, costs of the writ of summons, court price of public and private court, costs of representation in court), and the course of the proceedings (the capability of the court, the accuser's right to be appropriately informed about the approaching court processes, observing the court's arbitration directives, decisions about the presence of the accused in the court, and the decisions about rejection of unlawful or unreasonable claims)(Nakad-Weststrate et al., 2015: 1102-1104).

3.3.4.7. Brazil

Brazil published, on 12 April 2021, its Ordinance No. 4,617 of 6 April 2021 on AI Strategy following a public consultation which occurred between December 2019 and March 2020. AI consulting firms supported the process and involved in it. The process was stated to take more than 1,000 contributions. The AI strategy concentrates on researches, innovations, and the improvement of AI technologies to deal with Brazil`s own problems. It was stated that Brazil invested 1 million dollars to AI start-ups in 2019 (Mari, 2021).

Basically, the AI strategy has been established in 6 goals:

1. Developing ethical principles guiding the responsible usage of the AI technology
2. Removing obstacles to innovation
3. Improving collaboration among government, the private sector and the academy
4. Developing AI skills
5. Promoting investments in AI
6. Advancing Brazilian technology abroad

Rooted in the goals, the strategy has been designed to take particular actions to improve AI in Brazil such as researches in AI ethics, the revision of the national education curriculum for certain skills such as computing and programming, the foundation of governance ecosystems in the public and private sectors for the usage of AI, and the formation of diverse groups for advancing AI. The investment of government incentives reached 12 million dollars. With the network starting in 2020, the funding was designed to spread out over 5 years, with 3.5 million dollars which will reach particular AI sectors such as automotive and agribusiness. According to the study of the Ducker Frontier consulting firm, Brazil could reach a 7.1% increase in GDP by totally embracing AI (McFarland, 2021).

Brazil’s courts have been struggled with a huge number of lawsuits. Approximately eighty million lawsuits awaited judgment in 2017. The time between 2009 and 2017 witnessed an increase of 19.4 million lawsuits. The average processing duration of cases may take much time such as over 7 years in some lawsuits. The long waiting times affect the legal certainty, efficiency and credibility and cause huge budgetary costs. For instance, Brazil spent R$ 90.7 billion in 2017 to keep up the judiciary, about $ 22 billion (Araújo et

al., 2020:1449). Brazil is considered to have the largest judiciary system in the world with 92 courts. For example, it would take 22,000 man-hours to process the 42,000 taken by the Supreme Federal Tribunal per semester (Silva et al., 2018:7). To handle the enormous quantity and diversity of lawsuits, Brazilian courts decided to transform themselves by using AI tools in courts. The tools are utilized for a variety of tasks, from categorizing lawsuits, to handling repetitive tasks, to giving advices for court verdicts. Some AI tools are currently used in various types of courts in Brazil.

Table 12: AI Tools in Brazilian Courts

Courts	AI Tools	Functions
Higher Courts		
Supreme Federal Tribunal	Victor	Aiming to simplify pattern recognition within legal texts (such as PDF) used for the Supreme Federal Tribunal. This was created in partnership with a group from the University of Brasilia.
Supreme Tribunal of Justice	Socrates	Producing an automated examination of each appeal sent to the Supreme Tribunal of Justice and its previous judgment, recommending legislative resources and legal precedents, and a recommendation for action (the final decision will always be made by a Supreme Tribunal of Justice Minister).
Federal Appeals Court	Sigma	Conducting the production of admissibility judgments, spots the violation of constitutional provisions or federal law and makes easy the production of special and extraordinary appeals for admissibility judgment.
State Courts		
Tribunal of Justice of Acre	LEIA	Attempting to connect each lawsuit with precedents in the higher courts.
Tribunal of Justice of Alagoas	Hércules	Helping to prevent servers from performing repetitive tasks, like classifying whether a document is a request to block goods, quote stakeholders, or suspend processes. This was created in a partnership with a group from the Federal University of Alagoas.

Table 12:(continues) AI Tools in Brazilian Courts

Tribunal of Justice of Minas Gerais	Radar	Identifing and separating legal resources which handle the same issues or have precedents in the Supreme Justice Tribunal or the Resolution Incident of Repetitive Demands
Tribunal of Justice of Pernambuco	Elis	Confering and presenting documents and dates from lawsuits to judges. In the Judiciary of Pernambuco, AI checks new tax enforcement actions and determines which ones are in accordance with procedural rules and which ones are dismissed because of the statute of limitations. AI in the Justice of Pernambuco was created in 2018 and fed with data from the approximately 450,000 tax foreclosures underway at the time in Recife, largely related to the non-payment of tax – the property tax and the tax applicable to any received service.
Tribunal of Justice of Rio Grande do Norte	Poti, Clara, and Jerimum	Poti performs account blocking and unlocking and issues certificates related to Bacenjud, a system which links the Tribunal of Justice of Rio Grande do Norte with the Central Bank and other financial entities. Clara is still in testing, but will read documents and recommend tasks which will be approved by a server, and Jerimum, which is in testing, will categorize and label processes.
Tribunal of Justice of Rondonia	SINAPSES	Firstly used as a tool capable of optimizing the performance of repetitive tasks and ensuring greater legal security. Today, it is being transformed into a framework where various courts collaborate on algorithms.

Source: (Brehm et al., 2020: 13-14)

In the table 12, AI tools are currently being used in the Brazilian Judiciary and are organically made by tech savvy courts rooted in their needs. Especially some of these tools are worth to be mentioned more. For instance, Brazilian Supreme Federal Tribunal utilizes an AI tool called VICTOR to deal with the court's backlog of petitions. The 2017 Brazilian Federal Supreme Court Activity Report stated that the court issued 126,531 decisions and registered its lowest final collection of pending cases of the last 5 years (45,437). The AI tool lessens the initial analysis of petitions from 30 minutes to 5 seconds (Roque-Doherty, 2021). In the initial stage, it can read each extraordinary appeal that reaches the Brazilian Supreme Federal Tribunal and recognize which problems are connected with particular

topics of general repercussion. It makes its own neural networks to learn from tons of verdicts in the court. Victor has been created and improved in partnership with the University of Brasília. The university set up a group consisting of researchers, professors and high-level students and numerous of them were experienced and educated overseas from law and technology research centres. The aims are to use ML techniques for pattern recognition in legal processes and to make a tool consisting of deep ML algorithms automating textual analyses of legal processes by making ML models to analyse the court's resources concerning the most recurring general repercussion themes and combining the Court's solutions to help servers accountable to analyse the resources received and discover related subjects. The tool has been created to act in layers of process organization to boost judicial evaluation efficiency and speed. In addition, SIGMA is called as an AI tool for the use of models and the creation of verdict drafts. The tool can store documents, matching data from procedural documents with how each unit utilizes the models. It makes inputs for the report's writing. It observes the procedural documents to stay away from conflicting verdicts. On July 3, 2020, the Federal Appeals Court for the 3rd Region began to implement an AI tool called SIGMA to help to prepare reports and verdicts in the Electronic Judicial Process system. It was made in collaboration with several federal justice bodies of the 3rd Region: The Vice-Presidency of the district court of the 3rd region, the Secretariat of Information Technology, the Laboratory of Applied Artificial Intelligence of the 3rd Region and the Electronic Judicial Process Systems Division. Brazilian Supreme Tribunal of Justice utilizes an AI tool called SOCRATES and it is trained using data from 300,000 tribunal verdicts. It analyses new cases, collects them according to similar features and then they are judged in blocks. SOCRATES is utilized to block entries of some cases which are not related with the duties of the tribunal (De Sanctis, 2021:2-4). It identifies sets of similar processes in 100 thousand processes by comparing them in less than 15 minutes. It can identify the other processes handling same subjects in 2 million processes and 8 million procedural pieces, covering all processes in progress at the Supreme Tribunal of Justice and another 4 years of history in 24 seconds. It is possible to automatically check the 1,500 new cases to choose matters of interest (Salomão, 2021:28).

3.4. Legal Technology

Generally, a big transformation in legal technology is admitted by scholars and this is steered and controlled extensively by AI. However, there is ambiguity about how the

transformation will go on. The AI technology in the world has increased significantly by changing traditional methods and generating new types of the legal service delivery. Experts think that the new technology can improve the current system with particular new processes. This technological transformation for the legal world can be divided into 3 phases (1.0, 2.0 and 3.0). Legal Technology 1.0 gives legal practitioners and attorneys more power in the system. This technology helps users with applications which can carry out legal research, make documents, perform practice management, and accomplish early e-discovery (Goodenough, 2017; Vogl, 2016). As an example, the PerfectNDA software shortens the process of making a non-disclosure agreement and this software drafts unlimited numbers of documents thousands of times faster than humans. Kira Systems can complete high volume contract data extraction within less time between 20–90%.

In Legal Technology 2.0, this technology can replace a mounting number of humans within the system. This technology can make the procedures easier and faster and can make the connection of laymen with lawyers more efficient and easier and help laymen solve some problems without needing any lawyer. It offers the opportunity to solve legal problems by reducing the need for negotiations. In e-discovery, ML approaches can subtract the document review works. The Legal Technology 2.0 contains systems which can merge word processing and expert systems to formulate contract document assembly applications. Legal Technology 2.0 can use numerous disciplines: proceeding formulation to visualize the process of completion of works, management to determine the organization and the optimal use of resources and organizing the preparation and the financial plan for investments. This technology can make a model which can serve clients in a more satisfying way, help improve their careers, and create sufficient financial solutions for advocates and companies (Baxter, 2015). For instance, LegalZoom and Rocket Lawyer offer economical legal assistance. Also, DoNotPay creator Joshua Browder developed the chatbot asylum application rearranged to provide legal advice to immigrants by voice and text messages (Mohan, 2017).

Finally, in Legal Technology 3.0, the aim is to create the technology for justice such as legal analysis systems and the computational technology for communication, modelling and execution causing a radical redesign. A robot judge learning the decision making process in an AI-supported court can be showed as an example (Vogl, 2016). Instead of a human judge in court, AI robots with the deep-learning algorithm developed to make decisions has been used in Estonia, China, the U.S.A and etc. In a study conducted in 2017, between 1816

and 2015 more than 240,000 justice votes and 28,000 lawsuits given by the US Supreme Court were tried to be estimated. 70.2% success in the case prediction and 71.9% success in the prediction of judge vote success were achieved (Katz, Bommarito and Blackman, 2017:1). In February 2019, the entrance of the AI technology into the mediation field became a fresh landmark with Canadian iCan Systems as the leading company and it deals with disagreements in public courts in Wales and England with robot mediators. Smartsettle ONE tool took the place of human mediators and, within less than one hour with a blind-bid mechanism, solved a three-month disagreement more than a £2,000 unpaid bill for a personal counselling course (Beioley, 2019). Estonia is considered as a mysterious centre for pioneering robotics. The Estonian government gave the job to Velsberg to manage this task to bring the AI technology into a variety of ministries to streamline services given to citizens. In 2017, Estonia started testing AI projects in thirteen places where an AI tool has taken the place of public servants such as a tool checking government subsidies for farmers and matching employers` abilities and a robot judge making decisions about small claims disputes under €7,000. The AI judge is in the early phases, and is led by the Ministry of Justice (Cowan, 2019). In addition, the COMPAS system is used as a risk-prediction system in numerous state courts (Vaccaro and Waldo: 2019:2). In December 2019, China declared that millions of legal cases are now being solved by "Internet courts" which do not need people to come out in court. China's first Internet court was made in the eastern city of Hangzhou in 2017 and in 2019. In China, the "smart court" contains robot judges and makes the registration possible for users online and solves their issues through a digital court hearing (Vasdani, 2020).

Table 13: Legal Technology

Legal Technology	Aim	Capability	Examples
1.0	Empowering humans in this technological system	-Computer-assisted legal research -Document production -Practice management -Early e-discovery	-Ross Intelligence -eBrevia -Leverton - Kira Systems -Legal Analtyics - PerfectNDA
2.0	Replacing numerous humans within the system	-Smart case forms -Interactive resources and Remote assistance -Web services -Internet robots	-LegalZoom -Rocket Lawyer -DoNotPay
3.0	Steering the decision making process in the legal world with legal analysis systems	- Decision making tools -Prediction justice tools	-Legal expert systems (such as risk-assessment algorithms as COMPAS) -Judgment machines (such as Robot judges)

Source: (Modified figure from (Abanoz, 2020:198))

3.4.1. Legal Analysis Systems

Legal analysis systems generally are separated into 2 categories (Popple, 1991:12):

– **Judgment machines:** Machines render a judgelike announcement (for instance, "A is guilty of offence B for the reasons below ..."). The making of a judgment machine is not an old idea and in the past, numerous researchers discussed about this idea. In 1959, Mehl (1959) said that the machines can take the places of judges in the future because solutions to legal problems are based on extra-rational factors along with human experience. Today, some states and some companies create algorithms which make verdicts about cases and try to use them in various ways. However, to integrate the robot judges into the jurisdiction of states, there are some problems to solve. Firstly, some modifications should be in laws and international rules. For instance, there should be a rule that justice is made with the utilization of the AI technology

according to particular rules. Secondly, rules and modifications are needed to make robot judges possible in courts. At the early period, robots may be utilized as assistants in courts to collect and evaluate the information. Ross Intelligence has done this in the private sector for advocates. Rules on automatic decision-making and the use and process of utilization of the robots are needed in the public sector. These rules help robots to be used in courts for the specific sorts of claims like the consumer protection and small-amount claims. Robot can take a role at one of the court processes. However, a robot judge must not involve in the process at the very final stage, which is no-appealable. Human judges should check decisions made by robot judges. Intermediate checks should be active during the entire process (Pastukhova, 2017:42).

– **Legal expert systems:** The systems make recommendations similar in form to that which a lawyer can make (for instance, facts in a case are similar to these in A v B where the accused was found guilty, but the instant case can be different from A v B like). Actually, the term expert system looks vague. It is variously described as a tool which uses information taken from an expert, a tool which functions at the level expected of an expert, or a tool which is utilized by an expert. Each of them can be considered as an expert system.

3.4.2. The Current State of the Legal Technology in Turkey

The ways of access to legal information are changing and developing rapidly in Turkey. Especially, the impact of Legal Technology 1.0, which gives lawyers more power in the system, has recently increased significantly. Many examples can be given such as Law (Office) Automation Systems, Legislation Mobile Applications, Decision Search Engines, Legal Forum Sites, National Judiciary Informatics System (UYAP in Turkish), Celse, and e-Tahsilat. These systems have been prepared according to the needs of the lawyers. But there are some systems with AI which find judicial decisions and present them systematically such as Turklex. This system provides case result analysis as well as the automatic creation of the case file. It offers a technology focused on predicting the outcome of the case. Although there are some unique examples, Legal Technology 2.0 and 3.0 are not used commonly in Turkey. For instance, the artificial intelligence-supported legal assistant which is Adalethanım analyses and interprets cases and produces results. By the help of NLP, it can search and help people write petitions and prepare documents (Abanoz, 2020:198).

Kodex Bilişim, which is a part of ODTÜ Teknokent, offers solutions in the field of law with the Robot Software Interface for Lawyers (ARYA). ARYA, which is developed by Kodex Bilişim and provides solutions in the field of law by utilizing AI, can predict correctly the results of the Supreme Court cases at the rate of approximately 90% (Gökkoyun and Bodur, 2018).

The main reasons why Legal Technology 2.0 and 3.0 are not common in Turkey are the lack of trained personnel and technical infrastructure. The Turkish Ministry of Justice should support the global tendency of judgment machines in Turkey and can work with the union of Turkish bar associations and Turkish bar associations. Ankara, Istanbul and İzmir Bar Association made a report with the name of the Law at the Age of Artificial Intelligence and it was issued on December 21, 2020. The work of bar associations on AI robots which is supported by the government can be highly effective for the success of the potential project on robot judges in Turkey. For instance, bar associations can offer the appropriate environment to newcomers to the profession and lawyers who are interested in the field. Law apprentices in bar associations can be trained on informatics and computers in a way that covers the concepts of AI and big data. Programs should be planned with the appropriate time and a number of people for the best result. Students in law faculties can be trained for the legal technology. Informatics and computer science basic courses should be included into curriculums of law faculties and in these courses AI and big data concepts should be covered. The personnel who are expert at law and robotics should be trained in universities. The government should spend money for a secure, scalable, and trustworthy technology infrastructure as a foundation to offer digital services and public access and at the same time, the government should focus on privacy protections and security. The government should enhance access to the courts, control justice in a suitable and efficient method, and optimize case processing by supporting the digital court for robot judges and by executing wide-ranging digital services for the public. It should focus on innovation by reinforcing and broadening the IT Community through collaboration, education, and employment strategies. It should advance the transformation of laws, regulations, and rules to facilitate the utilization of the AI technology in court processes and the delivery of court services (Judicial Council of California, 2019:5).

3.5. The Regulation of Robot Judges

Recently, robots equipped with the AI technology have started to show sentient conduct similar to humans` conduct. With the today`s capability, robots can carry out rational, independent and responsive functions like humans. Today`s capability and the potential capability in the future make the legal status problem highly discussable in the world in relation to the other matters of robots and liability when granting legal personality to these machines (Sapiran and Krishnan, 2016:824). In the legal area, robots can be utilized effectively in many ways. Although it is early to discuss the legal status and liability of robots judges in courts with the full autonomy, in the future it will be very important and this study can illuminate the ways of other studies about regulating robots in different areas.

If one day some robots were decided to work as robot judges, humans firstly would focus on their responsibilities and rights. Would they have the same rights as human judges? Who would take the responsibility in case of wrong decisions? Would robot judges interact with other people with their robot bodies or would they be like computer programs? Would robots have same rights as humans and which types of robots could work in courts? Would robot judges have liability or insurance? How would humans solve the accountability, transparency and privacy problems? And there will be many problems which should be analysed and humans should be careful about what they will do.

The regulation of the judge robot will be designed mainly according to Turkish regulations and codes. However, other regulations and rules in the world will be used for the effective and appropriate robot judge. For instance, governments legally can use robots as a simple tool to deal with problems or for communication with humans who apply to courts due to their conflicts with other people or entities. The contracts or agreements should be directly celebrated among parties. This way has the benefits of being effortlessly introduced in a structure without the need for serious alterations, either by written law or unwritten law. This means that anything coming from robots really comes directly from their human controllers and this description totally pays no attention to any autonomy which robots might obtain. Moreover, the assumption of the agreement between parties that may not even be aware that the agreement was reached eliminates the agreement of the vital factor which is the meeting of wills (Alexandre, 2017:15).

Robots can be used in accelerated and simple trial procedures, mediation and conciliation. These institutions can be effective with the help of parties because parties have to accept the solutions. This means that human controllers can be these parties and they can check whether robots work well and appropriately, since all the responsibility belongs to the parties. Because parties have the advantages and interests of this solution, parties and their advocates control the robots` decisions much more tightly and accurately than any person. In Turkey, accelerated trial procedures are applicable for certain minor criminal offences similar to plea bargaining. In the accelerated trial procedure, the public prosecutors are chosen to offer the accelerated procedures to defendants. Provided that these defendants accept in the presence of their lawyers, the public prosecutors can impose a 50% reduced punishment. Robots can be used in these procedures and lawyers have the experience and the knowledge to understand whether robots do right things or not. Mediation can be called as an alternative dispute resolution method that can be used just for civil cases. Parties try to reach an agreement on their dispute with their consents by the help of a mediator without the need of a court. Parties should solve their problems with the help of a mediator and parties should find solutions. However, if there is no solution coming from them, the mediator proposes some solutions to parties. This intuition is suitable for robots because parties find their solutions and robots just lay the way open for their agreements. If they do not find a solution, the robots analyse the problem and propose some solutions. Even in this situation, parties decide whether this solution is acceptable or not. In conciliation, robots can be used in the role of the public prosecutor. Conciliation is called as an alternative dispute resolution method and states the resolution of a dispute in the range of conciliation through mediation in between a defendant or suspect and a victim or their legal representative by a conciliator chosen by the public prosecutor according to relevant regulations. The aim of this system is to deal with certain crimes in the reconciliation by peaceful means in a short time without the need of a court (Bozatay and Ürünal, 2018:329).

In this process, the public prosecutor evaluates the evidence that causes sufficient suspicion which implies that the crime is committed. The public prosecutor evaluates whether the qualification and condition of the crime is within the scope of conciliation and propose the compromise to the parties. The public prosecutor operates conciliation procedure, appoints conciliators and audits the legal consequences of conciliation. Generally public prosecutors carry out these tasks and in the same way, robots can do this automatically because the most of the responsibility belongs to conciliators and they help parties reach an

agreement. However, certain public prosecutors can check the process about the things the robots do and evaluate complaints coming from lawyers, conciliators and parties about misconduct carried out by robots. In this case, the responsibility should belong to partly conciliators and public prosecutors. But when autonomy increases in machines, these machines start to move away from simple tools. Provided that today it makes little sense to compare AI with a television, it will make even less in the future. Similar questions will be discussed in other fields like in civil and criminal liability issues. Regular rules are not ready for them now. But if the autonomy in machines continues to increase, the primary questions can take place about the need of a legal status for robots (Delvaux, 2016:5).

3.6. Judicial Reasoning: The Making of Legal Information

Law is based on practical reasoning which includes the application of a logical set of steps rooted in applying rules to factual scenarios to make a verdict. Therefore, this decision-making needs information for reasonable outcomes. Typically, information can be produced by logic or by observation. Judicial reasoning does not belong to observation. Judicial reasoning is considered as a type of information which is produced by the logic process. Other areas such as philosophy, ethics, and some areas in mathematics are produced by logic. This type of information production is controlled by rules and regulations which direct the production of correct forms of arguments, like the consistency of the premises with the conclusions.

Judicial reasoning is considered as a process. The process contains:

a. Firstly the details and features of the case that is brought before the court should be analysed carefully.

b. Guidance and assistance should be taken, from pertinent codes, rules, statutes or from precedents (previous related judgments) according to law systems.

c. The premises on which the judges can count should be made. The premises can be from the actual details of the case which is applied to courts as per ‘a’ above or from the pertinent guidance or assistance as per ‘b’ above.

d. Relations should be analysed among the various premises, which are made like in ‘c’ above.

e. Judges should have general results which can be utilized for future analogous cases.

f. ‘e’ should be used to make verdicts about the particular case in question (in case of the case law, the need appears to make this judicial reasoning process).

‘a’ above focuses on knowing what the legal case which can be solved in courts is about. ‘b’ is established to encourage judges to search for mental guidance or assistance to steer their mental reasoning to reason in a particular way. ‘c’, ‘d’ and ‘e’ above establish the Rationes Decidendi[6] (ratio) of the legal judgment, and ‘f’ is the verdict made regarding the particular legal case in hand.

3.6.1. Distinctions between logical and non-logical

The term ‘non-logical’ cannot be always considered as ‘illogical’, ‘irrational’ or ‘contradictory’. Any ratio that cannot be categorized as ‘logical’ is automatically categorised as ‘non-logical’.

For a ratio to be seen as logical, this ratio should consist of:

I. Premises (‘c’ in the judicial reasoning process) and

II. The relations among these premises make conclusions appear (‘d’ in the judicial reasoning process)

III. These conclusions are generated by necessity rather than probability (‘f’ in the judicial reasoning process).

These 3 indications above (I, II, III) are the part which a ratio contains. Provided that a conclusion does not pursue necessarily from 1) the premises and 2) the relations among the premises, it is considered ‘non-logical’.

An example can be given to explain an ideal logical ratio (the conclusion that is generated by the premises and the relations between the premises is generated by necessity):

- As an example, ‘F’ and ‘U’ can be chosen as premises which symbolizes numbers, and

[6] This is the judicial ratio like the rules and principles that establish the structure for making verdicts about legal cases (shortly "the reason" or "the rationale for the decision")

- Assume that upon examination of the premises, the relationship between the premises ‘F and ‘U’ is exposed by us to be:
- F ≠ U (‘F’ and ‘U’ have to be different numbers), and
- F + U = F (‘F’ and ‘U’ yield ‘F’)

Then the conclusion which is generated by necessity is that ‘U’ has to be zero.

This conclusion is that F = Zero was the result of necessity. ‘Zero’ is not mentioned in the premises or the relationship between the two premises ‘F’ and ‘U’ but it appeared as an answer. Where 2 different units exist and adding those two units at all times regenerate one of the 2 units, then the element which is not regenerated have to lack a value (zero).

3.6.2. Legal Reasoning

Generally, legal reasoning has some techniques that advocates utilize to apply rules to factual scenarios to find relevant solutions and handle problems. According to interpretations, the meaning and use of laws makes sense and the interpretations can be various. The useful and efficient legal reasoning has the capability to read articles, laws, directives and comprehends how human judges work. These legal rules can be complex and complicated in a written way and the interpretation of rules needs a systematic approach. Even though rules can be seen in various forms, rules contain the same primary “if/then” formation: provided that the facts of a case satisfy a group of criteria, the law imposes results. Any effort to identify legal reasoning raises the issue of whether the meaning is normative or descriptive (American University of Iraq, Sulaimani, 2014:3). An advocate inspects the facts of the case at issue and decides which rules are used. The rules are utilized for the facts of the case. The meaning of the concept might be open-textured, and might decide on the consequence of the application of the rule for the case. An advocate discusses the meaning of an open textured concept in relation to the facts of the case and completed cases. The consequences of cases can be attractive in that they attribute a meaning to an open-textured notion that (when the rule is used) brings about a wanted outcome in the case. Cases cannot be totally same, taking into consideration the excess and complexity of facts connected to any given case. Provided that the consequences of a completed case do not have noteworthy distinctions between the previous case and the current case, the previous case can be utilized to help solve the current case (Popple, 1991:13).

3.6.2.1. Rule-Based Reasoning

Basically RBR can be called as the reasoning approach supporting some classical expert tools such as MYCIN for treating blood infections, XCON for configuring PDP and VAX computers and PROSPECTOR for aid geologists in mineral exploration. RBR includes a rule base, or a group of if-then rules; an inference engine, or a means of utilizing the rules for the solution of problems; a working memory, or a means of maintaining the present problem state; and often, an explanation facility, or a means of demonstrating a customer the chain of rules which opens a door to a result. Rules characterize a small portion of knowledge which can be united, or chained together, with other rules to deduce results or solve problems (Marling et al., 2002: 70). Examples about legal rule-based expert systems can be given as McCarty's Taxman, Anne Gardener's system and CORBS. Rule-based expert systems obtain some advantages and disadvantages (El Ghosh et al., 2017: 633-634):

- **Advantageous Points:**

– Natural knowledge representation in the structure of if -then rules which reflect the problem-solving process clarified by the domain experts.

– Uniformity of structure where each rule is represented in the same format.

– Modularity of structure where all the rules are an autonomous part of knowledge.

– Division of knowledge from its process.

– Justification of the decisions by giving explanation about how the system reaches a certain result and by making audit trails available for use.

- **Disadvantageous Points:**

– Non-transparent relationships among rules due to the uniformity and modularity of the structure.

– Incapability to learn from experience.

– Black boxes, which is the inference process is not observable or concealed and solutions cannot be explained easily.

In rule-based systems, there are some problems such as the hardness of modelling unclear or open-textured concepts. Indistinct and unclear legal concepts like sensible and deliberate cannot be modelled in a manner similar to human thinking. Things constituting

sensible actions can change from place to place, man to man and time to time. RBR systems do not focus to handle every single one of legal automation problems. However, they are expert at encoding rules in laws and codes where the law is open and is able to be observed, understood, but complicated in a logical way (El Ghosh, 2018:109).

In the conventional rule-based reasoning, domain expertise and common sense knowledge are demonstrated in formats of plausible rules (If-then). This is rooted in generalised relations between result and problem description. As an example of a specific rule (Pal and Campbell, 1997:50):

IF (Parker has a driving license for trucks)

AND (Parker exceeded the speed limit)

AND (Parker is driving a truck)

AND (Parker is stopped by police)

THEN (Parker's driving license is taken by police).

Rule-based reasoning needs a precise match on the preconditions to foresee the conclusions. This can impose restrictions, as real-world circumstances are frequently unclear and do not go with rule preconditions precisely. Therefore, there are several extensions to the fundamental approach which fits in with the needs of partial degrees of matching in rule preconditions. As a minimum, the framework of rule-based reasoning systems demonstrates two components which are the knowledge base and the inference engine and includes the domain knowledge in the format of rules. The inference engine covers the reasoning approach to explore the rules, in a knowledge base, which help discover a suitable solution for a current problem. Knowledge-based systems counting on rules prove fairly useful in building legal decision-support systems (Pal and Campbell, 1997: 50).

3.6.2.1.1. Knowledge acquisition and representation

Knowledge representation and acquisition are serious problems and for the case based systems they have the critical importance. Knowledge acquisition for statute law is relatively easy since legislation is systematically written down in a formulated way. But, knowledge acquisition can be an important problem in the legal domain in a written law. To solve this,

some scholars checked the possibility of the automatic-processing of rules. Provided that the sole input is the words of the rule itself, NLP can be used for this task in machine-readable formats. Otherwise, human expertise should be used to take knowledge out from rules and delegated legislation. All these proceedings can be called as a process of writing rules (Popple, 1996:35).

Taxman Sytem: McCarty is generally considered as the father of artificial intelligence and his famous article was published in 1977 about the Taxman project (McCarty, 1977). Taxman can be considered as an experiment in AI and legal reasoning (McCarty, 1980: 23). This Taxman system is the computer program that models particular characteristics of the conceptual structures that take place in a certain field of the law such as the taxation of corporate reorganization. The program has the capacity to carry out a very basic model of legal reasoning. Taking into consideration the explanation of the facts of a case, the program makes the analysis of these facts on the basis of some legal concepts (McCarty, 2018:58). The Taxman system`s aim is to decide if a given re-organization of companies is free from income tax by categorizing a re-organization case under a Type B, C, or D categorization in sections 354, 355 and 356 of the Internal Revenue Code in the order given. The comprehensive version of Taxman includes a broader field of corporate tax law such as the full tax treatment of the parties to a re-organization along with the tax treatment of corporate distributions outside the re-organization. Eventually, it intended to comprehend and differentiate between abstract tax-related concepts, like "form" and "substance", and decode them into more exact and definite concepts (Kuźniacki, 2019). McCarty stated that the fundamental representations are controllable. He considers the making of legal expert systems as a chance to help jurisprudence. The jurisprudential literature consists "*many illuminating examples and many valuable insights about the structure and dynamics of legal concepts*" (Popple, 1996:27). But, he spots 2 key problems to the idea in Taxman I. One of them is that the factual descriptions are excessively complicated and compound such as in the average contract or tort problem. The other is that the higher-level conceptual representations are not sufficient for all areas because of open-textured structure, contains a dynamic structure with the ability to develop and become accustomed to different circumstances, and the development of concepts is managed by a sense of purpose. McCarty decided to focus on the modified paradigm which allows people to say something about the structure and dynamics of the more unclearly defined concepts of corporate reorganization law. He wanted to solve the problems with Taxman II (Popple, 1993:31).

The article in 1977 was called as Taxman I and the latter article was called as Taxman II. There are some important principles which guide the Taxman II project and the principles were explained below (McCarty, 2018:59-60):

- Legal concepts are not sufficiently represented by descriptions which express essential and adequate conditions. Legal concepts are permanently open-textured.
- Legal rules cannot be static, but they have to be dynamic. As legal rules face new and different situations, these rules are continuously changed and transformed to cover the new factual scenarios. In legal reasoning, the essential procedure is not theory creation and not theory application.
- In the theory creation, there is no one correct solution. But, there are reasonable arguments, of varying levels of persuasiveness, for each alternative version of the article and clause in each different factual circumstance.

CORBS: It is considered legally as a RBS for the criminal field rooted in the integration of the legal domain ontology and the group of rational regulations and laws. This system is dependent on a proficient field knowledge basis that consists of the domain ontology and the rule base. The domain ontology characterizes the conceptual model of the domain application of the work. To make straightforward the complexity of the ontology making process and to get a justifiable criminal domain ontology which influences the performance of the reasoning capacities of the planned system, a middle-out approach is used. This approach uses modularization methods to separate the ontology into 4 independent units which are upper, core, domain and domain-specific. The rule base consists of a group of logic rules which contains atoms which are described based on the ontology elements and formalized utilizing the semantic web rule language as a modelling phase for the legal rules. The semantic web rule language is applied since it is more appropriate to represent the deductive knowledge by rules consisting of atoms. The reasoning engine guides the legal reasoning by taking back the facts given and matching facts with the rule base (El Ghosh et al., 2017:640).

In the legal reasoning model of CORBS, there are 3 main layers (El Ghosh et al., 2017:635-636):

1. User interface: Facts are listed as inputs and are seen as examples of the domain objects.

2. Knowledge base: It consists of the domain knowledge helpful to solve problem. In rule-based expert systems, the knowledge is symbolized as a group of rules characterized in IF (condition) THEN (action) base. The knowledge base includes the domain ontology and the rule base:

   a) Domain ontology: The domain ontology represents the conceptual model of the domain and was made earlier as bases to create the knowledge base for the legal DSS.

   b) Rule base: A group of rules is created rooted in the certain domain ontology by referring to vocabulary identified by this ontology. They are considered as independent and self-sufficient parts of knowledge. Therefore, each rule is altered or brought up to date without needing the adjustment of other rules or having an effect on the whole system. Furthermore, the reliability of rules has an influence on the performance of the system.

3. Reasoning engine: Steers legal reasoning by taking back facts given to the system and matching facts with the rule base to recognize rules which satisfy the input. Therefore, new values for facts are created in accordance with the satisfied rules.

3.6.2.2. Case-Based Reasoning

CBR has the capability to use the particular knowledge of experienced problem cases. Basically, new problems are solved by discovering similar previous cases, and reutilizing the knowledge and information of the previous similar cases for the new situations. CBR can be considered as a continuous, cyclic, integrated and progressive process, because new experiences are solved by using previous cases, they are protected by learning new situations and they are used with more previous experiences for future problems. CBR can be called as a subfield of ML. Because of that, CBR also denotes a ML paradigm which makes possible continuous learning by renewing cases base after each problem solved. If a problem is not solved, the reason of this is recognized and memorized to keep away from the same mistakes for future cases (Aamodt and Plaza, 1994:39-41). Lambert and Grunewald (1991:194) state that:

> *"The first task of such reasoning is to pick, from the infinite number of respects in which cases can be similar and dissimilar, a manageable set of respects or features*

that could support a conclusion that one case is so similar to another that it will likely have the same outcome. Without such constrain, one would be faced with the commonsense impracticability, if not the jurisprudential impossibility, of defining the entire set of features that arty case in the domain can have, together with the full ranges of possible values that those features could take. Taking this arbitrarily restricted, but practically necessary, case structure, one could in principle generate the complete set of cases belonging to the domain and produce thereby a case base containing one case that would be exactly the same as any possible test case in the domain. But the size of such case bases would be intractable for case structures possessing more than an extremely small number of features. Therefore, the next task of the reasoned is to install in the case base a set of cases considered typical of those one is likely to encounter in the domain. These can be either real or hypxhetical cases that an expert concludes collectively capture the essence of the domain".

CBR systems have a database of cases about the subjects at issue. Previous solutions can give vital hints or direct solutions to the present situation. Therefore, the reasoning architecture of the CBR system generally contains 2 key components which are the case-base and the inference cycle. Case representation scheme can be called as a function of the database and the complexity of the case description. When cases in the database are huge, it is essential to divide the database into parts for the successful retrieval. Automated legal CBR systems can reach helpful results by means which do not powerfully reflect the behaviour of legal specialists (Pal and Campbell, 1997:50-51). Also, there are some advantages (Gabel, 2010):

1. CBR systems make excessive knowledge gaining attempts redundant.
   - Typically, case knowledge is obtainable without difficulty.
   - A large amount of the general knowledge is not aimed.
2. It is more straightforward to maintain the knowledge by taking cases in/out from the database.
   - Cases are free from the other and easily interpretable.
3. The CBR makes easy of intelligent retrieval when compared with database systems.
4. This system can provide very good results for weakly understood areas.

- The systems keep the high quality in memory.
- Even if the reuse of cases needs some small adjustments, it does not affect the quality too much.

5. This system has the high user acceptance because
   - A solution has a close similarity with the actual experience.
   - The users can see chosen cases and solution adaptation.

Despite their advantages, there are some disadvantages:

- The CBR systems use only precedents without taking care of other legal sources such as rules, regulations and codes.
- The CBR system can have a too big storage space for every case.
- The CBR system can take much time to unearth similar cases in the database.
- Cases might require to be made by hand.
- Adaptation might be complicated.
- The CBR systems require various instruments which are case selection algorithms, databases and case adaptation algorithms.

3.6.2.2.1. Main types of Case-Based Reasoning

Case-based reasoning concept consists of a variety of various methods which can organize, retrieve, utilize and index the information taken from previous cases. Definite experiences may be taken from cases directly or some similar cases might be collected and make a generalized experience. According to information form cases, these cases can be held as separate information parts or separated into subdivisions. They might be indexed by an open or prefixed vocabulary, and in a hierarchical or flat index structure. Sometimes, previous cases can be used to the existing case and sometimes can altered depending on dissimilates among cases. The case matching process, solution adaptation and learning process might be directed and assisted by a profound form of general domain knowledge, by more shallow and amassed knowledge, or be based upon an obvious and syntactic similarity only. A case-based reasoning approach might complete by itself and might be automatic, or they might have serious contacts with users for the assistance and the direction of selections.

Some case-based reasoning approaches may have many distributed cases in the database or just have more the limited groups of the typical cases. Previous cases might be found, extracted and assessed in sequence or in parallel (Aamodt and Plaza, 1994: 45-48).

3.6.2.2.2. The CBR cycle

CBR is to deal with a new problem successfully by recalling past similar situations and by using the relevant information and the data of those situations again. For example, after physician examines a patient, he gets some information about the patient`s illness. Considering that the symptoms were similar to others, the physician applies the similar treatment of the previous patients to new patients. A judge working on special cases has some information in common such as the similarity of decisions, similar findings and etc. The judge finds past cases, which have some findings same as the current case and can easily solve the case. With theoretical and experimental outcomes coming from cognitive psychology, human problem solving and learning turns into processes which include the representation and the use of certain sorts of information and the mixture of certain reasoning approaches. In this way, there are two models representing different points of the view on CBR. The first one is called as a dynamic model identifying the main sub-processes of a case-based reasoning cycle, their interdependencies and products. The second one is called as a task-oriented view, where a task decomposition and related problem solving methods are portrayed (Roy and Chakraborty, 2016).

Firstly, the cycle retrieves and finds the most similar cases and reuses the data and knowledge in the cases to resolve the problems. After that, it revises the proposed solutions (tested for success (applied to the real situations or assessed or adjusted by experts)) and retains the parts of the experience as the new information expected to be practical and helpful in the future reuse. The database continuously is refreshed by new cases, or by the alteration of current cases. A problem case can be solved by recalling past cases, using the similar case again, revising the solution and keep newly experienced knowledge by including it into the current database. Generally, a problem solution of CBR consists of the problem description, the evaluation of the similarity of the existing problem to past problems collected in the database with their recognized solutions, the retrieval of similar case or cases, and the reuse of the solution of the retrieved case or cases after the explanation of dissimilarities. This solution offered is assessed. After the revision of the solution (if needed) according to the

assessment, the problem description and solution are kept as the new knowledge, and in the way, the system learns. A general case-based reasoning cycle might be explained simply by 4 steps and after that, this cycle can be illustrated below (Aamodt and Plaza, 1994: 45-55):

1. Retrieving the most similar case or cases.
2. Reusing the knowledge to deal with the problem case successfully.
3. Revising the offered solution.
4. Retaining the certain divisions of this experience expected to be helpful to solve future problems.

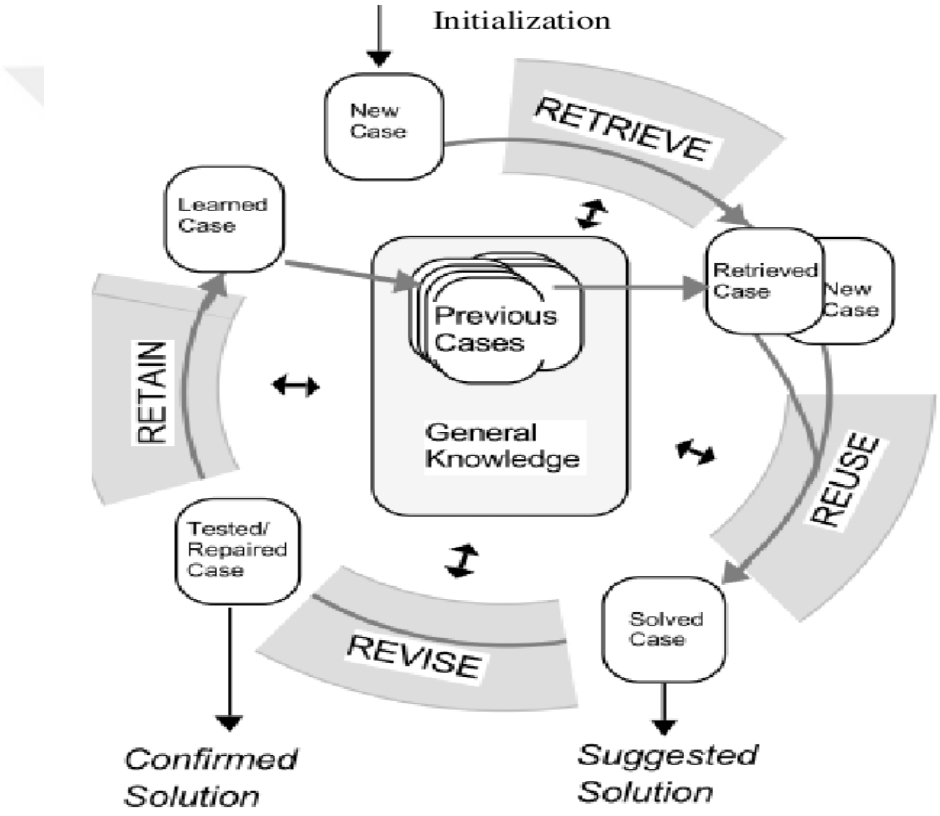


Figure 4: The CBR Cycle
Source: (Aamodt and Plaza, 1994:8)

Also, some methods are commonly utilized to implement the various stages of a typical case-based reasoning system and they contain: knowledge-based systems, ANNs, genetic algorithms, RBS, qualitative reasoning, fuzzy systems and constraint satisfaction problems (López-Fernández et al., 2011: 124-125).

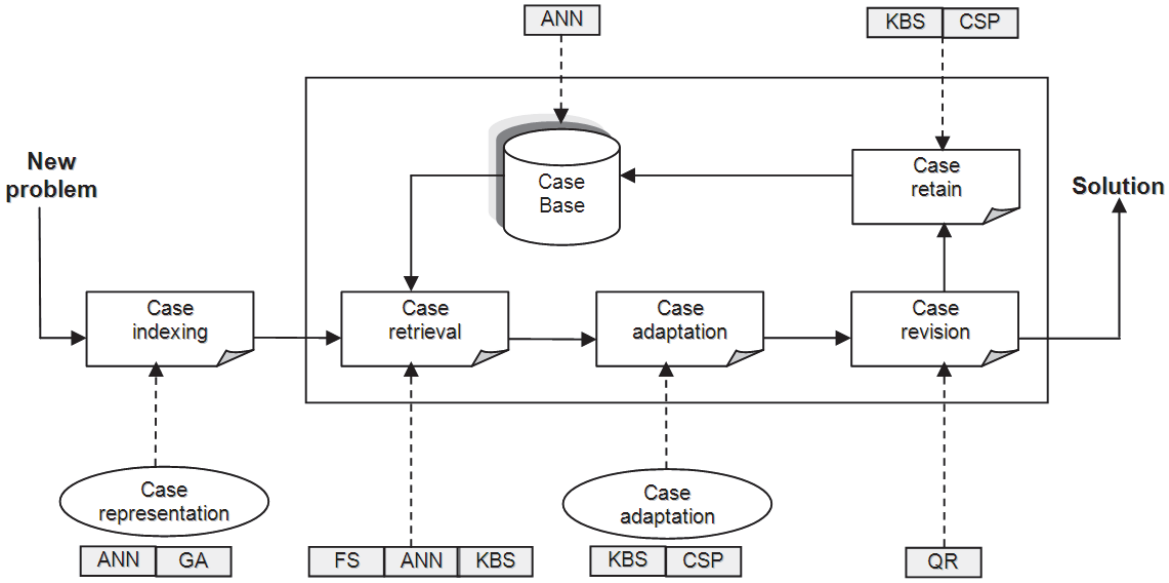


Figure 5: Methods and Techniques Commonly Used for Implementing Each Stage of a Typical CBR System

Source: (López-Fernández et al., 2011: 125)

Secondly, the tasks of the case-based reasoning cycle are further described in the figure below. They are expressed in bold letters, while methods are expressed in plain text. The links between task nodes (bold lines) are task decompositions. The connections between tasks and methods (stippled lines) identify alternative techniques appropriate to solve a task. The top-level task is to solve problems and learn from experiences and complete the task (showed in a particular way by a stippled arrow). It separates the top-level task into the 4 major CBR tasks as the means of retrieving, reusing, revising, and retaining. These 4 tasks are essential to carry out the top-level task. The retrieving is partitioned in the same manner (by a retrieval technique) into tasks identifying (pertinent descriptors), searching (to discover previous cases), initial matching (the pertinent descriptors to previous cases), and selecting (the most similar case). Task separations are complete. The figure does not demonstrate any control structure over the subtasks. The actual control is identified clearly and definitely as an element of the problem-solving technique. The actual retrieval technique, for instance (not clearly in the figure), identifies clearly and definitely the sequence and loop-backs for the subtasks of retrieval (Lenz et al., 1998). A technique identifies clearly and definitely the system which identifies and manages the implementation of subtasks, or deal with the task directly, while accessing and using the domain knowledge required performing this. The techniques in the figure are considered as high level technique classes, from which one or

more particular techniques ought to be selected. This figure is shown below (Bergmann and Althoff, 1998; Althoff et al., 1998).

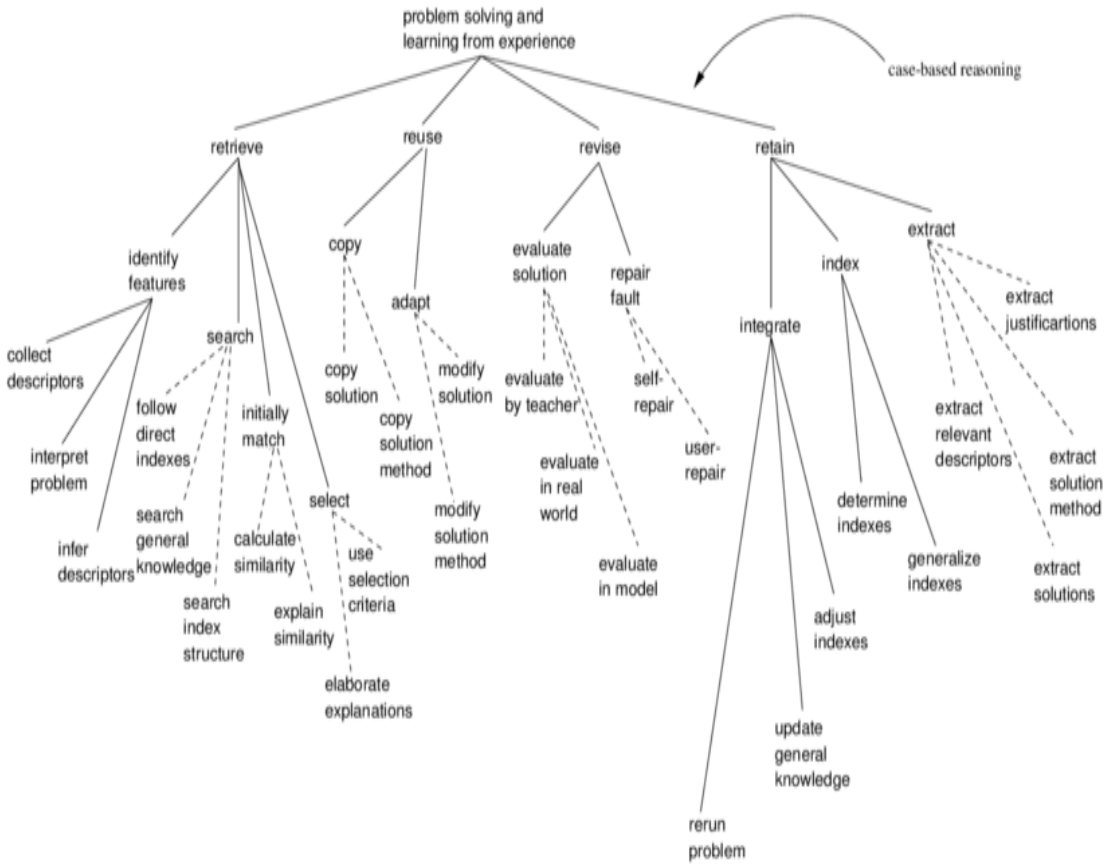


Figure 6: Task-method decomposition of CBR
Source: (Bergmann and Althoff, 1998:305)

3.6.2.2.3. Legal Case-Based Reasoning

The Legal CBR can be called as one of the major streams of researches in the area of artificial intelligence and law. In this area, there are some works which intend to make and improve formal models of the legal argument, and they are generally based on theoretical models such as works mainly about non-monotonic logics for defensible legal reasoning and works for model argumentation formally by means of dialogues. The works intend to inspect the practical use of AI techniques in the law, by creating applications. For instance, the system was created by Vey Mestdagh (1997) and it was used in the area of the Dutch environmental permit law. Another system is called as ARMOR (Matthijssen, 1999: Ch. 5) and this system offers an intelligent interface between lawyers and legal knowledge. A

practical application is called as the Split-Up system which helps parties in the case of divorce (Zeleznikow and Stranieri, 1995).

Many various paradigms of the case-based reasoning can be differentiated easily in AI. For instance, in the model-based approach, cases can be considered as examples described with regard to a theoretical domain model. Taking a new case into consideration, the case-based reasoning system decides if a past explanation is used. In the planning-oriented approach, cases are considered as records of solutions in previous problems, which are utilized as patterns which are used to find ways for new problems. In the exemplar-based approach, cases are considered as models which extensionally complete or support the definition of unclear concepts. Although, under the statutory law, case-based reasoning is possible to be employed successfully, generally CBR can be seen as a widespread practice in fields of the common law (Roth, 2003:3). For instance, stare decisis is a very important principle which can be employed easily in CBR and it means that, in Anglo-American law, principle that a question once considered by a court and answered have to obtain the same response each time the same matter is brought before the courts. Also, different methods can be used to have more accurate results such as rule extraction and case comparison.

HYPO: It is called as a CBR system which assesses problems by matching and contrasting a new case with past cases from the database and produces justifications coming from the previous cases to reach results about the side of the winner in matters such as trade secret law. The system shows challenging adversarial ideas about the problem and it presents hypothetical statements to change the balance of the evaluation. It utilizes dimensions as a generalization scheme to access and assess cases. Its reasoning process and a variety of computational definitions are portrayed and demonstrated, with the assessment of pertinent similarities and dissimilarities, perfect examples of cases, 4 sorts of counter-examples, aims for hypothetical statements and the faces of a case which are prominent in different argument positions. The definitions allow the system to render contextually delicate evaluations of appropriateness and prominence without depending on a strong domain theory or priori weighting schemes. Hypo`s focus is trade secret law about the protection of proprietary information against the unofficial commercial use by others. As long as a person utilizes or reveals the information either by the contravention of a confidential relation with the owner or by unjust or unlawful ways, the owner might take it right by claiming the misuse of the trade secret which is considered as one of numerous types of legal claims. The system

reasons by matching cases in the database and having conclusions. The process is one of picking over and collecting the cases in the database. There are 9 moves (Ashley, 1991:753 and 779):

- Examine the problem dimensionally.
- Retrieve pertinent cases from the database.
- Choose the most pertinent cases for the problem.
- Choose best cases for each side.
- Make differences between the relevant cases and the new case.
- Discover counter-examples to the best cases.
- Assess and sum up arguments generally.
- Produce 3-Ply Arguments[7] citing the best cases, differences and counter-examples.
- Make hypothetical statements to make stronger or grow weaker arguments.

FINDER: This system (Tyree et al., 1988) uses the case-based method and the nearest neighbour analysis was employed. The system makes recommendations in the law of trover (the law concerning the rights of the finders of lost chattels). This area of law is unusual in that it is based completely on cases (Popple, 1993:41). The form of the output of the system demonstrates a main attribute of legal expert systems which make justification highly important. Justification instruments are generally considered basic and are evidently planned to provide trust for users in verdicts (Tyree et al., 1989). Expert knowledge is utilized to find out vital cases in a certain field of law, and the attributes that has an importance for results of cases. The attributes are given weights-not by a legal expert, but by inspecting the extent to which each attribute varies across the cases. Utilizing the weighted attributes, it is possible to assess the similarity between cases. When the factual scenarios of a current case with important attributes are entered, the nearest solved case is discovered. Provided that the attributes of the nearest case fit the current case, the recommendation is obvious. When the attributes are different, the system provides features of the nearest case, and shows the

[7] Hypo makes 3-Ply Arguments using 4 steps (Chorley and Bench-Capon, 2004:90):
- Match a problem with a previous case with a best outcome.
- Separate a case with unwanted outcomes.
- Cite a perfect counterexample to a case cited by an opponent.
- Cite an as-on-point counterexample.

distinctions. It discovers the nearest case that has the reverse result to that of its other nearest case (Popple, 1991:15).

3.6.2.3. Hybrid systems

A DSS gives an interactive environment where the information is rapidly recognized and controlled for the construction of final verdicts. There are 3 main systems in the development. CBR and RBR systems are 2 main systems in the development of the DSS. CBR is utilized for learning and problem-solving applications to deal with new problems by retrieving and reutilizing particular information taken from previous experiences. RBR learns general domain-specific information from a group of training data and show the information in understandable way (if-then rules). But, sometimes each system experiences problems to give satisfactory solutions. Due to this, a hybrid legal DSS started to be used by integrating these systems. Also, provided that a maker that creates a legal expert system wants this system to be used in nearly every legal area, he/she has to create a system which can be used in both statute and case law. Generally, 3 different ways are used to combine RBR and CBR (Zhang et al., 2010:336, 338):

1. Maintaining RBR and CBR as 2 equal reasoning units;
2. Allowing the CBR element to utilize the inference ability of regulations when required and
3. Permitting the RBR unit to be dominant in CBR and utilize CBR categorically at certain ways in the reasoning process.

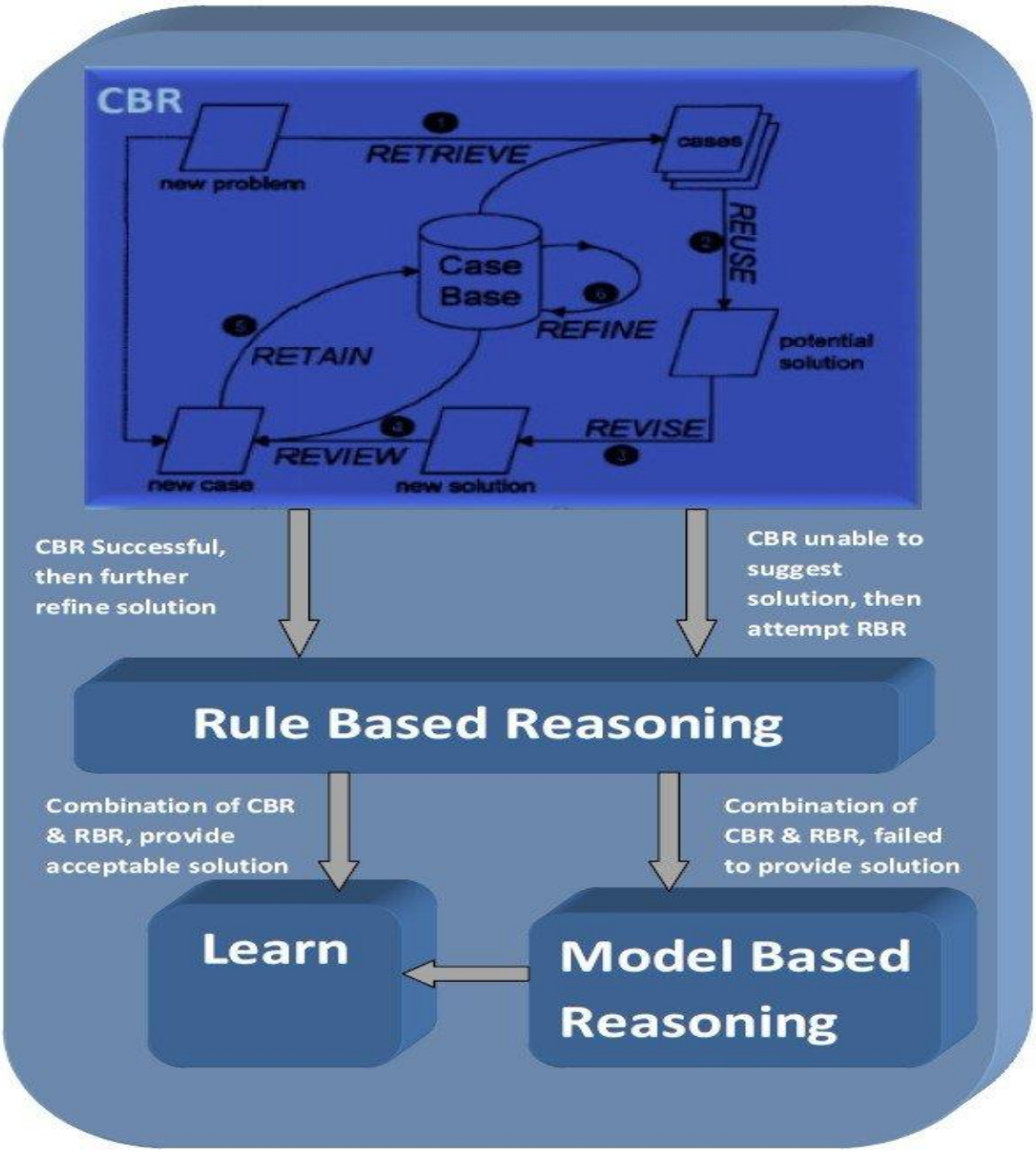


Figure 7: Hybrid Reasoning Method (CBR, RBR and MBR)
Source: (Khandelwal and Sharma, 2013: 92)

The hybrid method of CBR and RBR serves as the primary reasoning paradigm and the MBR is utilized as a separate reasoning method, only If the hybrid method cannot propose an answer. In this method, firstly CBS is used and pertinent findings are combined into a group of remindings, where each reminding points to a case (or a class of cases) with certain power. If some cases are pointed by remindings with power above the reminding threshold, the cases generally reminded of are retrieved. Provide that remindings are not made, the method triggers its RBR (Khandelwal and Sharma, 2013, 92-93). RBR are

primarily more different from CBR abut knowledge representation and knowledge utilization. For instance, Kolodner (1993) thinks that essential differences are that cases express a larger part of information than regulations and they create this information earlier than run-time inferencing; regulations express patterns, but cases are constants; and regulations are used when they compare a situation precisely, while cases can be utilized in partly comparing situations. Combining CBR with RBR can be also hard. Problem areas may include regulations and cases; human reasoners may employ regulations and cases; the regulations of an area may be unclear, or open textured, and thus need interpretation; regulations can contain some exceptions which have to be dealt with; regulations allow solutions to be evaluated without assisting the initial generation of solutions; and cases can be few or hard to obtain in an area. For instance, first CBR-RBR hybrids were created in statutory legal areas. The areas contain regulations and cases. Let us suppose that there is a regulation which forbids a vehicle into the car park. It is easy to understand that this bans an automobile, but is the same regulation is valid for bicycles, trucks and planes? What will happen for a park maintenance truck or emergency vehicles such as fire trucks? Even if regulations are cautiously designed, interpretive questions take place. The government handles the problems with the use of both cases and regulations. Cases can stand for implicit updates to the regulations, for instance, by listing undeclared exceptions and requirements. Cases permit a rule-based regime to get used to its altering situation without needing the regulations to be rewritten at each new turn of affairs (Hart, 1958:606-607; Marling et al., 2002: 70-71).

The Advisory Support for Home Settlement in Divorce: Legal reasoning can be thought to determine the group of important factual scenarios which represent a new case and make decisions about the group utilizing statutes and decided cases. Advisory Support for Home Settlement in Divorce is considered as a hybrid knowledge-based system which utilizes RBR and CBR. When CBR is chosen, the system refers to the characteristics of the chosen case to discover the nearest case or cases to the situation under consideration, and then demonstrate pertinent details and verdicts (Desouza, 2002:114). When RBR is utilized, the system makes wide-ranging recommendation provided that as a minimum one of the regulations from the database is activated. Provided that none of the regulations of the database is activated, the system can still give some incomplete or uncertain recommendations. Provided that the user does not give any preference, the system provides

some indication of the relative appropriateness of the rule-based advice and the most suitable previous cases (Pal and Campbell, 1997:51-52).

CABARET: When in 1989 Rissland and Skalak worked in the legal domain of statutory interpretation, they created a hybrid reasoning system which is CABARET. CABARET contains 2 coequal reasoners which are RBR and CBR with a separate agenda-based controller. The central controller consists of heuristics to control and interleave the 2 modules of reasoning and to post and prioritize missions for each reasoned (Domeshek, 1994:197; Bonissone and Dutta, 1990: 298). Basically, CABARET gives the structural design to integrate CBR and RBR in a manner which permits one reasoning paradigm to make amends for lacks in the other and for each to support the other. This is accomplished by concentrating on the control heuristics required for the integration of the 2 reasoning modes: that is, how to coordinate the reasoning of co-reasoners and which data to permit them to share (Lockemann et al., 1992).

In the recent versions, CABARET started to utilize a blackboard system that use heuristic control rules for watching the situation of problems-solving to suggest missions and rank the agenda. The user advances to identify an idea that is linked with a corresponding top-level goal to make an argument for a home office deduction. This point of view descriptor, together with particular sub-goals of the top-level goal, permits CABARET to utilize the cases and regulations to hold up a certain position. The selection of point of views, along with the possibility which a regulation might fire or fail to fire, leads to 4 tactics, called argument stances, that CABARET might pursue to utilize RBR (Lockemann et al., 1992).

- Confirming that a regulation should do well.
- Confirming that a regulation should not do well.
- Enabling a regulation to do well (making wider the range of a regulation).
- Disabling a regulation from doing well (limiting the range of a regulation, discrediting a regulation).

CABARET wants to advance the performance of regulations by supporting rule-based reasoning with case-based reasoning. It begins with the use of regulations for a main problem to choose an operator for using. Then it continues to look for comparisons which oppose the selection of operators. Provided that a strong difference is discovered, it uses the operator,

else it goes on to use the operator proposed by the regulations. Their domain knowledge consists of a group of regulations, a database and a similarity metric. Regulations identify an operator to use in each problem-solving situation. The database is considered as a compilation of cases with problems, answers and the chain of operators. The similarity metric measures an analogy between 2 problems for the aims of using a certain operator. The method is rooted in the idea that the only cases having helpful analogies are exceptions such as the cases which breach the rules. It discusses that cases which verify the regulations do not bring about any new knowledge. Its consideration causes the indexing scheme of keeping every case as a negative example of regulations which it breaches (Vossos and Zeleznikow, 1992: 140; Vossos, Zeleznikow and Hunter, 1993).

3.6.2.4. Other Techniques

Model-Based Reasoning (MBR): MBR can be called as a method in which general knowledge is expressed by the formulation of the mathematical or physical relations. The MBR method classically has causal relations to identify problems or foresee situation results. MBR is mainly helpful to make a diagnosis about equipment problems and reaches results from the knowledge of an application's structure and functions. MBR contains a form which imitates the structure and the behaviour of the equipment under diagnosis along with the comprehension of the equipments' internal activities. It utilizes the structural or the functional knowledge of the domain to solve problems and boosts the capability of the reasoner to deal with various problems along with problems unexpected by its designers. Information may be transferable among tasks and scientific and causal explanations are used by giving a more profound understanding of errors to human users (Khandelwal and Sharma, 2013:88-90).

Genetic Algorithm (GA): GA is an evolutionary computation method based on the standards of the natural selection. GA offers a proficient means of amalgamating parts of previous patterns. GA is utilized to amalgamate parts of previous building patterns into new complex patterns. Many studies transformed their execution of GAs with the use of the non-standard chromosome representation or with the design of the problem specific genetic operation to solve problems and to make competent evolution systems (Zhong and Santos Jr., 1999:477).

Information Retrieval (IR): IR uses chiefly statistical methods in order to solve problems about finding suitable documents in unstructured and big collections like archives and libraries. Classically, users enter structured queries having keywords to find relevant documents with the aims of the perfect precision and the retrieval of only pertinent documents (Marling et al., 2002: 76-77). IR depends on human users. The material that IR is dealing with obtains an essential property. Information retrieval's words are semantic in a natural way and its words are obviously an excellent starting point for the object characterisation and the recognition (Jones, 1999: 273).

Constraint Satisfaction Problem (CSP): CSP is considered as a dominant and broadly preferred artificial intelligence paradigm and users just require stating the constraints to be modelled. Due to the straightforward and rich representation, it is preferable for numerous various areas. The Constraint Satisfaction Problems are solved utilizing search (such as backtrack) and inference (such as arc consistency) methods. The Constraint Satisfaction Problems representations and techniques are possible to be utilized to model and solve numerous problems (Sqalli, Purvis and Freuder: 2007:2).

Hierarchical Planning (HP): Hierarchical problem solving has been always a popular method which is utilized to decrease the computational cost of planning and it firstly focuses on the most important problems. The key benefit comes from the fact that by putting emphasis on particular activities while temporarily ignoring others, it is possible to get a much smaller search space in which to find a plan. People can give a general introduction of HP, discovering the utilization of hierarchies in planning in some situations. People give a generic introduction to HP, in which a plan is progressively refined by thinking of rising levels of detail. After that, they specially think of 2 ways in which details are put in a plan. Firstly, precondition-elimination abstraction imitates the human intuition of discovering and solving sub-goals in order of significance, with vital aims dealt with firstly. Secondly, HP is considered as hierarchical task-network planning, where a planning problem and operators are arranged into a group of missions. An advanced mission can be diminished to a group of ordered low missions, and a mission can be diminished in some ways. The lessening carries out as a mapping from a mission to a group of sub-missions, identifying the information about how to get a comprehensive plan from an abstract one. Each of these 2 techniques is complementary and can be efficient in dealing with a various kind of problem successfully (Yang, 1997:163-164).

STRIPS-Style Planning: This planning was originated in the Stanford Research Institute Problem Solver (STRIPS) Project in the early 1970s. STRIPS were called as a general problem solver which instructs SHAKEY (robot) as it finds the way through various rooms, moving things to rooms. STRIPS tries to find a sequence of operators in world forms to change a given initial world form into a form in which a given aim formula can be proven to be true (Fikes and Nilsson 1971:189). In STRIPS-style planning, the assumption is produced that alterations just take place in the world provided that indicated by the operators in the domain definition. The operators are utilized to produce the well-organized steps of a plan that, when implemented, gets the aimed objective (Marling et al., 2002: 81).

3.7. The Ways of the Knowledge and Information Representation

The ways of the representation of legal knowledge in legal expert systems relies on the nature of law with which the legal expert systems are concerned: statute law or case law.

3.7.1. Statute Law

Statutes are determined by legislation and present general propositions of law which judges have to apply to particular facts. Statute law is written law, is fundamentally and naturally definitional and tries to define some legal relations or concepts. It gives the short-run certainty**.** When the codes and regulations are used for facts of cases, inference engines can make a solution that shows the effects of the statute, codes and regulations on the given facts. For instance, the British Nationality Act was programmed as a Prolog program and it defines British citizenship. This act covers features of statutes generally: syntactic complexity, vagueness, and reference to passed legislation in the past. Generally, the British Nationality Act experiment showed the feasibility of using Prolog logic for considerable amounts of tools managing the execution of codes and rules. The tools contain cases of statutory law and are linked with sophisticated data processing (Sergot et al., 1986:370, 385).

3.7.2. Case Law

Even highly a comprehensive written law does not cover all law fields. According to circumstances, statutes may need interpretations consistent with previously completed cases. Case law (judicial precedent or judge-made law, or common law) is considered as the body

of law based on judicial decisions of courts. The crucial feature of case law is based greatly on the doctrine of precedent which expresses that each completed case is not only a sample that later courts might choose to pursue, or not to obey: That case is the part of the law. Case law is rooted in the principle of stare decisis that gives case law the long-run certainty, since case law cannot be altered rapidly and gradually countervailing judicial prejudice dies out (Ponzetto and Fernandez, 2008: 382).

Morris et al. (1992) states that the principles of the doctrine of precedent can be explained in this way below:

- Each court has to obey verdicts of courts higher in the hierarchy;
- A verdict of a court in a different hierarchy might have some influences, but is not compulsory;
- Just the ratio decidendi[8] of a case is compulsory;
- Any pertinent decisions might be considered and pursued.
- Precedents are not necessarily cancelled by a period of time that passes.

[8] Ratio decidendi can be called as a legal rule concerning the legal reasoning behind the judgment of the judge or jury.

CHAPTER 4: THE CASE OF TURKISH ADMINISTRATIVE JURISDICTION IN THE IMPLEMENTATION OF THE AI ROBOT

4.1. Introduction

This chapter analyses the Turkish administrative jurisdiction for the applicability of AI robots. According to the legal rules to which the administration is subject, the legal systems are divided into two as the administrative regime (Continental European System) and the judicial administration system (Anglo-Saxon System or Anglo-American). Turkey has adopted the administrative regime system and has been mainly influenced by the French administrative law doctrine and the French administrative jurisdiction (Saygın, 2017: 61). The French administrative jurisdiction system has been the source of inspiration for the Turkish administrative judiciary. In this sense, with the establishment of the Council of State on May 10, 1868, for the first time under the name of "Şuray-ı Devlet" in accordance with the example of France, the first step was taken in the administrative jurisdiction (Mehdiyev and Saygın, 2011: 635). This law is mainly based on statute law but courts have to comply with certain verdicts of courts higher in its hierarchy. Judges make decisions according to primary (constitution, laws and etc.) and auxiliary sources (judicial decision and doctrine) and personal conviction. Legislation as statute law contains statutes and delegated legislation. Delegated legislation (such as laws, regulations and etc.) is created by legislative power which is given by the statute. On the other hand, case law is created by the judge and is based on judicial solutions of particular arguments. In Turkey, the judicial system represents a general division between private (civil) legal affairs and issues related to the government and administrative units. The dispute between businesses or individuals with regulations involving government bodies and issues like customs, state sanctions, taxes and etc. is subject to a special system steered by administrative procedures and a special court process.

Turkey does not have a general administrative procedure law consisting of general administrative procedural rules as a whole. Therefore, any classification or definition identified by a general law for parties in the process of administrative decision-making is not available. Instead of this, various legal regulations are used in Turkey and they consist of administrative procedural rules. In these rules, details are organized and for instance, the regulation explains application requirements such as people which have the right for the

applications, application time, the institutions which should be applied for complaints and etc. Also, provided that parties have interests and are directly affected, they can participate to the environment protection, the protection of historical and cultural values, the participation of associations and etc (The Federal Administrative Court of Germany and ACA-Europe, 2018:1). Turkish Procedure of Administrative Justice Act (The Grand National Assembly of Turkey, 1982) Article 10 says *that "1. The persons concerned may request the administrative authorities to implement an act or take an action that may be the subject of a lawsuit. 2. If the request is not replied within 30 days, it shall be deemed to be dismissed…"*

Especially, in Turkish administrative proceedings, the use of AI can be highly productive because Turkish administrative proceedings have some main features which may help AI software to be popular and useful in Turkey. Firstly, in Turkish administrative proceedings, inquisition without preoccupation is used and this can make categorizations easier. The courts check some documents and may decide some decisions on them fast without the further research. This check may be more systematic by AI software and the processes may become clearer. These proceedings are written and it means that the storage of documents is easy and when some necessary documents which are similar to these cases are needed, these documents can be found easily and decision-making processes become less complicated with careful categorizations of documents. Especially, Turkish administrative proceedings are designed to be simplified and relatively cheap. Due to that, in this judicial system hearings in courts are exceptional and the judges are inclined to give their decisions without any hearing. Hearing witnesses are not possible in this system and the inspection and expert witness reports are not used regularly (Kaplan, 2016). All of these may make the AI software possible and very beneficial in Turkish administrative proceedings with robust and faster decisions by accelerating the process.

Turkish administrative courts normally are in charge for judging the compliance of public administrations' behaviors and actions according to law upon a request of any grieved individual. These courts refer to a judiciary branch aside from the ordinary courts in Turkey and they have three tiers which are administrative courts and tax courts as first instance courts, regional administrative courts as appellate courts and Turkish Council of State as a supreme administrative court. District administrative courts can be called as regional courts created to assess applications for objection remedy against the verdicts of the first instance

courts. Administrative courts are considered as the courts of general jurisdiction in administrative judiciary branch and tax courts handle actions about the taxes, fees and etc. All these courts are generally different such as rules, proofs and application periods. This means that people who create robots for them should programme these robots separately for each court(Akbulut, 2016: 103).

However, there are some challenges to solve in Turkish administrative proceedings when they adapt the AI system to the Turkish administrative proceedings. For instance, some problems come from the interior structure of Turkish administrative proceedings and related laws such as fragmentation of norms in the Turkish administrative procedure law, the predictability of decisions for the Turkish administrative jurisdiction, the insufficient number of cases published, the uncertainty of legal texts coming from the use of general clauses, rough or evaluative concepts and the room for free interpretation. The government with the support of specialists who are expert at various fields such as law, public administration, linguistics and robotics should regulate the modification of laws, regulations, and rules to facilitate the utilization of the AI technology in courts. For example, when international examples were examined, in the area of NLP, which is a sub-field of AI, successful solutions have been obtained especially in English and other languages from the Indian European language family. Labelled data in these languages is one of vital factors that increase the success of AI systems. However, in Turkey, Turkish Natural Language Processing is not yet as developed as English. The basic structure of the Turkish language is agglutinative and it is more different from English. Due to this, the majority of artificial intelligence models that can be used for English do not work for the Turkish language.

4.2. The Turkish Administrative Jurisdiction

As a structure, public law is highly different from private law. Although Private law focuses on relations among people and is typified generally by civil law and commercial law, public law focuses on relations among people and the country and is typified by constitutional law and administrative law. Especially, precedent is less important for public law compared with the private law. The debates and the analysis of the example area of objection procedures in administrative law will be about Turkish administrative law by focusing on the sources of information and information which is taken and processed in this area. The Turkish administrative law mainly manages the relationships between the public

administration and citizens. Administrative law gives government particular legal tools to implement its public tasks and offers protection to the members of society against the governmental action. In the administrative law area, administrations make and issue acts and decisions can have effects on citizens. Citizens can involve into the verdict process and they can react to the final verdicts such as requesting a decision, proposing their own ideas and file objections. Administrative law can be considered as a formalized means of communication between the government and the public. This communication can be seen as an information handling process which creates what information input is needed by the parties in the tasks they carry out in administrative law.

4.2.1. The Sources of the Turkish Administrative Law

These sources mainly can be divided into two as "primary sources" and "auxiliary sources".

Table 14: Sources of the Turkish Administrative Law

Sources of the Turkish Administrative Law		
Primary Sources	Auxiliary Sources	
Written Sources	Judicial Decisions (Legal Precedent)	Doctrine
4. The Constitution **5. The laws** **6. Presidential Decrees** **7. International Treaties** **8. By-laws**		

Written sources are the constitution, the laws, presidential decrees, international treaties, regulations and by-laws. The laws, presidential decrees and the international treaties are at the same level in the hierarchy of norms. There is a hierarchy among others. The law, presidential decrees and international treaties are superior to the by-laws. The constitution is above all of them. These form a "hierarchy of norms". In this hierarchy, a norm in the lower level cannot be against the norm in the upper level. The administration has to comply with all norms in the hierarchy of norms.

The auxiliary sources of administrative law are divided into two as judicial jurisprudence and doctrine.

a) Judicial decisions as legal precedents serve as a very important resource in the administrative law. Legal precedent is essentially a court order that is taken as an example when making a verdict. Judges often take the example of their previous judgments or verdicts of other courts on the same subject, without obligation, in the case before them, instead of making a brand new verdict, finding a brand new solution. Administrative courts in particular take the verdicts of the Council of State as an example. In other words, these verdicts constitute the legal precedent. Actually, these verdicts are not binding except for verdicts on the unification of conflicting judgments. It means that only verdicts on the unification of conflicting judgments are compulsory, other verdicts are not binding and decisions on the unification of conflicting judgments have to be made by the Council of State. Administrative courts are not obliged to follow other verdicts of the Council of State or other verdicts but judges can benefit from these verdicts if judges wish.

b) Doctrine can be called as the second of the auxiliary sources of administrative law and is the views and thoughts of specialists in the administrative law. The doctrine is not binding. Administrative law judges do not have to abide by the doctrine. However, if they want, instead of solving a complicated problem themselves, they can take advantage of the solutions proposed by scholars in this regard.

The primary sources of law can be accessible easily in the Turkish administrative jurisdiction. However, there are numerous legal regulations. The problem is about understanding and evaluating the sources. The language of law is heavy and complex. When this is abstract, even judges may have the difficulty in understanding the information. Another problem is prolonged trials. For all these reasons, dispute resolution ways and the procedures should be more understandable. Also, in Turkey, generally laws are prepared by putting a person with a legal education in the centre and poor citizens may have the problems to get the access to the justice.

4.2.2. Features of Administrative Law

1. Administrative law is a young branch of law. It emerged in France in the late 1800s. However, the origin of private law goes back to Roman law.
2. It is a branch of law that has not been coded. So the rules of this branch of law are scattered. These rules were not compiled and they are not like the Civil Code, the Criminal Code or the Commercial Code.
3. Administrative law is based on a large-scale "legal precedent" branch of law. Administrative law rules were created by law-makers. Administrative law is a law built by judges. The rules of the administrative law have been formed by the decisions of administrative judicial organs in concrete cases for a long time. However, provided that there is a law about that subject, judges apply the law, not the legal precedent. Although there are some laws in the field of administrative law, there are no general legal texts that determine the basic concepts, principles and theories of this branch of law such as administrative procedure, administrative contract, regulatory transaction, administrative responsibility, public service, law enforcement, public domain and etc. These were created by legal precedent. Administrative courts decide on these issues not on the basis of laws, but on legal precedent.
4. Administrative law is an autonomous branch of law. Administrative law is a completely different branch of law from private law. Some of the concepts and principles of administrative law (such as unilateral transactions, enforcement, expropriation, administrative sanctions, the law of lawfulness, public power privileges and etc.) are unique. Some other concepts and rules (such as administrative contracts, administrative responsibility, etc.) are similar in private law. However, their legal regime is completely different from its counterparts in private law.
5. In the administrative law, there are no legal relations determined by the free will of the parties. There are general legal conditions determined before such as citizenship status, student status, civil service status and retirement status. It is optional to enter into or exit from these statuses. However, you do not have a chance to bargain on these issues.

6. Administrative law procedures are unilateral. In order to perform an administrative transaction in administrative law that transaction does not need to be accepted by the relevant person. Administrative law transactions occur with the unilateral declaration of will of the administration. For example, in cases where the public interest requires, the administration can take a property of the private ownership as its own property by expropriation, without the consent of the owner, provided that it pays the price. This expropriation process carried out by the administration results in the results whether or not the concerned person wants it. In the administrative law, the administration is equipped with superior powers and privileges. These powers and privileges are called "public power privileges. What lies beneath these privileges is the idea of public interest.
7. Disputes arising from administrative law are solved at administrative courts.

4.2.3. The Freedom of Evidence and Its Limits in Administrative Jurisdiction

Principally, every evidence and information can be used in the judicial procedure according to the principle of freedom of evidence. However, this is not an absolute principle in terms of the administrative jurisdiction. For instance, witness and oath evidence are not used in administrative judicial practice. In addition, according to paragraph 3 of Article 20 of the procedure law, provided that the information and documents requested from the administration under the authority of ex officio investigation by the court are confidential, they may not be presented to the court. Information and documents obtained cannot be evaluated by the courts. These can be the exceptions to the principle. In addition, Turkish Procedure of Administrative Justice Act (The Grand National Assembly of Turkey, 1982)'s 20/1 says that *"The Council of State, regional administrative courts and administrative and tax courts shall make any kind of examination regarding the actions before them of their own motion. The courts might ask the parties and other relevant authorities to send documents that they consider necessary and to present any kind of information within the designated period of time. It is mandatory for the decisions on this matter to be fulfilled within the given period of time. This period can be extended for once only provided that justified reasons are given."* Written proof such as official promissory note and receipt can be used in administrative proceedings and inspection and expert can also be consulted. However, in the administrative procedure, "oath" and "witness" cannot be accepted by the judicial bodies (Ceylan, 2018: 326-327). On the other hand, according to Turkish Procedure

of Administrative Justice Act (The Grand National Assembly of Turkey, 1982)'s article 20/3, *"if the requested information and documents are related to the security or high interests of the State or the foreign states as well as the security and high interests of the State, the President of the Republic or the relevant Vice President of the Republic or the minister might refuse to give the specified information and documents provided that its reason is notified. The decision cannot be taken according to defence based on the information and documents that have not been given."*

Evidence is an important tool used in the process of dispute resolution. Generally, evidence is divided into two as "absolute evidence" and "discretionary evidence". The judge has to take absolute evidence into account. In other words, a case that has been proved with absolute evidence cannot be considered unproved by a judge (Kuru, 2001:2032). Discretionary evidence is evidence that the judge can freely decide whether it should be used or not. The free evaluation of evidence is only possible for discretionary evidence. The distinction of the absolute evidence with the discretionary evidence in cases where the "principle of bringing by the parties" is adopted is important, but in cases where ex officio research principle is applied, all evidence is considered as discretionary evidence and it is accepted that there is no definitive evidence. However, some scholars think that acknowledgment or written documents in evaluating the evidence should have priorities like absolute evidence because acknowledgment and written documents are very strong documents which can be very hard to challenge and these documents facilitate judges` works and decisions can be speeded up (Gözübüyük, 2013: 464-465; Şenlen Sunay, 1997: 40; Yasin, 2015: 100).

The documents which were not submitted in due time according to article 21 of Turkish Procedure of Administrative Justice Act may cause the limits of the freedom about evidence. The article 21 of Turkish Procedure of Administrative Justice Act states that *"the documents that are not submitted together with the petitions and pleas shall be accepted and notified to the other party if it is considered by the court that their submission in time is not possible. If these documents are submitted in the hearing and the other party declares that it can immediately give its answer or does not consider it necessary to give an answer, these documents shall not be notified separately"*. It means that documents that were not submitted to the court during the petition exchange stage, if there is a reasonable reason for its delay and the reason which can convince a court, may be rejected. However, according to articles

20 and 21 of Turkish Procedure of Administrative Justice Act, the principle of ex officio research is valid in the administrative procedure. Both articles look opposite to each other. However, people should understand that the article 21 can be used to avoid reasons which intend to maliciously extend the time period of the case. Also, a document submitted late consistent with the provisions of article 21 may not be accepted by the court only in cases concerning people; but in the decisions concerning the public, even if the party submits the document late without a justifiable excuse, the court should accept and evaluate the document (Candan, 2012: 641). However, some scholars state that the most of the evidences that will illuminate the case especially in cancellation cases is in the hands of the administration and due to this, it is necessary to accept the submission of evidence until the trial is concluded (Çağlayan, 2014: 318). This idea seems to be more appropriate for the notion of the administrative jurisdiction.

4.2.4. Features of Administrative Procedural Law

The administrative procedures have their own characteristics and are regulated by laws. Unless the opposite rule is made, legal arrangements regarding the administrative jurisdiction are applied even in the cases and works that are in progress. Rules about the administrative jurisdiction cannot provide concerned people with vested interests. All the rules about the administrative jurisdiction are connected with each other and their aims are to reach the public benefit. Although decisions on administrative cases are primarily considered to serve for the interest of the plaintiff, the effects and results which decisions will create are not limited with them. This situation can show itself especially in the cancellation of regulatory acts such as Presidential Decrees and by-laws since each person can take the advantage of outcomes of a cancellation verdict. Even in the situation of cancellation of individual procedures (e.g., the terminations of jobs of public servants, disciplinary punishments for students, or taxes and penalties for taxpayers) the impacts and results of verdicts are only not limited with parties. Basically, the administration, which does not work well, is urged to be repaired with these verdicts and is punished with the price of its violation. For these situations or outcomes, it cannot be said that it has no effect on third parties.

1. **The Validity of the Written Trail Procedure:** Administrative disputes generally come from administrative proceedings, actions and contracts. Administrative

jurisdiction is completed in written form since the administrative contracts which comprise the subject of administrative disputes are naturally in written form, except for implied rejections; administrative procedures are dependent on written form as a rule. Because formal applications or requests are obligatory in administrative actions to the administration before filing a lawsuit, rejections of the applications or requests are written. Implied rejection verdicts are considered as the same assumption. Since each administrative dispute comes from written administrative procedures or verdicts, any lawsuit to be filed against them has to be in the written form. The writing of the allegations and responses gives an assurance which keeps the parties safe from potential shocks and they can think carefully about what they will write because they have the time to write. This will increase the quality of the allegations and responses and can speed decisions up (Kaplan, 2020:13-14).

2. **Exceptional Hearings:** Due to the writing procedure, there is no type of lawsuit in which the hearing is obligatory and the related regulations. For the hearing of the administrative jurisdiction, the prescribed conditions must be fulfilled. Therefore, in the administrative judiciary, the hearing is an exception and the hearing mechanism can be applied in two ways. The first is the request of one of the parties and the judge's acceptance of this request, and the other is the court's decision to hold a hearing. Pursuant to the article 17 of Turkish Procedure of Administrative Justice Act, in all full remedy action and tax cases that fall below the monetary limit shown in the law both at regional administrative courts and the council of state, even if the parties demand a hearing, since the discretion is in court, this demand may be rejected by the court. In practice, most of the cases that fall below the monetary limit when the parties' hearings are rejected and the Council of State have not reversed these decisions (Karavelioğlu, 2006: 1191-1192). The request of the parties for a hearing during the appeal and appeal stages is not enough to be accepted and the judge has to accept the request. The second paragraph of article 17 of Turkish Procedure of Administrative Justice Act states that *"A hearing can be held in the appellates and appeals, depending on the request of the parties and based on the decision of the Council of State or the relevant regional administrative court."* The Constitutional Court states that if the trial is held at the trial in the first instance court, then the rejection of the requests for appeals during regional

administrative courts and the council of state is not a violation of the right to a fair trial[910].

3. **The Lack of Public Verdict**: In the Turkish administrative justice, there is no regulation that decisions will be in the form of the public verdict (Candan, 2009: 576). In practice, decisions arising from this situation are made in the absence of the parties, even in cases where the hearing is held and justified decision is notified later. According to the article 19 of Turkish Procedure of Administrative Justice Act, "*a decision shall be taken within no later than fifteen days after the hearing is held. In cases where an interim decision is taken, the files shall be examined principally upon the fulfilment of this decision*". The proceedings are not recorded and the statements of the parties are not recorded in the hearings.

4. **Limited Stages Where Hearing May Be Requested**: In the current administrative judicial system, the parties cannot request a hearing at every stage of the trial and they can only request a hearing at the stages shown in the law. The 3rd paragraph of article 17 of the Turkish Procedure of Administrative Justice Act says that *"a request for hearing can be made in the responses and pleas within the lawsuit petition*". In other words, the plaintiff requests a hearing in the action petition and the replication, and the defendant can request a hearing in defense plea and second defense plea. The hearing requests made after these phases are rejected in accordance with the provision (Ocak, 2019: 359-360).

5. **The Principle of Ex Officio Examination**: In the current administrative judicial system, the ex officio examination is used. The article 20 of the Turkish Procedure of Administrative Justice Act states that *"The Council of State, regional administrative courts and administrative and tax courts shall make any kind of examination regarding the actions before them of their own motion. The courts might ask the parties and other relevant authorities to send documents that they consider necessary and to present any kind of information within the designated period of time. It is mandatory for the decisions on this matter to be fulfilled within the given period of time. This period can be extended for once only provided that justified reasons are given."* The management of the case belongs to the court from

[9] The Turkish Constitutional Court, 09.09.2015 date, 2013/1943 the decision with reference number, http://kararlaryeni.anayasa.gov.tr, (Access: 09.06.2020).
[10] Nevruz Bozkurt, B. No: 2013/664, 17/9/2013, § 32

filing a lawsuit to the final verdict. In this context, the investigation of the fact which causes dispute and litigation and legal assessment and classification of facts belongs to the court and the collection and evaluation of evidence belongs to the court. The court analyses claims and defenses coming from parties. The court automatically explores and inspects whether factual scenarios are real and legitimate. This contains the determination and usage of the legal rules appropriate to facts. The court can want every document which is necessary from parties except for some documents explained above.

6. **The Simple and Economic Solution**: The written trail procedure makes the administrative jurisdiction simpler and cheaper for parties. Particularly the hearing is not common, there is no possibility to listen or watch witnesses and experts are not used commonly because they increase expenses.
7. **Public Prosecution Service:** The prosecution service only exists in the Council of State. In regional administrative courts and administrative and tax courts, there are not public prosecutors The six paragraph of the article 16/6 of the Turkish Procedure of Administrative Justice Act states that *"in actions that are tried in the Council of State in the capacity of the court of first instance, the written opinion of the prosecutor on the justification shall be notified to the parties. The parties can submit their opinions in writing within ten days as of the notification."*
8. **The Importance of Case Law in the Administrative Jurisdiction Procedure:** Today generally the administrative jurisdiction procedures have been regulated by positive law rules. However, when compared with the criminal procedure law, it is impossible to say that all rules and institutions which can be required are regulated in a detail way. For instance, in the situation of the pendency, withdrawal of the suit, procedural rights etc. to fill in the gap, the council of state tries to produce its case law.

4.3. The Benefits of Artificial Intelligence on the Administrative Jurisdiction in Turkey

Today, the importance of the technological developments in AI in the legal world cannot be deniable. Especially the jurisdiction is taking advantage of the improvements in the AI technology in certain countries like U.S., China and etc. Turkey should benefit

optimally from the new improvements in AI especially in the jurisdiction. There are some clear benefits of the use of robot judges in the Turkish jurisdiction (especially in the Turkish administrative jurisdiction procedures). The advantages can be explained with the technical literature and various points of views by giving examples of certain countries. There are basic features of robot judges, which will be explained in a detailed way below. Robot judges are quicker, they can handle multiple cases at once, and they can find and analyse pertinent legal documents very quickly. This is beneficial for current judges to concentrate on more important cases.

4.3.1. Time Saving and Efficiency

Turkey needs to use AI especially in the jurisdiction for the time saving and efficiency in courts and there can be huge benefits for the use of robot judges in the Turkish jurisdiction, especially in the Turkish administrative jurisdiction because in Turkey the population increases significantly and the employment of the judicial staff is not enough. In the Turkish administrative jurisdiction, although continuously the judicial staff is employed, there are still some problems causing the slow and long duration of the judicial process.

Table 15: The Number of Cases for per Judge in Administrative Jurisdiction and the Number of Cases Completed by Per Judge

The Number of Cases for per Judge in Administrative Jurisdiction and the Number of Cases Completed by Per Judge			
	2017	2018	2019
The Number of Incoming Cases for Judge per Year	373	308	330
The Total Number of Incoming Cases per Judge (Taken From Last Year + Cases Sued During The Year + Reversal of Decisions)	522	433	458
The Number of Cases Completed by per Judge During the Year	402	318	314

Source: (Adli Sicil ve İstatistik Genel Müdürlüğü, 2019: 256)

When the table is analysed, in 2019, it can be seen that the number of incoming cases for a judge (330) increased according to the previous year (2018-308) and the total number of incoming cases per judge (taken from last year + cases sued during the year + reversal of decisions) (458) compared to the previous year (2018-433). Also, when the number of cases

completed by per judge during 2019 (314) is analysed, even if there are positive signals for administrative courts compared to the previous year (318), the number in 2019 is not reduced much and still high. In Turkey, on average, administrative law judges can complete 314 cases from 458 and it has become higher from year to year. This means that highly possibly in next years, the rate between incoming cases and completed cases will get higher negatively. As AI robots can handle repetitive tasks and sort out essential documents, administrative law judges can make decisions or can check important decisions made by AI robots. When robots are employed, the number of administrative law judges will reduce and in this way, more skilled judges can be chosen by the government.

Table 16: The Number of Cases in Administrative Courts

	Left from Last Year	**Sued During the Year**	**Reversal of Decisions**	**Decided During the Year**	**Transferred to the Next Year**	**Average Completion Duration, Days**
2017	114.151	223.710	17.308	257.301	97.868	153
2018	97.862	211.455	17.476	207.237	119.556	179
2019	119.547	237.805	15.794	225.611	147.535	201

Source: (Adli Sicil ve İstatistik Genel Müdürlüğü, 2019: 259)

When the table is analysed, in 2019, it can be easily seen that the number of unfinished cases (119.547) increased according to the previous years (2017-114.151) (2018-97.862) and decided cases (225.611) compared to the previous year (2018-207.237). Sued cases during the year (237.805) in 2019 are higher than previous years (2017-223.710) (2018-211.455). The rate of decided cases during 2019 (225.611) decreased compared to the previous year (2018-207.237). As a total, in 2019, there is a clear increase in cases. In 2019, the average completion duration of a case (201) was higher than previous years (2017-153) (2018-179). The transferred cases (147.535) in 2019 due to some problems such as caseloads, time and etc. increased compared to previous years (2017- 97.868) (2018-119.556). In 2019, the average completion duration of a case is really long and because of this, people can consider that courts are really slow and they do not feel satisfied about the process of courts. Justice delayed is justice denied. The slow and long duration of the judicial process due to the excessive increase in the workload of the administrative judiciary makes Turkish administrative courts significantly difficult to fulfil the expectations of the Turkish citizens. When the reversal of decisions is analysed, even if there are positive signals in 2019

(15.794) for administrative courts compared to the previous years (2017- 17.308) (2018- 17.476), the number is still high. This means that administrative judges make wrong decisions according to the higher court (the Turkish Council of State) and this causes the extra burden on judges and the duration of cases lengthens out.

A faster proceeding is indispensable for a fair trial and is conducted without unnecessary formalities for the speedy disposition of a matter. Provided that a country proposes an enormous change in nearly all court systems (such as robot judges and online proceedings), the country should offer huge advantages which come from the status and features of the robot judges. Judicial proceedings have to be carried out in a timely manner. Verdicts have to be made within a predictable timeframe. Robot judges should contribute to fast proceedings and make the decision-making process faster. Generally, the ordinary court proceedings take longer time and the number of cases is beyond human judges' capacity. They do not have the time to focus on cases in a detailed way. The use of robot judges might advance the efficiency of the judicial system. Robot judges can handle an enormous workload and give human judges the extra time for complex and complicated cases. Robot judges can cut down the duration of proceedings because robot judges can deal with a huge number of cases simultaneously in a much faster way without fatigue, inexperience, depression, holidays, stress, financial difficulties and etc (Gyuranecz et al., 2019: 12). Also, when judges start working, they generally feel pressure and are inexperienced and are not used to the new environment in areas where they will go. These lead to wrong decisions and they learn their jobs by making mistakes. However, this occupation is not a kind of job which can tolerate mistakes. In some situations, even if judges recognize their mistakes, they may not able to correct them. The system of the judiciary does not allow them to do these actions. For instance, when judges make their final decisions (as courts of first instance) in due form, they cannot change their mistakes. These can be changed by higher courts if conditions and requirements are suitable.

The analysis of document can be done faster by robot judges. For instance, in Brazil, VICTOR can complete a task in five seconds which was completed before by servers in about thirty minutes and it can show huge savings in the allocation of working time for particular servers. It identifies the most common themes of general repercussion and helps to solve approximately 10,000 extraordinary appeals which go to the Brazilian Supreme Court every year (De Sanctis, 2021: 3). The administrative jurisdiction accepts the validity

of the written trail procedure and hearings are exceptional in the administrative jurisdiction. Hearing witnesses and promissory oath are not possible in this system and inspection and expert witness reports are not used regularly. These features of the administrative jurisdiction can be a perfect area for robot judges. Today, there are applications which can carry out contracts and document views. For instance, Kira Systems states that its software searches, highlights, and extracts relevant contents for analysis to carry out a correct and precise due diligence contract review service. This system is able to handle the mission up to 40% faster in the situation of utilization of this system for the first time, and up to 90 % with experienced usages. Also, Exterro's WhatSun states that the functions of the project management software can be merged with the abilities of executing e-Discovery. This means that users carry out legal researches and collaborate with others utilizing the software. One of Exterro's law firm clients said that they could reduce the amount of employees from 100 lawyers down to 5 when they began to use the system (Faggella, 2020). EY Global Limited stated that document intelligence solutions are able to assist businesses to lessen document reviews by using time efficiently by 90%. EY Global Limited executed and tuned Microsoft-based document intelligence solutions to duplicate engineers' decision-making processes. The duration for reviews and organization of lab reports was almost 200% faster, and the evaluation is 10% more precise than humans' evaluation. These solutions can alter enormously how firms understand and evaluate key meanings and descriptions embedded in business documents (EY Global, 2019). eBrevia stated that it can lessen the manual review duration between 30% and 90% and at the same time increase the accuracy. The system analyses more than 50 documents in less than one minute and minimises the possibility of missing valuable information. These applications named can reduce courts' workload by sifting through documents and making electronic court documents and texts (eBrevia, 2020).

4.3.2. Cost Saving

AI robots can useful for a world connected and keen for fast and less costly solutions. When AI robots make decisions, they can evaluate the value of the humans' threatened interests, the possible benefits of additional or substitute procedures, and the government's asserted interests, including the cost of additional safeguards. AI robots could be utilized to solve so many problems with a single program which can clear a whole country's caseload (Re and Solow-Niederman, 2019: 256). In some parts of law, AI robots can be effective. AI voice recognition can be utilized to generate real time transcripts of testimony court

proceedings. It can be beneficial for judges to evaluate written records of what transpired in the day's proceedings and AI robots can handle this at low cost (Campbell, 2020:342). Countries can find the recruitment of system designers cost-effective to use a wide variety of programs and designers can give the necessary policy expertise for AI programs (Eggers, 2003:14). If they find something wrong in AI systems, the maintenance cost will be nearly free for AI robots. In courts should be used in courts because the employment of the judicial staff will be highly expensive in the long run. Especially in Turkish courts, every year the number of public prosecutors and judges is increasing and this causes the cost to the government every month.

Table 17: The Number of Judges and Public Prosecutors (2017-2019)

	2017	**2018**	**2019**
Public Prosecutors (all of them including chiefs of public prosecutors, public prosecutors in court of appeals and council of state and etc.)	4.859	6.076	6.572
All judges (in court of appeals, administrative courts, council of state, civil and criminal jurisdiction, tax courts and etc.)	11.530	13.794	14.391
Administrative Law Judges (administrative courts and tax courts)	1.229	1.354	1.345

Source: (Adli Sicil ve İstatistik Genel Müdürlüğü, 2019: 1)

The total number of public prosecutors is 6.572 in 2019 in Turkey. The total number of judges is 14.391 in 2019 in Turkey. The number of tax court and administrative law judges in administrative jurisdiction is 1.345 and the judges are lesser and tax court and administrative courts are located only in certain places. Recently for more than 1.000 for candidates for the position of the public prosecutor and judge and 100 for the administrative law judges, exams have been made to recruit them for training (1100 for judges in civil and criminal law and public prosecutors and 100 for administrative law judges for 2020 (Sabah, 2020) and 1200 for judges in civil and criminal law and public prosecutors and 100 for administrative law judges for 2019 (Memurlar.net, 2019). This training time takes about 1 or 2 years and after that, they take 2 exams more to be appointed as the public prosecutors and judges. In these training seasons, they take about 6.952 TL (tax rate 15%) or 6.844 TL (tax rate 20%) (15 July 2020 Net Salary). They will receive more when they are appointed as judges and public prosecutors (9.951 TL (tax rate 15%) or 9.720 TL (tax rate 20%) (15

July 2020 Net Salary). When their ranks in seniority become higher, their salaries become higher proportionally too. For instance, first class judges and prosecutors with a 21-year experience at the 1/4 rank receive a fee about 17.155 TL (tax rate 15%) or 16.692 (tax rate 20%) (Memurunyeri, 2020). 10,885,213,548 TL, which is 55.11% of the total 19,751,360,000 TL appropriation allocated to the Ministry of Justice with the 2020 budget, turned into expenditure in the first half of the year. This expenditure amount represents an increase of 12.33% compared to the expenditure amount for the same period of the previous year, 9.690.794.952 TL (Adalet Bakanlığı, 2020:4). AI robots can drastically reduce the human role in making decisions and doing repetitive tasks, the government can cut judicial staff and close judge offices and courts. Robots can ensure consistent decisions and this means that robots interpret rules in the same way in each case and eradicate the hassle of physically visiting a clerk's office. The AI robots can be seen as an efficient way to reduce operating costs and paperwork and staff (Citron, 2008: 1252-1253). For instance, the AI system called ELIS is used in the decision-making process in the Tribunal of Justice of Pernambuco. It checks new tax enforcement actions and decides which ones are in accordance with rules. It has zero cost for the Court because servers of the Court itself developed it (De Sanctis, 2021: 3).

ECHR announced its 2019 annual report and Turkey took first place with 35 convictions for "violation of freedom of thought and expression. Between 1959 and 2019, ECHR made verdicts on 3.645 cases from Turkey. It convicted the state in 3.225 of the cases. This means that public prosecutors and judges are not very good at decision-making and trying to comply with rules and principles or because of the inexperience, they make these mistakes. Due to these mistakes, Turkey has been convicted to indemnity in numerous cases. Because judges and public prosecutors make wrong decisions, victims take compensations from the government by the help of the domestic remedies such as higher courts. This increases cost and time to victims. For instance, they should go to trails, pay money for some transactions, hire a lawyer and etc. Owing to inexperience, lack of knowledge and etc., proceedings take a long time and unnecessary measures are taken by judges and public prosecutors. All of these lead to the high cost to the public and the government (BIA News Desk, 2020).

When Turkey begins to employ robot judges, costs will reduce with the usage of one robot judge instead of multiple human judges. Moreover, a robot judge seems faultless and

speedy and permits citizens and judicial staff to complete their works in courts at faster speeds (Gluckstein, 2019). Legal procedures can permit acceleration as robot judges can work 24/7. Especially, in the administrative jurisdiction, verdicts can be made accurately by robot judges and cost less because administrative judges mainly depend on documents and documents can be sent online and can be filed suits without even going to courts. In these courts, there is no need to the huge amount of judicial staff and due to nearly everything online and cheap robot judges, governments and parties will pay less money. The AI system can cut back on the amount of data and evidence input, give a more considerable and larger overview of each pertinent parts of evidence among state registries and can eliminate the red tape among courts, residents and government institutions (Shaw, 2020).

States should begin with the ground conditions in the AI technology and should be sure that they build a robust foundation. Otherwise, the structure they build will experience costly problems badly in future. This means that before the government uses the legal analysis machines in courts and in related areas, the infrastructure of AI should be strong and completed since that the infrastructure of AI can be used in various areas. Some of countries specifically released the investment plans for their legal sectors. For instance, The Ministry of Justice committed to investing 2 million pounds in government funds for entrepreneurial network Tech Nation to further the progress of the digital transformation in the United Kingdom's legal sector. International investment was about US$1,663 million in 2018 in lawtech, a 714% increase on the past year and UK investment rose by 3 times in the previous year, increasing to £61 million in lawtech (Pressley, 2019).

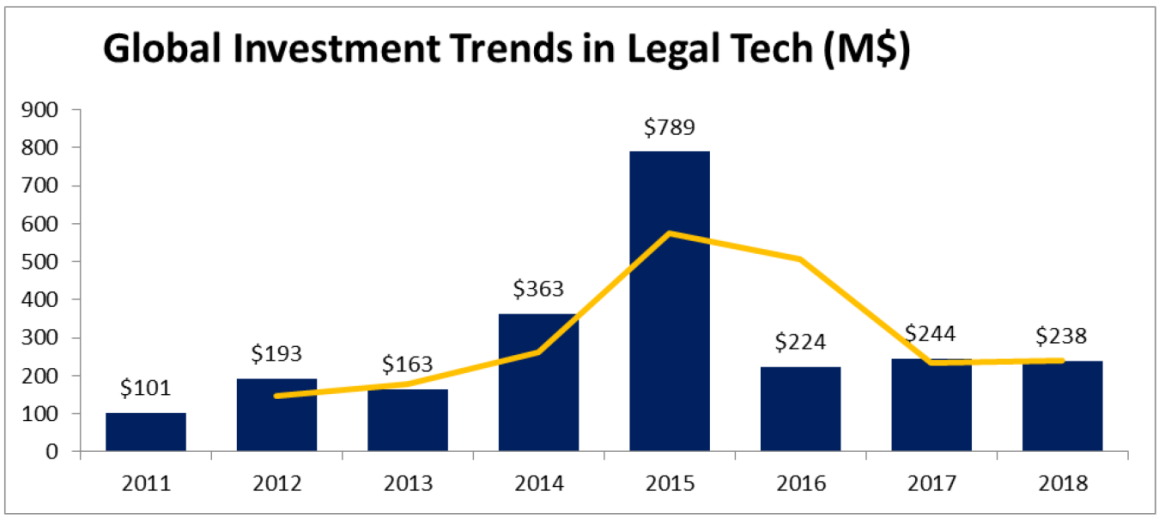


Figure 8: Global Legal Technology Investments

Source: ((Tracxn 2018 report (legal tech start-up landscape))

Note: 2018 data is until May

This data points out enormous investments in loads of disruptive legal-tech firms in the previous few years in the world. Even if, after 2015($789), the rate of investments went down in companies, the investments in 2018 ($238) were still high. These companies also help the judicial processes of courts, people who want to file suits, judges and etc. in various ways. The transfer of the AI technology in the legal technology to the certain government institutions such as the justice ministry is possible.

4.3.3. The Quality of Justified Verdicts

Parties want to know why they won or lost their cases. These demands should be treated naturally and pleasantly. All court decisions are reasoned and this is protected by the Turkish Constitution. This situation is clarified in the Turkish Constitution (The Grand National Assembly of Turkey, 1982) article 141. It says that *"the decisions of all courts shall be written with a justification."* Likewise, according to article 24 of the Administrative Jurisdiction Procedures Law, some subjects must be included in the judgments such as the legal basis of the judgment, justification, verdict and etc. Since our subject is administrative court decisions, reasoned administrative judicial decisions are even more important. Due to the objective nature of annulment cases and the effects of regulatory administrative acts, verdicts given by administrative jurisdictions do not only affect the parties of the case, but also each person at the same situation is affected in a positive way or negative way. Because of this reason, the justification should be satisfactory, detailed and descriptive. Generally, in

law faculties, there is no class about the reasoning of judicial decisions about the administrative jurisdiction. Because of this, administrative law judges may be inexperienced in writing the satisfactory reasoned decisions especially in the beginning of their careers. Judges may make opposite decisions and different reasoned verdicts from each other.

Every judge is not capable of writing appropriate reasoned verdicts and some of them are not good at this. The explanation ability may not be at a good level. When judges are recruited, nobody checks whether they can write appropriate reasoned verdicts. This ability can be acquired in time but when people take the jobs as judges, they may not desire to improve themselves and they can choose to write mediocre reasoned verdicts. These problems reduce the trust on administrative courts and the public complains that their claims are not adequately met. The material and legal elements may be briefly and superficially examined and explained without making a logical and legal examination (Alp, 2001: 438). Although more than one claim was made in the lawsuit petition, the administrative court took one of them seriously as a result, but it did not find it worthy of mentioning other claims in a verdict. They make general statements in a verdict and they do not make specific statements[11]. In courts, sometimes administrative law judges can resolve disputes without knowing files well. This can happen due to the work workload and the lack of the knowledge. Administrative law judges have to make a decision within a certain period of time such as within 6 months. For example, in Istanbul, in tax courts, approximately 50 cases per month need should be decided so that the circulation continues. This means that approximately an administrative law judge should make decisions about 50-60 cases each month in İstanbul. Moreover, 1/3 of the members of the judiciary was dismissed due to their relations with the Fetullah terrorist organization which carried out 15 July military coup attempt in 2016. Especially in tax courts, nearly all judiciary staff started their duty in 2016 and later (Balcı, 2019: 28-31).

A detailed reasoning for verdicts should be the case for robots. It is vital to provide a specific and reasonable justification and to demonstrate counterfactual faithfulness. Robot judges are reproducible, do not have cognitive biases and do not feel any social pressure. AI robots have the perfect memory and can analyse all the decisions made before and they can use previously acquired knowledge to answer new questions. After a certain point, all cases

[11] For instance, the court states that in the case, there is no illegality in the transaction according to the law without giving any appropriate reason.

can be the same of others. This means that the same case (or same explanation) or the nearly same case (or the nearly same explanation) can be found in the millions or billions of cases (or explanation). Even if robots do not have the explanation post-hoc and cannot adapt to particular circumstances for now, they can use what they learn and there are millions of cases which can be analysed by robots. Provided that humans look at the problem closely, they can understand that consciousness is not much important when robots can analyse millions of examples. People depend on their consciousness mostly because it is impossible for them to analyse millions of cases and remember and use them in new cases. Provided that a robot is designed to store information about a decision, the inputs with intermediate steps and the final outputs can be stored precisely (Doshi-Velez et al., 2017: 19). For instance, the study of Legal AI platform LawGeex took place with the help of law professors from various universities with 20 experienced advocates against the AI machine about the evaluation of legal contracts by giving scores according to the accurate identification of issues. The human lawyers took about an 85% accuracy rate on average. But the AI machine took 95% accuracy (Nicholson, 2018**)**.

4.3.4. Fair Trail and Correct Verdicts with Legal Certainty

The right to adversarial proceedings provides parties in administrative jurisdiction a chance to evaluate the case documents and give statements on evidence or finding, to affect the verdict. Parties can present the relevant findings. The equality of arms for parties is a primary factor for fair trial and gives parties a chance to represent their cases and findings under conditions which do not put them in the considerable disadvantage in comparison with the other party. However, verdicts within the administrative jurisdiction may contain discretion. Discretionary verdicts might need to consider social values, the various characteristics of parties and etc. Along with this discretion, there are matters with existing types of judging and prejudice. The result of the court judgment can be affected by numerous dynamics such as the quality of decision-making and representation, sources accessible for a litigant and etc. Adjudicative decision-making is affected by many dynamics which affects substantive justice (Sourdin, 2015). The dynamics consist of many factors (Sourdin, 2018:1128-1129):

- when and what a judge ate;
- the time of the day;

- an excessive number of decisions made by judges (decision fatigue);
- individual values;
- assumptions;
- instincts and perceptions;
- family problems;
- emotions;

However, robot judges carry out their tasks rooted in logic, where data is processed by means of algorithms to reach a result. Lawmakers can replace discretionary rules with more formal and determinate rules to increase the efficiency. These changes can make the law straightforward and enable robot judges to make better and easier verdicts (Roth, 2016:17). In the administrative jurisdiction, rights and obligations are decided by the constitution, codes and regulations and judges mostly are considered to apply the law. In this jurisdiction, there are not much places where judges use the discretionary power. For instance, there are not hearing witnesses and promissory oath, hearings are exceptional and are in the limited stages and inspection and expert witness reports are not used regularly. In the same situations, robot judges will make the same verdicts. This means that there will not be different reasoned judgments about the same cases in different courts. This will increase the trust to courts by the public. People can predict which results can come out by checking old verdicts. The predictability will increase significantly.

4.3.5. Principles of Independence and Impartiality

Judges are independent according to the separation of powers and people believe that even if they do not like the actions of the government and are against the government in the democratic way, they think that judges are independent and make fair decisions about them. The judges are protected with national laws. However, private and institutional channels can put pressure on them. Some governments put the pressure on judges due to the political reasons and they can force them to make decisions according to governments` demands. Provided that the judges refuse to obey governments` demands, they cannot make them redundant. But the governments send them to unimportant and risky areas with poor conditions. This threat may work for some mediocre judges. The social media pressure can be so harsh that judges can be forced to make wrong decisions. Even if the media does not

know the reality of the case, the media attack them with simple and wrong information and the judges cannot protect themselves due to rules and principles. Judges may have some political and religious opinions or have some political or religious ideas or groups. When they encounter with these kinds of cases, they have a great difficulty in being impartial.

There is no possibility of any punishment, threat, promotion, dismissal, remuneration and pressure for robot judges which could be utilized as leverage against them. Robots are considered to be unbiased and function without emotions. The certain groups which are made up of humans may be needed to control and monitor them at least at the early stage of this implementation.

4.4. The Preliminary Preparations of the Use of Artificial Intelligence on the Administrative Jurisdiction Procedures in Turkey

Artificial intelligence is designed to assist, adjust, and replace human decision-making, including in courts. Artificial intelligence already fosters numerous facets of how judges make decisions about cases, and the likelihood of robot judges seems reasonable. Robot judges` judgment intensely affects the judgmental values held by education, law and government policy. The implementation of the AI technology influences the administrative jurisdiction in many ways. By offering efficiency, cost and time reduction, independence, impartiality, legal certainty and etc., robot judges promote and benefit from a turn toward strictly codified rules and supports standardization rather than discretion. The implementation of robot judges in the administrative jurisdiction will affect the education, law and government policies deeply. To make the country and courts ready, these three powers should transform their own policies and implement some urgent actions.

4.4.1. The Government Policy

AI governance refers to the notion that AI tools and ML applications require an underlying legal basis and policy framework, and that practices and possible results are researched comprehensively and used equally and properly (Cormier, 2021). AI continues to be used significantly across spheres of considerable significance by the public and private sectors such as in education, law and others (Pomares and Abdala, 2020; 91). Especially, numerous AI tools have already been employed in public services such as traffic control systems which influence the acts of drivers in many ways according to the assessment of

traffic and weather information. The purposes, opportunities and risks of AI are contingent. AI can be used for various aims and can be called as a general purpose technology. This means that the range and meaning of AI in a society is only developed in time and in its application (Ihde, 2012). It is not easy to say that AI is associated with certain benefits and dangers. For instance, a camera system can be used to inform police officers when the camera detects criminal actions. At the same time, the camera can track people and collect information by violating human rights. AI has promising features for greater efficiency and effectiveness. AI can be used to help public administrators make fair and just decisions (Djeffal, 2020: 281). This means that administration can be more humane through AI.

Table 18: AI Governance Framework

AI GOVERNANCE FRAMEWORK			
PERFORMANCE	**SECURITY**	**PRIVACY**	**TRANSPARENCY**
Accuracy	Adaptability	IP Capture	Explainability
Bias	Adversarial Robustness	Impacted Users	Intent
Completeness			

Source: (jfgagne.ai, 2021)

For the AI governance, performance is very important and citizens' expectations should be met appropriately. If AI tools perform well, they can gain citizens' trust. Performance is divided into three parts as accuracy, bias and completeness. Accuracy is about the ability to correctly categorise data and make the right predictions, recommendations or decisions. When an AI tool is created, numerous bias highly possibly enters into the AI tool such as designers' world view, religious views and etc. These bias should be eliminated at the stage of collection by adding more diverse datasets and inputs and after that, the tool should be controlled regularly to prevent bias from affecting results and decisions for it within the model. Completeness is very similar to fairness and AI should not miss relevant data inputs. Otherwise, wrong results may take place. To protect performance, AI systems require security for fair processes, information and results. AI should be protected against adversarial data, manipulations and other negative effects. Adaptability and adversarial robustness are very important for protection. Adaptability helps AI systems handle changing situations. Adversarial robustness can prevent the AI systems from maligned attacks and focusses on cybersecurity. Privacy has to be guaranteed to users

in various ways and should be supported by IP Capture and impacted users. The leak of users' information can deteriorate the credibility of AI systems highly. IP Capture should be protected well because this determines the identity of the user. The position of impacted users should be active and users should have the right to take their data elsewhere (portability) or delete their data (right to be forgotten). Transparency builds trust for AI systems and should be supported by explainability and intent. Aims ought to be exposed and answer whether certain standards for applications are met or not met. Government institutions on AI should release their intentions such as human rights, transparency, and harm-avoidance. This can help citizens understand how AI applications should be applied (Gagné, 2018).

Table 19: Organizing Framework

Artificial Intelligence						
Healthcare	Information and Communication Technology	Environmental Sustainability	Government Law and Policy Making	Transportation	Economic and Financial Applications	Other Domains
Food quality, Biomedicines,Healthcare Information systems, advanced medical devices, multiple applications	Data management, Networking, Data security	Global warming, Waste management ,Wildlifecare, Geographic information system, EnvironmentAI risk assessment, Energy concerns, Land-use planning, Geo-science	Public administration, Policy making, Legal system, E-voting	Traffic, routing, Accident management; Electric vehicle; Automation; Digital vehicle related forms; Freight prediction	Fraud detection, Digitalization, R&D, Banking system, Financial/ Political risk assessment, Capital budgeting, Strategic management, Staffing, Unemployment prediction, Income distribution, Robotic Army, Mass production, Financial regulation	Education, smart & democratic governance, Decision-making, social impacts

Source: (Sharma, Yadav and Chopra, 2020)

The use of AI in these sectors is very important to improve the life quality for citizens and the efficiency of governance. In the environmental sustainability, AI tools can be used in energy and utilities, agriculture and environmental protection. For instance, an AI tool using satellite data helps predict global solar radiation to deal with global warming effectively (Deo et al., 2019). In economic and financial sectors, AI tools can be implemented in various ways and economic and financial sectors can be interested in AI tools which improve the customer service and stimulate more people to invest money into banks. For instance, investment and fin-tech firms use Robo-traders for autonomous trading and Robo-advisors for portfolio management (Zavadskaya, 2017). In legal environment, AI has a huge effect on judgment and law enforcement such as automated legal advice services. For instance, Canada started using an automated decision tool checking and filtering people's applications for immigration in 2014 (Government of Canada, 2017; Kuziemski and Misuraca, 2020). Information, communication and technology can be considered as a set of machines, equipment, resources, software and networks leading to colleting, processing, storing of information which contains voice, videos, texts, images and etc. For instance, by the help of the information, communication and technology sector, chatbots can be created to improve communication between government and citizens (Corvalán, 2018). For instance, in the energy and utility sectors, AI systems can be used to optimize and predict the energy utilization by developing power generation and balanced energy usage intelligent machines. Similarly, a knowledge-based geographic information system can be employed to make decisions and formulate policies for issues such as environmental monitoring, land use planning and etc. In the healthcare sector, innovative health monitoring devices (for heart rate, oxygen level, blood pressure, motion monitors) are connected with remote systems providing health surveillance for old people from home or hospitals. In public safety, networked cameras can be employed on hotel stays, malls, government institutions and other public places to spot and track criminals. In the transportation sector, backed vehicles can be produced with in-built GPS, voice assistants and real-time information system on traffic to avoid road accidents and guide people to the fastest and safest route. Other government domains like education, banking sector, democratic governance can be transformed by utilizing AI applications. AI can be used in data management, security, and governance and can be utilized by governments for surveillance aim to improve citizens' awareness and to encourage citizens' participation for public administration (Sharma, Yadav and Chopra, 2020).

Artificial intelligence has started to be used in various institutions in governments and promotes public policy aims (public administration, finance, justice and etc.) and help citizens interact with governments (such as virtual assistants). AI can offer governments efficiency and costs savings. Management consulting group McKinsey predicted that the AI technology will add 13 trillion dollars to the global economy by 2030 (McKinsey Global Institute, 2018). Deloitte predicted that the automation technology could save the U.S. civil servants 96.7 million 1.2 billion hours a year as potential savings of between $3.3 billion and $41.1 billion a year (Eggers, Schatsky and Viechnicki, 2017). Similarly, consulting firm PwC predicted that artificial intelligence would add 7 trillion dollars to the Chinese economy by 2030, same as the 26.1% of the China's gross domestic product and due to this, the use of AI would increase significantly in China. The plan is to provide lower totals, helping its AI industry arrive at 160 billion dollars, with related industries exceeding 1.6 trillion dollars (Sheehan, 2018).

The increasing use of robot judges can primarily change practical capacities, institutional incentives, the opinions of experts and the public and the use of power. This will force the government to prepare the policy for robot judges. There are some important points which Turkey focuses on to make a good policy about the use of robot judges in courts, especially in the administrative jurisdiction below.

4.4.1.1. Infrastructure and Networking

Many countries in the world declared national AI strategies and defined road maps with various perspectives and by the help of universities, businesses, and government institutions on how to utilize this vital technology. They produced a variety of plans about how to improve their national priorities such as networking and public infrastructures with AI. Turkey is now maturing its own AI strategy. Because of this, networking and public infrastructures are not developed well for AI tools. However, some countries which developed national AI strategies and improved their networking and public infrastructures by making platforms, initiatives, nodes and etc. can be good examples for Turkey. After that, the study can propose the adequate networking and public infrastructures for Turkey.

Table 20: AI Networking and Public Infrastructures in Selected Countries

The United Kingdom	• **The AI Council:** It makes stronger networking opportunities among universities, the public sector and industries by sharing know-how and information and promoting the channel of communication among these power groups. • **Bayes Centre:** A data-driven innovation hub is in Edinburgh and is a hub for artificial intelligence and data science (financed with 30 million pounds by the United Kingdom). • **Exceptional Talent (Tier 1) Visas (up to 2,000 per year):** These visas are Tier 1 and take talents up to 2.000 each year. It was planned to encourage talents in the scientific areas of science, technology and artificial intelligence to work for the United Kingdom. • **The Immigration Rules:** Foremost scholars and academicians are given the opportunity to apply for accelerated settlements following three years • **The Red Tape:** The reduction took place to hire international researchers and recruit talented candidates. • **The Geospatial Commission:** This commission advances access to geospatial information to a broader public, consisting of AI companies. • **The National Productivity Investment Fund:** This fund has raised to 31 billion pounds in 2017 to further the progress of the growth of a digital infrastructure.
France	• **The French national research institute for the digital sciences:** This institute is planned to coordinate the network of French AI expertise through the growth of the Interdisciplinary Institutes of Artificial Intelligence and other research-driven collaborative support systems. • **Trilateral French-Japanese-German Research Projects on AI**: The French National Research Agency with the German Research Foundation and the Japan Science and Technology Agency declared the first trilateral call for research proposals on artificial intelligence to foster collaborative projects of trilateral research teams over three years, collecting researchers from these three countries • **LabComs**: They intend to foster collaborative AI research and innovations. • **Data Sharing in Private Sector**: The French strategy recommends the encouragement of the formation of data commons and fosters an alternative data making and governance model rooted in reciprocity, collaboration and data sharing among private actors • **Data of Public Interest**: This strategy recommends the access of databases to the public. • **Increased Data Portability:** The strategy says that the data portability should be fostered, permitting the migration of data from one service ecosystem to the other one without the loss of data history. • **Investment in a Supercomputer Worth 115 Million Euros**: The supercomputer will own a processing power exceeding ten Petaflops and is considered to be functional in 2020.

Table 21:(continues) AI Networking and Public Infrastructures in Selected Countries

Denmark	• **National Centre for Public Sector Innovation**: The centre aims to foster public-private collaboration. Due to this, the public sector aims to make the benefits of private sector`s capability, sources and experiences. Denmark predict to develop these ideas: • **Common Danish Language Resource:** The government would like to make a structured compilation of digital datasets freely accessible for each person to support language technology solutions with the access of high-class shared language resources; • **Access to Public Sector Data:** The strategy should encourage the utilization and distribution of public sector data. • **Development of digital export certificates**: Denmark promotes digital certificates for exported goods advancing traceability and transparency of the export course. The usage of big data will be utilized for smarter and more advanced assistance for exporters; • **The Open Science Policy**: The aim of the policy is to focus on open access to scientific publications, research integrity and open research data. • **Cloud Technologies:** A strategy should be made to support the huge database in the cloud to reach low-priced access to enormous computational power and database capacity.

Sources: (European Commission-Country report – For United Kingdom, 2-3: 2020; European Commission-Country report – For France, 3-4: 2020; (European Commission-Country report – For Denmark, 2-4: 2020).

The UK has taken policy actions and made plans for the future and networking and public infrastructures are priorities in the UK AI strategy. It focuses on networking among universities, the public sector and industries to increase the knowledge about AI. It encourages AI researchers to work in the UK and provide appropriate resources for citizens, foreign researchers and companies such as Bayes centre, exceptional talent system, immigration rules, the red tape, the geospatial commission, the national productivity investment fund and etc. (European Commission, 2021). France aims to increase the attractiveness of AI internationally and makes actions and plans for foreign talents and researchers by improving working conditions such as the French national research institute for the digital sciences, trilateral French-Japanese-German Research Projects on AI, LabComs and etc. With regard to data infrastructure, France encourages the advancement of ML and AI algorithms and supports the public, companies and government institutions by sharing data with private sector, opening access to databases for the public, increasing data portability, investing a supercomputer and etc. France facilitates networking among

businesses and associations, provides adequate resources, create hub centres to improve the development of the AI infrastructures (Villani et al., 2018: 146). Denmark supports a collaborative environment for the improvement of the AI technology and is keen to create opportunities for partnerships between public and private sectors and keen to develop relations with research centres, education and private sector for the improvement of AI. Similarly, it encourages the public and private sector to benefit from the AI technology and helps the public embrace AI with some plans such as common Danish language resource, access to public sector data, development of digital export certificates, the open science policy, cloud technology, "Applied AI Academy" training course for Danish technology leaders from knowledge and public institutions and the private sector (Danish Ministry of Finance & Danish Ministry of Industry, Business and Financial Afairs, 2019: 45).

4.4.1.2. National Artificial Intelligence Strategy of Turkey

Turkey started to be affected by the winds of change all over the world after the 1980s and the Turkish public administration has undergone a very important systemic change about artificial intelligence and digital transformation approximately in 20 years. It is possible to summarize the steps taken by Turkey on the path of transformation into a digital state after 2000 as follows (Okçu, 2021: 225-226):

- e-Turkey Initiative for the implementation of the eEurope+ Action Plan started in 2001.
- Action Plan for Transition to e-Government was prepared in 2002.
- With the Prime Ministry Circular, it was decided to combine the (former) Information and Communication Technologies studies carried out by all public institutions under the responsibility of the State Planning Organization under the name of e-Transformation Turkey Project. Turkey Project Short Term Action Plan has been prepared between 2003 and 2004. The Information Society Department (BTD) was established within the (former) State Planning Organization to carry out the project in 2003.
- A Short-Term Action Plan was prepared and the infrastructure for the preparation of the Information Society Strategy was established in 2004.
- One-year e-Transformation Turkey Project Action Plan was put into effect in 2005.

- 2006-2010 Information Society within the scope of e-Transformation Turkey Project Strategy and Action Plan have been put into practice in 2006.
- With the Decree Law No. 655, the duty and responsibility for e-Government policies has been given to the Ministry of Transport, Maritime Affairs and Communications (UDHB). In this context, the e-Government Services Department of the Directorate General of Communications was established in 2011.
- With the transformation of the State Planning Organization into the Ministry of Development, the duties and responsibilities of the institution were given to this ministry in 2011.
- The Tenth Development Plan (2014-2018), which directs public policies at the highest level, has been published in 2014.
- 2015-2018 Information Society Strategy and Action Plan has been put into practice. Unlike the policy documents prepared in previous years, e-Government studies are at the center of the policy document in 2015.
- In 2016, the Ministry of Transport, Maritime Affairs and Communications prepared the 2016-2019 National e-Government Strategy and Action Plan in order to shape Turkey's e-Government policy with a holistic perspective within the framework of the information society policy.

The Prime Ministry Circular, published in 2013 with the name "Open Government Partnership Initiative", is the re-voicing of concepts that have become the basic principles of public administration, such as openness, transparency, accountability, citizen participation, acceleration of services, and efficiency in public policy design. Big data and the internet of things are also included in recent Turkish public administration documents. For example, the concept of big data was included in the Tenth Development Plan (2014- 2018) for the first time and then was re-emphasized in the 2015-2018 Information Society Strategy and Action Plan and the 2016-2019 National e-Government Strategy and Action Plan. The Internet of Things was mentioned for the first time in the "2015-2018 Information Society Strategy and Action Plan" without setting any targets. In the 2016-2019 "National e-Government Strategy and Action Plan", it was stated that the Internet of Things would be used "to improve the delivery of existing public services", but it was not explained how this would happen (Okçu, 2021: 226). The "11th Development Plan", the Presidential 100-Day

Action Programs, the Presidential Annual Programs, the Ministry of Industry and Technology "2023 Industry and Technology Strategy Document" are the documents that reveal the targets of the new period. For example, the 11th Development Plan considers artificial intelligence and digital technologies as the most important elements in Turkey's "National Technology Move". In this direction, in the "Presidential 100-Day Action Program", the Ministry of Industry and Technology was assigned some duties and responsibilities regarding digitalization, and all government institutions were asked to complete all structural transformations in line with the transition from e-Government to d(digital)-Government. On the other hand, in the "II. 100-Day Action Program", the Digital Transformation Office was given the task of integrating 95% of the services provided by the public with e-Government and measuring the performance of the services offered via e-Government (Akman and Okçu, 2021:411).

Preliminary studies was launched to create the national AI strategy of Turkey. The "National Artificial Intelligence Strategy preliminary report" was issued in February 2020 and the preliminary report was considered as an internal document and was sent to the relevant institutions for their opinions. The report was completed by the Artificial Intelligence Research Initiative and Door Technology (Demir, 2020), and contained the impact of the AI technology on education, legal preparations, competence of public officials, the effect on labour, adjustments in jobs and sectors, the relations among people and AI, the financial system and development. In addition, human rights were prioritized as an important point roadmap in numerous various fields like ethics and law. The Presidency's Digital Transformation Office, which is the main power behind the national AI strategy of Turkey, is working with the Ministry of Industry and Technology. Digital transformation (e-government), cyber security, national technologies, big data and artificial intelligence studies that are carried out separately under different institutions in Turkey were planned to be collected under the umbrella of the Presidency's Digital Transformation Office founded on July 10, 2018 and due to this, important steps has been taken. This office kept contact with people from various sectors and fields to shape and make the national AI strategy of Turkey. Generally, Turkey planed to make a sustainable AI ecosystem (creating the strong AI infrastructure, having the satisfactory AI technology competitiveness, putting into practice bold regulatory reforms and policy maintenance, promoting and cultivating AI talents and education for people, using the AI technology across various industries) for the production based environment with the improved data accessibility and planed to use the AI technology

firstly at public institutions to boost efficiency and to create relevant human resources. In addition, ethical issues in the usage of the AI technology were discussed.

The preliminary report was prepared in ten main headings and was issued to become a guiding resource in the execution of the AI technology in Turkey. The report gave some general recommendations on the utilization of AI in numerous sectors, from education to law, from business to public administration. Turkey's National Artificial Intelligence Strategy Preliminary Report was be called as the main starting point in Turkey`s preparation for the AI technology. The aim was to make a national action plan for Turkey on the AI technology and this report is an important guide for the AI technology to become a part of life in nearly each sector. Especially, the preliminary stages were vital for Turkey`s national AI strategy. Thus, this strategy was separated into 3 phases. They were called as preparation, trial and start-up phases. In the preparatory phase, by the help of education, teachers, students and the business were prepared for the AI technology according to their levels. Turkey`s national AI strategy were supported by a national education plan which includes the world of business and education. In the trial phase, it was tested whether the training results and the abilities gained were changed into talent, whether the start-up phase was started for Turkey`s national AI strategy. The quality of human resources had the enough power to compete with the rest of the world (Demir, 2020).

Turkey published its national AI Strategy on 24 August 2021 and this strategy was prepared by the Digital Transformation Office of the Presidency of the Republic of Turkey and the Ministry of Industry and Technology consistent with the 11th Development Plan and Presidential Annual Programs within the framework of the “Digital Turkey” vision and Turkey’s “National Technology Move”. This includes some measures and goals in AI for 2021-2025 (Yilmaz, Sozer and Oztoprak, 2021). Turkey tries to expand the share of AI in gross domestic product to 5%, create 50,000 new jobs and reach 10.000 postgraduate students in AI by 2025. Turkey wants to become one of the top twenty countries in the international AI indices and has six main goals (Republic of Turkey Ministry of Industry and Technology and Digital Transformation Office, 2021:10-13):

- Train artificial intelligence professionals and increase the employment in AI.
- Support researches, entrepreneurships and innovations.
- Expand access to valuable data and technical infrastructure.

• Make preparations to speed up socioeconomic adjustments.

• Strengthen international cooperations with other countries.

• Accelerate structural and workforce transformations for AI.

Moreover, within the scope of the strategic priorities, 24 goals and 119 measures have been determined. Turkey focuses to boost the social welfare and make stronger the national security capacity. Also, it tries to boost the global competitiveness, make stronger the economic and technological independence (Özdemir,2021). Turkey plans various governance mechanisms for AI and plans to establish a National AI Strategy Board, a Public AI Ecosystem and Sectoral Co-Development Laboratories and an AI Ecosystem Advisory Group. This group will include representatives from universities, nongovernmental organizations and the private sector to give recommendations to the board. Turkey aims to ensure that the transformation will be beneficial for the society (Ergöçün, 2021).

Under the auspices of the Presidency's The Science, Technology and Innovation Policies Council, The Scientific and Technological Research Council of Turkey (TÜBİTAK) has initiated for national AI roadmap. Meanwhile, prioritization studies are carried out with the target suggestions from all stakeholders of universities, private and public sectors, and NGOs. Apart from this national strategy and roadmap initiatives which is ongoing, the Ministry of Industry and Technology has been restructured. Two new Directorates have been established which are both tackling issues directly relevant to AI among other emerging technological issues. The "National Technology Directorate General" will be focusing on the implementation of the AI strategy under the coordination of the Presidency's Digital Transformation Office and in line with the national technological initiative. The other newly established Directorate will be more research focused and will undertake researches on the newly emerging technologies including AI.

The AI technology has become a strategic priority for Turkey like many countries in the world. Data is called as a critical component of the AI technology because AI applications depend on ML and DL techniques that utilize data for training and validation. A report which is "*Artificial Intelligence in the Middle East and Africa, Outlook for 2019 and Beyond*", said that Turkey, which is seen as a leading state in its region from the point of investments, awareness, areas of usage and strategic importance, made the highest investment in AI in its region. In Turkey, the number of transactions was 252 out of the total

of 929 transactions, and Turkey is seen as the leader from the point of the amount invested as $3.4bn. In the past decade, 3459 million dollars' investment was made to Turkey about the AI technology and in the last past decade, Turkey which made 38% of the total investment to the AI field with investments became the regional leader. In this percentage, there are 252 investments and 21 Mergers / Acquisitions which are worth $ 2303 million. In the area of social media and the internet of things investments, Turkey by far take the lion`s share and in cyber security and planning / time plan making / optimization areas investments made showed a strong growth (Ernst & Young Consulting LLC, 2019:20-21).

The Head of Department of Big Data and Artificial Intelligence Applications were established to follow developments and are working on AI and big data. Applications and robots with AI cannot make progress without data input because applications and robots which utilize AI are typically designed to read and interpret a data input and take action to it by utilizing predictive analytics, machine learning or other methods.

Big data generally refers to huge, compound and complicated data sets that traditional data processing software is insufficient to handle and refers to predictive analytics, user behaviour analytics, and other sophisticated analytical techniques which take values from data. It manages data sets (such as mobile phones, remote sensing, software logs, cameras, microphones, radio-frequency identification readers, wireless sensor networks and etc.) which are insufficient to be handled by traditional data-processing application software (Keerthan and Aithal, 2018: 73). Big data, which is an enormous mass of raw data which is collected, stored and analysed through various means, can make the AI applications and robots more efficient and can give the applications and robots the sufficient information which can help them to make a right decision since big data provides AI machines with the data essential for advancing and improving features and pattern recognition abilities. Without huge quantities of high-quality data, it cannot be possible to develop and train the intelligent algorithms, neural networks, and predictive models which render the AI technology a game-changing power. In general, the qualities and features of big data are called with the abbreviation "5V" due to their English names. This 5V consists of (Okçu et al., 2019: 305-306):

1. Variety showing that the data is obtained from different sources,
2. Velocity to show that data is produced at very high speeds at all times,

3. Volume to express the resulting data stack and its size,
4. Verification to indicate that the data should be checked for security,
5. Value to indicate that the data filtered by the first four data components provides added value to the users.

With the Head of Department of Big Data and Artificial Intelligence Applications, Turkey plans to use big data and AI applications efficiently in the public, use big data analytics, carry out security and privacy studies, improve cooperation among institutions. By establishing the national Open Data Portal and then coordinating public data dictionary preparations, Turkey plans to determine procedures, directives and instructions for data transfer to the portal with the aim of creating effective decision-making processes.

TÜBİTAK has funded numerous artificial intelligence research and development projects and planned a multilateral call for artificial intelligence projects in the perspective of the EUREKA intergovernmental network for innovation. The Ministry of Science and Technology made a national digital roadmap in the perspective of Turkey's Industrial Digital Transformation Platform. The roadmap includes technological improvement and the development of the artificial intelligence technology (OECD, 2019: 134). Turkey has the significant experience, has knowledge about planning and has an important legal and institutional infrastructure in planning (Aydın et al., 2020).

4.4.1.3. The Coordination of the Artificial Intelligence Implementation

The AI robots have high profits, are potentially risky for the public safety and human rights and cannot be left to the market or private companies by governments. Especially, robot judges in the administrative jurisdiction procedures in Turkey are more sensitive than other possible robots in law. In the administrative law, the government is more dominant than citizens and the government and citizens cannot be considered totally equal. It means that the government should take the initiative and support judges to make a right decision. This sensitive job cannot be given to private companies or the market. The government institutions have to create robot judges in the administrative jurisdiction procedures and monitor robot judges tightly. Even today if human judges make judicial activities causing the civil liability, the government pay compensation to the winning party and take the compensation from the judge making judicial activities with the civil liability. However, the

government can be a coordinator for training human resources for technologies, making preliminary preparations, funding the investments, preparing the relevant legislation and shaping applications.

With the Presidential Decree No. 48, the coordination of e-government was given to the Digital Transformation Office and this e-government is termed as "Digital Portal of Turkey". The Digital Transformation Office which has the task of coordinating preparation processes and has the task to collect data which is used in the creation of the digital transformation policies of public services should become the coordinator in the area of AI applications such as robot judges. For instance, the Digital Transformation Office should coordinate the AI applications in law and courts such as robot judges in the administrative jurisdiction procedures with the cooperation of the Ministry of Justice, the Constitutional Court, the Council of Judges and Prosecutors, the Court of Cassation, the Council of State and the Court of Accounts. Particularly, in the context of robot judges in the administrative jurisdiction procedures, the Digital Transformation Office should be a coordinator and cooperate with the Ministry of Justice, the Council of Judges and Prosecutors, the Council of State and regional administrative courts. The Ministry of Justice should create an office which focuses on regulations of AI and the use of robots in the jurisdiction. In the future, the accumulation of knowledge by the office can merge with the projects made by the Digital Transformation Office in the future. Even today there are numerous projects which may involve the law system. For instance, the office has an AI project which can understand the AI robots with black boxes and its inputs and operations are not observable to users and other interested parties. With this project, the government can identify how exactly the algorithm is functioning or which methods the algorithm is using. It can help the government to understand what problems are when robots make wrong decisions. Especially, this can work well to find and understand the reasons of bias in decision-making. At the same time, the office has an AI project about adversarial data. This project aims to protect the AI system from malevolent people attempting to fool the AI system by supplying the deceptive input. Such a successful attempt can abuse the trust to the AI robots deeply. There are projects which are called as federated learning and differential privacy. The aims of these two projects are to protect data privacy and provide data security. At the same time, the law system should regulate the laws and regulations according to data privacy and data security on AI systems.

In the future, the Digital Transformation Office may not be enough to carry the burden of AI and may fail to satisfy ministries which want to use the AI technologies. In the future, especially in the context of human resources, budget and information, the office may have problems. In this case, other solutions may be useful. It means that the capacity of the Digital Transformation Office may be upgraded by the government in the future, because the capability of the AI technology is enormous and highly complex. The AI technology is estimated to put the additional fifteen trillion American dollars into the world economy by 2030 (Oxford Insights, 2019: 5). There are other two proper solutions which may work in the future. One of them is a non-statutory expert committee of independent members which recommends the government and related sectors such as a system in the U.K and this kind of committee does not coordinate AI strategies and basically give recommendations. Therefore, each ministry, university or industry makes its own plan and coordination. For instance, the AI Council which is established in the U.K. can be an example for Turkey. This council is considered as an independent commission of specialists in industries, universities and the public sector which recommends the U.K. government on policy and research (Pearce, 2020). It supports and provides an open dialogue and exchanges of ideas among industry, academia and government and share research and development expertise. It has the capacity to horizon-scan for new AI technologies, applications and their effects, recommend the government on its priorities, benefits and problems for the responsible adoption of the AI technology by taking care of public perception. The second solution can be an AI ministry established to work on the AI technology such as United Arab Emirates. In this solution, the ministry governs all process and take the responsibility to develop and use the AI technologies. The UAE started to shift traditional services into artificial intelligence-powered services along with the creation of the Ministry of Artificial Intelligence. Its plan for the future fifteen years (UAE Government, 2017) is to pass the world in the development and utilization of AI systems and machines. Its AI ministry firstly planed the AI strategy in October 2017. This strategy includes improving its government performance in every way, utilizing integrated smart digital systems which deal with problems and offer rapid competent answers and putting its country in the first place in the area of artificial intelligence investments in different sectors (Halaweh, 269-270:2018).

4.4.1.4. Natural Language Processing and Big Data

NLP is considered as a subdivision of linguistics, computer science, information engineering, and artificial intelligence related to communication between computers and human languages, especially how to provide a computer with coded instructions to perform and analyse a huge quantity of natural language data. Generally, NLP permits the AI machines to recognize and analyse the language that humans utilize to communicate such as Siri, Alexa, and Watson (Bhorat, 2017). When international examples were checked about NLP, successful solutions have been obtained especially in English and other languages from the Indian European language family. In the world, the English language is dominant and generally people make robots which can communicate with others in English to help more humans and make the robots useable for more people. Labelled data in these languages is one of vital factors which boosts the success of AI systems. However, in Turkey, Turkish Natural Language Processing is not yet as developed as English. The basic structure of the Turkish language is agglutinative and it is more different from English. Due to this, the majority of AI models that can be used for English do not work for the Turkish language. For the success on judgment machines, labelled big data with Turkish text processing interfaces should be created, stored and shared. This should be at a level that promotes its safety, storage and processing. Experts on the Turkish language and institutions working on the Turkish language should involve in this process. Researches on data should be funded by universities and relevant institutions.

Solving high quality communication problems in natural language is the highly important process in creating robot judges, because with NLP the robot judges can understand, analyse and respond. With the Eliza chatbot in the mid-1960s, humans understood that robots cannot work well with imitation and repetitive sentences. Today, with the approach of statistics and ML, humans are working on humanoid language processing robots. It is understood here that both grammar and the ability to process a language is important. When evaluated in terms of grammar and semantic knowledge, time series ML models can produce successful results. But for this, the language-specific features should be determined and there should be a huge data volume in the range of big data.

When this technology is used in the legal world, the applications which appear first are machines which summarize, classify cases and present similar cases in the field of law. However, even for this work, cases should be opened to access to the public. If the

government wants to use the AI robots in courts as decision makers or assistants, the government should allow applications to reach all the cases completed. This kind of applications will increase the data volume and help applications understand the Turkish language well without mistakes and respond well. Firstly, at least for the future robot judges in the administrative jurisdiction procedures, the completed cases should be opened to access by the Council of State, Ministry of Justice, Council of Judges and Prosecutors and Regional Administrative Courts. All case decisions about the administrative law should be open to the public. Especially, in collaboration with the Ministry of Justice the software which can do data processing on UYAP system and UDF as main text editor should be produced and the labelled data obtained from that software should be anonymous in a way that does not violate personal rights. This data can be useful for software developers and academic studies as a resource (Kızrak, 2019: 20-21).

4.4.2. Education Policy

In 2020, Turkey has a total of 80 law faculties in universities, 36 of them are public university, 34 of them are foundation universities and 10 of them are private universities in the Turkish Republic of Northern Cyprus. Although the number of law faculties is increasing significantly in Turkey, the education quality does not increase and still in the education, traditional methods are dominant. In the recent years, some changes and innovations have taken place to increase the education law quality. However, a more fundamental and deep-rooted reforms are vital. Law faculties' quotas are still high and the increasing foundation of new law faculties in almost all universities reduces the quality of education along with the severe deficiency of academicians in newly established law faculties due to the insufficiency of infrastructure and also some academicians are not good enough to teach lessons to students. Creative thinking, abstract and motivated reasoning should be used instead of the memorization of the information (Uyumaz and Erdoğan: 2015: 460). Traditional methods and lessons should be changed with modern methods and new lessons such as information technology law, international technology law, big data, human rights and human security, bioethics, technology and law and law and ethics on robots and artificial intelligence. The practice should more dominant than theory. In practice lessons, a teaching method should be supported with workshops about AI on law and students should solve possible legal disputes based on assumptions by improving their creativity. In some countries, there are law clinics, which give legal advice to many clients. The advice is mainly given by students, under the

supervision of qualified lawyers or academicians and is called as clinical legal education. This can be used in law faculties in Turkey. However, universities should have research groups which can create AI tools which can help citizens about law. In these law clinics, AI tools should replace qualified lawyers or academicians. In this way, AI tools can supervise students and students can be more comfortable with AI tools without the pressure of qualified lawyers or academicians. These tools can facilitate the work of qualified lawyers or academicians and qualified lawyers or academicians oversee and check decisions and cases like a supreme court. Similarly, laymen can take the free professional aid.

Laboratories, research centres and new university departments (such as Computer Engineering at Hacettepe and TOBB University) are very important to be established and engineering and law-based academicians from different disciplines within universities can work together. For example, the Tech Policy Lab is considered as the matchless and interdisciplinary cooperation at the University of Washington which intends to improve the technology policy by means of researches, education and thought leadership, bridges the gap among technologists and policymakers and helps make more efficient and more comprehensive technology policy. The Lab collects specialists from the law faculty and communication faculty and computing engineering faculty and other units on campus to draw attention to the significance of interdisciplinary work. In the world, specialized academic conferences are held in the area of AI and law. WeRobot 2012 is the most exciting interdisciplinary conference on the social and legal issues about the subject of robotics. Every year, this conference brings together robot scientists, politicians, academics, economists, entrepreneurs and lawyers who annually are interested in the future of robots and robot law (Miami Law Staff Report, 2021). The relations among AI and interdisciplinary researches can be thought as a two-way street which consists of “from artificial intelligence to other fields” and “other fields to artificial intelligence”. Other fields are very important to help reach the full potential of the AI technology. Similarly, AI draws inspiration from multiple scientific fields like developmental science, ecology, anthropology, evolutionary biology and etc. For instance, AI systems which can split complicated tasks into simpler tasks can evolve more complicated behaviors through coadaptation in varied competitive situations (Kusters et al., 2020: 2-3). AI has the transdisciplinary approach which is not just about interactions with fields, but also about placing the interactions in a total system. Transdisciplinary collaboration can accelerate the rate at which researches contribute to the understanding of problems, speed the ratio of new discoveries and expands human

knowledge. For instance, the collaboration among Neuroinformatics, Neurobiology and Neurophilosophy is essential to go beyond the continuing growth of knowledge-base observed in traditional university research settings (Rudin, 2020).

There are some investments and policies which some countries with national development strategies made. These policies can be efficient for the Turkish AI national strategy and guide Turkey to the right path.

Table 21: Selected Countries` AI education policies

The United Kingdom	The United Kingdom is proposing the policy initiatives: ● Sixteen New Centres for Doctoral Training in U.K. universities (1.000 new PhDs over the next five years). ● Industry-funding for new AI Master Students: 2.500 places were made available for data conversion and artificial intelligence courses beginning in 2020. ● Financing to foster education in mathematics, digital and technical areas to support abilities in science, technology, engineering and maths related subjects (406 million pounds) ● The formation of a pilot for a Teacher Development Premium (42 million pounds) for high-class professional development for teachers in less-developed places. ● New prestigious artificial intelligence Turing Fellowships to create a centre of attention and keep the best artificial intelligence researchers ● The formation of new National Retraining Scheme giving re-skilling opportunities with devoted investment sources for digital training.

Table 22:(continues) Selected Countries` AI education policies

Sweden	• Master degrees for data engineering, ML, statistics, image analysis and ML at Uppsala University. • Master degrees on Design for Creative and Immersive Technology at Stockholm University. • Master degrees on ML, and Systems, Control and Robotics at KTH Royal Institute of Technology. • Master degrees on Language technology and Logic at the University of Gothenburg. • 3 new created AI-related master degrees on Data science and artificial intelligence, High-Performance computer systems and Physics at Chalmers University Policy advices: • The incorporation of artificial intelligence in non-technical programmes to support a wide and accountable comprehension of the utilization of artificial intelligence. • The support of connections among researches, higher education and innovations in the area of artificial intelligence • Carrying on and advancing the education of experts.
Germany	The Germany is proposing the policy initiatives: • Formation of the 'teach-and-learn AI' platform to advance a strong skill hub in artificial intelligence aiming for certain users. • Formation of as a minimum one-hundred extra professorships in the area of artificial intelligence to make sure that artificial intelligence gets a powerful grip in the higher education. • Formation of the National Skills Strategy to support sophisticated vocational education in digital and AI-linked aspects among others. The Mittelstand 4.0 centres of excellence for Small and medium-sized enterprises will get "artificial intelligence trainers" contacts as a minimum 1000 companies every year; • Creation of Regional Centres of Excellence for Labour Research focusing on labour in artificial intelligence working environments and making the essential abilities known to management and workforce. • Formation of a Skilled Labour Strategy to monitor systems to recognize what abilities are required in the future; • Creation of Regional Centres for the Future to upgrade employees` skills in rural areas.

Source: (European Commission- Country report – For Sweden, 1: 2020; European Commission - Country report – For Germany, 1-2: 2020; European Commission - Country report – For United Kingdom, 1: 2020).

The UK government is keen to give some incentives to the education to advance AI-related skills and competences of future generations and propose various policy initiatives such as doctoral training centres for AI, offering 1,000 new PhDs over the next five years, industry funds for new AI masters students, funds to encourage education in mathematics, digital and technical fields, teacher development plans and etc. Similarly, the UK government encourages lifelong learning and reskilling/upskilling opportunities to support the workforce's knowledge and skills in AI with some incentives such as AI Turing Fellowships and a new National Retraining Scheme (European Commission, 2021). In Sweden, education institutions have already developed their offers to meet digital challenges such as programmes, master degrees and etc. Sweden states that Interdisciplinary knowledge is very important to ensure ethical issues, safety, security and sustainability for the AI technology. The education and training of AI knowledge are not only crucial for technical experts and students but also for managers and other professionals interacting with AI (Government Offices of Sweden, 2018: 6). Germany aims to attracting leading AI talents and experts from abroad, promoting young students at German universities and encourages initial and continuing education and training of workers to empower the private and public sector. Germany attracts national talents to increase the development of AI sustainably in Germany. These initiatives should be maintained and increased for continued effectiveness in AI for Germany (German Federal Government, 2020: 5).

4.4.2.1. The Modification of Primary and Secondary Educations

Primary and secondary educations are very important tools to train students well. Most of time students in universities do not want to embrace new disciplines together with their own discipline chosen by them such as law. For instance, even if students take the basic computer courses and some basic information about the AI and big data, they may not attach importance to them. The main reasons are that AI is thought to be very complicated by laymen, they do not have any knowledge about it and they do not understand the importance of it. In order to deal with these challenges successfully, in primary schools and high schools, the basic knowledge about AI and big data should be given to students and the methods of lifelong learning, digital classroom and personalized education services can be designed for primary school and high school students. The Ministry of National Education of the Republic of Turkey implemented e-school and FATİH project in previous years. Today, it should update these projects and new ones should be added. For instance, Bornova Municipality

made the "digital classroom" application and approximately 55,000 primary and secondary school students will benefit from this application (T.C. Bornova Municipality, 2019). T. C. The Ministry of National Education continues to develop the EBA system so that students and teachers who switch to distance education due to the COVID-19 can continue their education more efficiently. The Ministry of National Education accelerated these efforts and announced that it has commissioned the EBA Assistant, which was developed together with the artificial intelligence company CBOT, consisting of Turkish engineers. EBA Assistant will be able to answer nearly 100 different questions in 10 main topics determined by the Ministry of Education officials in a few seconds (Papuççiyan, 2020). In 19th Education Symposium, Minister of National Education Ziya Selçuk stated that:

> " *We are in constant contact with the Presidency Digital Transformation Office, our Ministry of Science, Industry and Technology, TUBITAK, the private sector and civil society. In 11. Development Plan, we want to use artificial intelligence in inspection, assignment, construction, learning processes and everywhere. These efforts are in their final stages. We have a dedicated team following this. To publish our strategy, an ethical framework on artificial intelligence, education and children's rights will be published in the next few weeks with UNICEF and UNESCO. On the one hand, we expect this too. Our friends represent us there; they are in discussions. So we are on this issue. Our aim is to actualize artificial intelligence-oriented decision support systems in learning and education policies to be used for the benefit of humanity. "*

Stating that they are in cooperation with Istanbul Technical University in this regard, they have established AI workshops at ARGEM and BİLSEMs, and they have given high school students the opportunity to receive international certificates and Minister of National Education Ziya Selçuk stated that they have recently signed protocols with Google, Intel, Cisco and Microsoft on student and teacher training. He said, "Our next goal is to establish a 'meb.ai platform'. It is now possible to say this as a 'teaser' in quotation marks. In this strategy, we are preparing to establish a research centre with various stakeholders under the name of “The Future of Learning Institute” (Göçümlü and Aktaş, 2020).

On May 20, 2019, in the other speech, Ziya Selçuk stated that the ministry was in contact with national and international organizations for the information theory course. Information theory and other newly introduced elective courses have become commonplace courses in the contemporary world. For example, we brought artificial intelligence books

from China. If the high school children in China are reading this, our children do it too, as long as the environment is available, as long as the conditions and conditions improve and the teacher is qualified (Çakmakçı, 2019).

In the world, the leading countries in AI which are China and the U.S. declared pertinent artificial intelligence education initiatives in 2018. The Ministry of Education of China declared the "*Artificial Intelligence Innovation Action Plan for Institutions of Higher Education*" to promote and support young people for the AI technology (Chiu and Chai, 2020:1-2). China has huge plans and goals to be an AI leader and China announced this goal in 2017. That is "Next Generation Artificial Intelligence Development Plan", which help China become the world leader in AI by 2030. In order to accomplish the goal, China is putting into practice a three-part plan (Lynch, 2019):

- Becoming competitive in artificial intelligence by 2020
- Making breakthroughs by 2025
- Becoming the leader in artificial intelligence by 2030.

One of the most important points of the plan is to focus on youth. China focuses on children to start the plan and become successful. China officially started using AI in the college educational system following directives for the improvement of artificial intelligence education in elementary and high schools. The Ministry of Education accepted applications by 180 colleges to establish majors in artificial intelligence for undergraduate students in 2019 and a circular was published by the Ministry of Education (Dai, 2020). In China, today Children in kindergarten are learning about the AI technology. Following China's statement, Henan People's Publishing House started issuing AI textbook series. The publishing house released a 33-edition set of books on AI which forms the AI curriculum from kindergarten kids to 12th grade students. China wants AI studies to start being learnt at early ages, make children interested in AI and discover young talents as soon as possible. These textbooks were created with the contribution of artificial intelligence specialists from Google and the Institute of Automation of the Chinese Academy of Sciences. In the U.S., the Association for the Advancement of AI declared a joint initiative with the Computer Science Teachers Association to make national general rules to teach K-12 students about the artificial intelligence technology and identify which students should take the education of AI, ML and robotics (Lynch, 2019).

At home, families can teach their children simple AI knowledge. Having a home-school during the Covid-19 pandemic is a good opportunity to use and learn the technology. Especially, the foundations of coding are necessary for students to make their own AI projects. For instance, block-based coding tools (e.g., Scratch and Tynker) permit students to utilize basic prewritten coding instructions. Scratch is called as a free programming language and children can make their games, animations and etc. with this programming. Tynker is considered as an educational programming platform designed to teach children how to make games and programs. In these programs, codes are simplified into instructions like moving back, turning right and etc. and children begin applying algorithmic thinking to making their games and programs. After these programs, children can begin experiencing coding languages. In schools which utilize Apple hardware, the Swift Playgrounds application is a highly efficient method of starting making codes. In the same way, Python is called as a computer language which is utilized to make simple games and programs (Ford, 2019).

Children should require new abilities in the world surrounded by the artificial intelligence technology. Children should begin with simple works such as collecting data, showing them with simple graphics and labelling the data accurately in the primary school. Generally, they must have a strong structure and comprehension about the artificial intelligence technology and its related areas such as ML, machine intelligence, robotics, data mining and Deep Learning and etc. However, firstly AI work and studies should be designed for every level and certain age categories. In certain years, the difficult level should be increased systematically. AI can be modified according to the profession that students will prefer and can give many benefits for their future jobs. The main point is to develop modified studies for young students and children. If they desire law careers, the ethics on AI, regulations of AI, judging machines and predictive machines should be in their curriculum. The AI changes the world very fast and the next generation has to know the AI technology because they may must have jobs which do not exist yet and may have to create jobs for themselves.

4.4.2.2. The Modification of Law Faculties

AI is changing the world rapidly and higher education is no exception. AI is changing the way people work, the way people learn, and the way people live. AI is impacting higher

education significantly. Many jobs will become obsolete and new skills will be needed in the future. Law faculties are not exceptions. They need to rise to the challenge to prepare their students for the AI revolution and equip them with the crucial skills to compete in the AI age. Turkish Universities nascent research aims to shed light on the higher education evolution and revolution as AI advances.

Today, in general there are compulsory courses in Turkish law faculties and they are mentioned below:

Table 22: Compulsory Courses in Turkish Law Faculties

Public Law	**Private Law**	**Mixed Fields of Law**
- Constitutional Law - Criminal Law -Administrative Law (Administrative Jurisdiction) -Public International Law -Criminal Procedure Law -Tax Law -Execution and Bankruptcy Law	-Civil Law -Obligations Law -Commercial Law -Private International Law -Civil Jurisdiction	-Roman Law -Labour and Social Security Law -Intellectual and Artistic Works Law

Some laws above are separated into different courses (such as four different courses for one law) and can be taken in different years such as Civil Law and Commercial law, because their scope is highly wide and complex. With these compulsory courses, there are elective courses in law faculties in Turkey. In some university, according to the education policies of the law faculties and students' interests and professional preferences, law faculties may prefer various courses for elective courses. To a certain extent, each law faculty is free to choose elective courses. Basically, a student in a law faculty in Turkey has to take many courses about 20. With elective courses, a student has to take 30-35 courses in four years. Firstly, four years are not enough for these courses and students just take general information about these courses. When they graduate, they should select some sections and they should learn them nearly from the beginning because they forget the information of courses in four years and they just focus on the certain information which is enough to pass courses. Today, in law faculties, the curriculums are highly heavy and full and at the same time, with additional courses, the curriculums must keep up with technological development in the age of the AI technology. Provided that graduates from law faculties do not know the technology

and the legal problems caused by the technology, they cannot practice law adequately. Therefore, the law faculties in Turkey should give law courses related to the AI technology as elective courses and when these technologies are decided to use in courts, law faculties should give them as compulsory courses. For instance, in 2016, Council of Higher Education (YÖK in Turkish) allowed Informatics and Technology Law to be opened in faculties. In 2019, Inter-Universities Council added "Information and Technologies Law" as the department to the fields of associate professorship. In law faculties, the number of master programs, research institutes and centres related to information technology law is being increased significantly such as Istanbul Aydın University- Information and Technology Law (with thesis) as a master degree, İstanbul Bilgi University- the Institute of Information and Technology Law, Yeditepe University- Information Technology Law Sub-Branch Program and İstanbul Ticaret University Information Technology Law Training Program.

Especially in universities and research centres, the capacity in the fields and these technologies and the budget should increase. In law faculties in Turkey, the curriculum should contain basic courses in informatics and computer science about the concepts of artificial intelligence and big data. Pilot studies ought to take place in cooperation with engineering and communication faculties. Lawyers and engineers should work together in universities about artificial intelligence and big data. The basic computer courses and some basic information which can be used in profession about the artificial intelligence and big data ought to be taught in the first year of the law faculty. Universities should work with bar associations to improve legal education and to provide education in accordance with digital transformation. In law, sociology, philosophy and philology and engineering faculties, the courses of AI and big data should be provided. For instance, in the construction period of a robot judge, the interdisciplinary work is needed to make a robot judge. The network among these disciplines should be always active and government institutions should support this cooperation. Multidisciplinary approach is one in which one subject is examined from the viewpoint of more than one discipline. Thanks to this approach in AI, students can get a more holistic understanding of the world. Instead of checking departments and subject matters separately, this approach can integrate parts of each department into the study programs of the other. Students can get the different perspectives and obtain collaboration skills (Glebe, 2020).

In China, authorities permitted thirty-five universities to establish majors in artificial intelligence such as University of Science and Technology Beijing and Zhejiang University. 101 universities have been permitted to offer robotics engineering major and 203 universities have the right to offer data science and big data technology majors. Chinese Universities are getting used to the artificial intelligence world, trying to accomplish discoveries, developments and big successes in basic theory and essential technological researches by 2020 and aims to be the main hub in making artificial intelligence innovation centres by 2030 (Caiyu, 2019). The U.K. government declared that 1,000 students would receive funding (115 million pounds) to enable students to finish PhDs at 16 U.K. Research and Innovation AI Centres for Doctoral Training. A group of businesses (such as Google DeepMind and BAE Systems) promised to help fund 200 new artificial intelligence master courses at the U.K. universities (Shead, 2019). Government quango U.K. Research & Innovation (2019) stated that industry partners would give 78 million pounds and partner universities would give an extra 23 million pounds. With them, the total funding becomes more that 200 million pounds (Maintaining American Leadership in Artificial Intelligence, 2019).

4.4.2.3. The Modification of the Training Programs in the Justice Academy of Turkey

The Justice Academy of Turkey is an institution established to train the judicial staff assigned in the Turkish judicial system. The Justice Academy of Turkey is officially affiliated with the Ministry of Justice and one of the main aims of the academy is to train judicial staff, especially candidate public prosecutors and judges, in various ways. Mainly it organises and implement the initial training of candidate public prosecutors and judges and gives pre-service and in-service education for judges and public prosecutors in civil and administrative jurisdictions, notaries and advocates; organizes online classes, conferences, meetings and etc.; gives expert advices and focus on matters about training and education in the area of judiciary as an affiliated institution of the Ministry of Justice (Aksel, 2013: 24, 26).

The Justice Academy of Turkey is a perfect place to start the AI research, improve development expertise and train judicial personnel and candidates. Firstly, the Justice Academy of Turkey has the public entity having scientific, administrative and financial

autonomy with a special budget. The academy publishes several journals today and can give priority to articles on the relations between the AI and law, regulations of AI, ethics, intellectual property law and artificial intelligence, criminal liability and artificial intelligence and etc. When the academy reaches the certain capacity in AI articles, it should make an AI journal. The academy should publish books and other materials on AI in law and legal practise.

Secondly, the Justice Academy of Turkey can train prospective judges and public prosecutors, auxiliary judicial personnel, judges and public prosecutors, advocates and notaries by giving AI courses. However, firstly the academy should focus on prospective judges and public prosecutors. This study recommends the government to add basic questions related to AI, big data and ethics to the civil judge and public prosecutor exam and the administrative law judge exam because the academy can train prospective judges and public prosecutors more easily and better, who has the basic knowledge about AI, big data and ethics. When they pass the exams, they will be trained by the academy in Ankara for certain months (such as civil judges and public prosecutors coming from lawyers at least with 3 years' experience as lawyers for 6 months, civil judges and public prosecutors and administrative law judges for 3 months and 15 days for 2019 candidates) and their training time can be changed according to needs (one year for 2019 candidates). In the academy, some classes are given such as penal law, civil law, obligations law, tax law, commercial law and etc. according to their choices (civil judge, administrative law judge or public prosecutor). In the end of the training time, the candidates take the last exams to finish their candidate status and to start their jobs as prosecutors and judges. First option is that candidates can take more classes in a day in the academy for 3 months and 15 days and online classes can be taken as additional when they are working in courts. If there are some classes about psychology, self-improvement and some specific classes, some of them can be removed and some of them can be given with the AI classes. For instance, ethics in AI can be taught with self-improvement and psychology classes. The responsibility of the AI robots can be taught with the responsibility of judges, public prosecutors and judicial staff in judges and public prosecutors` responsibilities. UYAP can be improved with AI and can be taught with big data and the AI technology. AI is being used for license plate recognition or face recognition system and it is one of the tools used to ensure the security of cities. This feature of AI can be taught with the gathering of the evidence class in the penal law to judges and public prosecutors. Second option is that the time of the training time in the academy can be

extended. In this time, all classes about AI on law can be given with other classes or alone. In the academy, training time is divided into two sections, which are preparatory training (one month and 15 days) and last training season (two months). In the preparatory training, there are common classes for all prospective judges and public prosecutors and some classes should be added. For instance,

- Introduction to artificial intelligence / information technology law:
- Big Data
- Artificial Technology and Regulations
- Comparative analysis: US, EU, China and Japan information technology law / artificial intelligence in Turkey
- Data security and privacy and artificial intelligence
- Ethical issues and Artificial Intelligence

In the last training season, specific classes should be given to prospective judges and public prosecutors according to their professions (such as administrative law judge). For instance, some specific classes should be given to prospective administrative law judges in the academy:

- Criminal liability and artificial intelligence
- Legal responsibility and artificial intelligence
- Evidence collection procedures in AI in the administrative law
- The preliminary examinations of AI in the administrative jurisdiction procedures
- Cases for compensation causing the actions of AI working for governmental institutions
- Control of decisions of administrative robot judges

Thirdly, the academy should design and implement AI courses for the professional improvement of judges and prosecutors, auxiliary judicial personnel and advocates in various fields along with seminars, conferences and etc. It can establish AI certificate programs and help the formation and organization of AI programs and AI research projects of institutions and agencies associated with the area of law. It can check the publications of

international AI institutions and organizations about latest technological improvements in the field of law and can translate and publish such AI publications. The academy can work together with the Union of Turkish Bar Associations and other pertinent organizations, institutions and agencies to develop and implement AI applications and ideas for the use of AI in law and produces information and documentation centres, databanks and libraries to create the background of AI applications such as robot judges for big data and natural language processing. It can help the preparation of the Turkish law of justice bibliographies for AI cases in the future. The Consultative Committee of the academy for AI should contain AI professionals, mathematics, engineering and law professors. Lecturers and educators working in higher education institutions about AI should be appointed as instructors in the Justice Academy. Judges, prosecutors, advocates, and other people expert in the field of AI should teach at the academy provided that they are considered suitable by the related authorities.

4.4.2.4. The Use of AI in Education

AI has evolved as a ubiquitous figure of technology on a daily basis and is improving very fast in the field of education. In the world, generally the implementation of AI is at early stage in elementary education and is more prevalent in higher education. Artificial intelligence can assist instructors to promote students' abilities and interests. It can handle specific rote tasks in classrooms, giving instructors the extra time for more attention to their students. Perhaps AI may teach basic types of knowledge while humans teach more completed knowledge or it may assist instructor to follow student performance. This ability of AI can be used in the primary education and secondary education in Turkey. Young students can learn the basic knowledge of AI online and teachers can follow their performance. These classes may not be obligatory at the beginning but the government should encourage young students to take these courses. Turkey started to air broadcast school lessons for the distance learning due to COVID-19. Students have benefited from the Education Information Network, where students have watched online classes with the participation of teachers and other peers (Kazancı, 2020). The Minister of National Education can make these online lessons permanent with the AI technology. For instance, in fall 2014, a foundational course in AI (Knowledge-Based AI) was set up as a part of Georgia Institute of Technology's Online Master of Science in Computer Science program. Standards and experiences from the learning and cognitive methods were used in the formation of the

course. Artificial intelligence methods were utilized in the instruction of the course with embedding one-hundred experienced intelligent tutoring agents in the video lessons. Over 2000 students benefited from the course. One-hundred nano-tutors support the exercises, are embedded in the video lessons and are highly focused intelligent tutoring agents guiding students' understanding of one narrowly defined ability like finishing a semantic network for a specific problem or simulating an agent's planning in the blocks world. The nanotutors take action to support the course's video lessons, which is assessed through the written assignments and examinations. Approximately 80% of students think that the interactive exercises advance their understanding of the material, and approximately 75% of students think that nanotutors help increase their understanding of the material. Generally, the students seem enjoyable in this course compared with traditional one, and online students matched residential students' performance on same assessments. The results stated that the video lessons were more like a textbook for the online class, and that the true online classroom is in the discussion forum. It is the forum which duplicates most activities which take place in a physical classroom like class announcements, discussions, student collaboration, and instructional support via question answering. The online experience can be more abundantly interactive than the residential experience. However, this needs correctly understanding the ideal roles for the video material and the online forum (Goel and Joyner, 2017: 48, 50, 52, 54).

Although China is considered to centralize the power of the AI development for its own aims, China has a tendency to share the power of the AI development on education with some companies to support the growth of the private sector. Firstly, the government give start-ups mainly working on education projects (such as student learning, teacher training, school management and etc.) tax-breaks and these process can be a wise option for investors. Secondly, in China academic competition is very high. 10 million students take the college entrance exam and this exam is considered as the vital determinant of success for the rest of their lives. Their parents are ready to pay for private lessons and courses which help their children take the score they want. Lastly, due to the enormous population, there is a huge amount of data and since the population wants the government to advance in AI, the population is not as strict as the West about the privacy (Hao, 2019).

There are 3 major Chinese private education companies which have benefited from this opportunity to make in education and they are New Oriental Group, Tomorrow

Advancing Life, and Squirrel AI. The New Oriental Education and Technology Group is called as the largest private education company in China and focus on English and other foreign language training, domestic exam training, online education and etc (New Oriental Education and Technology Group, 2015). The group declared a project in October 2018, which is called AI Class Director. While now this project is in a development phase, the 'AI Class Director' is considered to have the characteristics of face and speech recognition, facial attributes analysis and NLP to record and check students' class performance in real time, examine emotions, participation and outcomes in a quantitative method, providing advices with the information taken. The application grades and corrects children's pronunciation and produce individual learning reports derived from data, enabling the application with artificial intelligence to comprehend Chinese students' capacity for English and advance the experience and results (Xu, 2018). The BlingABC, which is a subsidiary of the New Oriental Group, develops this application. While the BlingABC does not release what data is utilized to train the application, the BlingABC functions by connecting young people with English teachers via live video feeds, making sizeable volumes of voice recordings (Knox, 2020:8). Secondly, Tomorrow Advancing Life appeared as a major developer of the educational artificial intelligence. It created magic mirror system to advance the quality of the teaching process like feedback on the quality of students' listening, teacher evaluation, and teacher-student style matching by having cameras, microphones, clouds and clickers, ipads in the classroom with the use of the combination of software and hardware (People's Daily, 2018). Lastly, Squirrel AI combined the most cutting-edge AI, big data, psychology, pedagogy, making a group of adaptive learning strategic algorithms running through the entire teaching process. By the help of the advance in artificial intelligence and algorithms, knowledge graph and graph theory are utilized to explain and represent every subject's knowledge system. By using the dynamic tracking of students' knowledge points, Squirrel AI assists students to make personalized learning ways. According to students' knowledge, the system automatically determines the most appropriate learning difficulty and order for students, assists students to analyse their omissions and fill in the gaps, in order to make sure that they take the knowledge with a minimum effort. Squirrel AI plans to add students' real-time heart rates, brain waves and facial expression recognition systems during learning for inclusive analysis (Squirrel AI Learning, 2019).

4.4.2.5. The Framework of the Proposed Development Cycle of Curriculum for Educators on AI

Planning stage: The planning stage is highly important and should be acted carefully. This stage concentrates on the preparation of educators for the preparation of the curriculum. Although the understanding of the AI and the AI capacity are very important, the most important thing is to embrace and perceive AI schooling. To maximize the capacity of the AI technology, the government should order schools and universities to take adequate actions in the fastest way. It may not be perfect at the beginning but the system will start to be better every single day. When the government understands the inadequate sides, it will modify the system in time. The government should put the promises into practice about the AI technology. This technology is not stable and it is changing fast. Examples in the world may not be a good solution in the adoption of the curriculum on AI because their internal dynamics, the capacity, infrastructure, the closeness to the technology and education system and aims in the use of AI are more different than Turkey. Training has to give educators the knowledge of the very basics of AI and big data. At least educators should have a basic understanding of how to create simple AI applications and know the internal structure of the applications for the primary and secondary education. In universities, each department should benefit from the AI technology according to their needs. For instance, the construction of the robot should not be the topic of a student in a philosophy department. Teaching models utilizing the AI technology as an instrument in the classroom to assist students to achieve should be analysed well and given to students. Technology integration started changing the traditional paradigm of teachers giving wisdom and students taking knowledge. The knowledge required for occupations for today will alter in the future before today's students start their careers. Students have to search and find information and actively interact with other people in the world, and need to adopt changes fast in the technology. In this way, students can be fruitful members of the society for life (Bitner & Bitner, 2002: 96-97). Due to this, the concept of Lifelong Education in Turkey can be modified. Education Offices can be established. This department can give online courses about AI and big data and can share new developments in AI, research and development expertise with the public.

Design Phase: The curriculum should use a model of a shift from local explanations to global understanding, rendering links between AI and student life. The educators ought to take local difficulties as samples and expand it to global difficulties and in this way the

students can grasp the societal and personal effects of the AI technology in a better way. Educators ought to handle the subject field of artificial intelligence from a design-thinking perspective with positive thinking which achieves an empathic understanding of the students to deal with challenges. This approach supports various students to grasp the complex world of the AI technology in an advanced way by making sure that the participation of more students takes place. Because there are numerous abstract contents in AI, the Ministry of Education should use Mayer's 12 Principles of Multimedia Learning. For instance, the Ministry of Education should design teaching materials such as graphics, info-graphics, slides and videos (Chiu and Chai, 2020:14-15; Walsh, 2017). Also, educators` beliefs are primary for the acceptance of new technologies along with their opinions on knowledge acquisition and efficient methods of education. Educator thinking about the AI technology is a vital predictor in the AI technology acceptance. Provided that educators find a method or technology effortless to learn the use of a new instrument, they highly possibly try the instrument in their lessons. This means that the ministry of education convinces educators that the AI technology will be effective for children, young students and university students. Anxiety is considered as a strong negative predictor in technology acceptance. Changes of any type cause anxiety, fear and concern for educators. Educators might be concerned about a potential huge workload because of the education and use of AI, or about having problems with the classroom management because of a deficiency of familiarity with AI. If the permission is given to educators about experiencing and getting familiar with new methods, these can alter their thinking and anxiety levels about the methods (Chiu and Churchill, 2016:318-320).

Implementation and Continuous Modification Phase: The Ministry of National Education should manage and oversee this curriculum. Educators should be chosen very carefully and should take the highest points in the exams. Also, educators should gain AI knowledge from various specialists such as AI experts, mathematics and engineering professors, and school teachers to teach artificial intelligence. The educators should comply with decisions and rules taken in the preparation and the design phase. However, the flexibility of the curriculum should high. The AI contents decided derived from environments and students' interests and competencies should be supported with pedagogy. In this phase, to a certain extent, educators should take the responsibility and take initiatives to develop the curriculum according to students` capacity and emotional conditions. But educators should give reports about this change because the ministry of education may like

this new curriculum or they may block this new curriculum. Educators` initiatives are highly important because educators can observe students' conditions better and make decisions in a faster way. Because they are trained well by the ministry of Education, they can follow the world and new changes in AI better.

4.4.3. The Law Policy

AI in justice and society can transform the existing social structures and cause some regulatory problems because the legal structure is not ready to provide a direct answer to. Thus, the situations of machines with limited memory, machines with a theory of mind and self-aware machines ought to be analysed deeply in the context of legal status, liabilities, regulation, ethics, safety and etc. Because of this, when Turkey decides to use robot judges, Turkey should be careful about the regulations of robot judges in courts, especially in the administrative jurisdiction.

4.4.3.1. Regulation, Ethics and Safety

There are selected 3 countries which developed their AI national strategies and created some platforms, services, laws and etc. about regulation, ethics and safety as a part of their national strategies. These countries can give some ideas to Turkey about the development of its own AI national strategies in the cases of regulation, ethics and safety.

Table 23: Selected Countries` AI Regulation, Ethics and Safety

Germany	- **Gruender Platform:** This is an online platform fostering start-ups (from a starter to an advance). -**Industrial Collective Research Programme:** It supports joint businesses and science researches on collective artificial intelligence projects. -**Advisory and Funding Services:** These services' aims are to promote the development of newly established businesses on AI by means of such as venture debts. This can contain policies to support firm formations in the area of top-rate researches in human machine interactions. -**The Commission on Competition Law 4.0:** This is considered as a platform on how to promote the development of competition and copyright law. -**The Opportunities for Qualifications Act:** This act provides re-skilling opportunities and fosters employees whose jobs are risky because of AI.

Table 24:(continues) Selected Countries` AI Regulation, Ethics and Safety

Germany	-**The Skilled Labour Immigration Act:** The act is designed to smooth the progress of the movement of skillful people to Germany. -**The Workforce Data Protection Act:** This act codifies data protection regulations and privacy issues (such as protecting the control on personal data) and can occur with the EU law together without problems. -**The Cyber Security Directive:** This is considered as the directive on security of network and information systems requiring member states to embrace national cyber-security strategies. In 2017, this was put into practice by the NIS Implementation Act.
France	-**The "MIAI@Grenoble-Alpes" Project**: This established a Multidisciplinary Institute in AI with 2 main research themes (Future AI Systems and AI for Human Beings and the Environment). The project focuses on the areas of personalised healthcare, medical devices, the environment and energy. -**The "3IA Côte d'Azur" Project**: For this project, more than 100 researchers in the subjects of training, research and transfer projects, especially in the areas of healthcare and regional development are collected. -**The "PRAIRIE" Project**: The project intends to dive deep into the fundamental knowledge in the AI technology, to become a means for exchanges among universities and institutions and to have an important task to lead and organize the public. Generally, this focuses especially on the areas of healthcare, transport and environment. -**The "ANITI" Project:** It focuses on mobility, transportation and robotics. It is aimed to collect two hundred researchers from universities, research organisations and businesses to form a new generation of AI called hybrid in the subjects of reliability, robustness, social acceptability and economic viability. - **AI research and teaching chairs:** This is a multi-year programme of 40 Chairs in AI presented by the Minister of Higher Education, Research and Innovation and the Secretary of State for Digital Technology and gives essential resources and foster host institutions for determined AI research projects. -**The Digital Republic Act**: This is an act to disclose public data by making stronger the safety of users' rights and data privacy and to make sure that digitalisation benefit to all equally.

Table 24:(continues) Selected Countries` AI Regulation, Ethics and Safety

France	- **The Cyber Security Directive:** This is considered as the directive on security of network and information systems requiring member states to embrace national cyber-security strategies. In 2018, it was put into practice by the French Act No. 2018-133. **- A Global Partnership for AI:** The formation of an international AI study group is aimed to create responsible AI with Canada as a partner and will be started in the near future by the help of the Organisation for Economic Co-operation and Development.
Finland	- **The National Cybersecurity Strategy:** It develops the comprehensive state security and expands towards the areas of AI. **- The Public Procurement Act:** It can enable effective public-private co-development and public sector operators should be secured adequate sources and incentives to involve in such development, paying special attention to deal with rights of results of co-development. **The Formation of the Road Traffic Act:** It aims to advance the smooth running and safety of transportation and make preconditions for the safe automation of traffic. **-An AI Business Programme**: This proposes innovation funds, networks and internationalization services for research and development. -**The Hyteairo Programme:** It fosters the usage of artificial intelligence and robotics in the well-being sector. -**Act on Public Administration Information Management**: This identifies the whole life cycle of information in public administration. It aims to guarantee reliable administration of the authorities' data groups and secure data processing. It started to be effective in 2020.

Source: (European Commission-Country report – For Finland, 2 and 4: 2020; European Commission-Country report – For France, 2-3: 2020; European Commission-Country report–For Germany, 2-3: 2020)

The German Federal Government started to give initiatives businesses to deal with other matters like information management, safety, data ownership, standardisation such as Gruender platform and industrial collective research programme advisory and funding services reforms focus on numerous fields such as the codification of rights of the labour force, consolidation of competitiveness of the private sector and the development of regulations regarding data use and protection such as commission on competition law 4.0,

opportunities for qualifications act, skilled labour immigration act, workforce data protection act and cyber security directive. Germany stated that AI should be designed safely, to respect humans' rights and freedoms, be secure, and eliminate prejudice and discrimination (Meyer, 2019). France focuses on ethical matters to guarantee a fair and the transparent usage of AI in the French AI strategy and started creating some projects to make the use of AI in public services and education easier and more trustworthy such as MIAI@Grenoble-Alpes, 3IA Côte d'Azur, PRAIRIE and ANITI projects and AI research and teaching chairs. In addition, it focuses on numerous fields such as the codification of rights, safety, data privacy, cyber security and international cooperation such as digital republic act, cyber security directive global partnership for AI (Van Roy et al., 2021). Finland enables efficient public-private co-development and provide sources and incentives for the safety of use of AI in public sectors with some actions such as national cybersecurity strategy, the public procurement act, act on public administration information management and road traffic act and it focuses on fostering private and public sector with some programmes such as AI Business Programme and Hyteairo Programme (Finnish steering group and secretariat of the Artificial Intelligence Programme, 2019: 48).

Artificial intelligence regulation cannot be considered just as a complex territory, but also AI is an uncharted territory. But time has changed and the human dominance has started to shrink since especially AI as machine learning, automation, robotic manufacturing and deep learning reliance began to replace human work. But regulations about this area are much more complicated than the regulations made for problems among humans. The use of artificial intelligence is very versatile and normally AI should handle with present and future regulatory challenges from many angles. Some of the challenges can be considered as conceptual because they are about the definition of AI and the assignation of moral and legal responsibility such as compliance, liability, features of regulators, monitoring and the problem of fairness in case of the failure of AI in a dangerous way. Other challenges can be defined as practical such as the natural problems in checking the activities of autonomous machines, which might make ex post regulations ineffective and unproductive. There are serious risks and these risks can be seen in various ways. For instance, artificial intelligence may make actions which may be unforeseeable to their designers, managers and operators and artificial intelligence can be developed so secretly or complicatedly in order to make ex ante regulations unworkable. In spite of these challenges, some important precautions can be possible to deal with these challenges with highly flexible and well-considered

regulations and to avoid negative outcomes coming from the challenges and the massive, wide-ranging and mighty companies can be more effective than ever in the lawmaking process.

Major government entities such as legislatures, agencies, and courts are very essential and important for the guiding principles of the artificial intelligence system. Legislatures have the power to deal with some procedural difficulties and can give agencies more freedom and protection for the principles which are as convenient and effective as possible. Agencies can be used well to decide the substantive territory of the AI regulations because, to a various degree, agencies` autonomy, the capacity of technical know-how, the possibility of neutrality and the possible harmony with other non-governmental/governmental institutions or companies could be enough to handle such a highly flexible and complicated task. In this system, courts should be used to solve difficulties such as risks of AI, efforts of slowing down the regulation process without foundation, some possible technical and management problems in a fast and convenient way. Courts should be prepared well for these problems which courts can face quite likely in the near future.

The legal perspective is vital for AI about the problem of the compensation in case of harm, the relations of autonomous robots with humans and the environment, the definition of AI, the definition of the capacity and the capability of AI, the different legal stances on various characteristics of AI in each field, the rules about mass-production, the measurement of potential public risks and the role of AI on dangerous areas such as nuclear technology, environmental threats and powerful weaponry. All of these things make AI regulations very difficult but at the same time they make AI regulations essential and inevitable for countries and people, more generally for the humanity.

4.4.3.2. Possible Statuses for Autonomous Robots

In this century, robots are connected with different facets of humans` lives. These complicated and developed robots have been to an increasing extent utilized in various manufacturing sectors and various services for decades and at the same time have caused a serious discussion about the possibility of damages to humans and liability matters. In order to talk about the rights and responsibilities of robots, it will be necessary to discuss whether there are rights and punishments, and whether they will be subject to the laws that people are subject to. Legal personalities which can be used in robots` statuses will be analysed

deeply and advantages and disadvantages will be shown neutrally. Possible statuses for robots are an animal model, a tool model, a slavery model, a human model, a company model, a legal representative model and an electronic person model.

4.4.3.2.1. Legal Personality as Status – An Animal Model

The legal status of animals is not neutral and gives something to discuss the argument on whether to give their rights to robots, or to maintain their status as an object of rights, or to make a sui generis regime for robots. For instance, in France, the civil law approach to the status of animals has changed and developed over time. The qualification of animals as a movable property was taken away from the French Civil Code and was upgraded to sentient living beings. However, animals remain subject to the regime of property. If the legal relationship between the qualification and the regime is not present and the only thing left is a legal reference to a today`s regime, then animals could be submitted to other rules which can make a hybrid, sui generis regime, at least to the extent that animals are sentient living beings that are unique to their owner, a part of the property regime could be eliminated. Social robotics, which makes empathy and a form of attachment with the user, can pursue the similar model. The robot can be considered as a private matter. For instance, in some cultures, such as those in parts of Asian, where the boundaries between living matter and inert matter are not identical in the West, traditional funerals were made for "Aibo" animalod robots created by Sony when it was no longer possible to repair them. (Bensoussan, A. and Bensoussan, J., 2016).

The rights that humans gave to animals are based on pain. But to have rights, it must first be defined as a "person" by law. The concept of "animal rights", which is wrong in terms of fact, actually imposes certain responsibilities on humans. In other words, the main address of the animal right is humans. Orang-utan Sandra is a good example. Sandra was born at a zoo in Germany and spent 25 years in a cage in an Argentina zoo. She could not interact with other orang-utans for many years. However, lawyers won a landmark appeal for Sandra in 2014, saying Sandra was detained in Buenos Aires unlawfully. A court decided that she is a "*non-human person that has some basic human rights*" and ruled that she should be transferred to a reputable sanctuary which meets her needs better (Kretzer, 2019). Also, robots like animals can hurt people and their properties. There are different rules in the world. For instance, in Turkey, the article 67 of Turkish code of obligations (2011) says that

a person who permanently or temporarily assumes the care of an animal is held responsible to remedy to the damages from the animal but provided that he proves that he has acted in due diligence to avert the occurrence of the damages, he is absolved from the liability. But, in the case the animal is frightened by another person or by an animal belonging to other human, the keeper of the animals has the right of recourse against this human. The article 68 of Turkish code of obligations (2011) says that provided that an animal belonging to human causes damages to an immovable of the other person, the holder of the immovable can catch the animal and hold it in his possession until the damaged is compensated. Furthermore, he can even restrain or confine the animal provided that the circumstances prove it right. But, in this situation, the holder of the immovable has the obligation to inform the owner of the animal. In terms of Turkish criminal law, the robot is just like tools cannot commit crime and punishment, such as devices or animals. A robot can hurt a person, but it is not possible to blame robots for this incident. They can be offensive weapons and people who use them can be blamed (Sivrikaya, 2019: 1258, 1261-1262).

Animals have no responsibility, but they have rights. Although generally humans give animals the rights which are designed to protect animals from humans, humans should have rights which will protect them from robots. While animals have rights, robots should have responsibilities (Gunkel, 2018:42-43). Their conditions are totally different. Giving same rights as animals to robots which does not feel pain (at least for now) will be not a very clever move. Animals do not have responsibilities, but their owners have some responsibilities. This is not right to give no responsibility to robots which can make decisions autonomously and can be much more dangerous than animals. Because robots can be much more intelligent than owners (at least some of them), giving the responsibility only to humans who may be more inferior as a brain capacity than robots can be absurd. While people tend to be afraid of robots, humans feel pity for animals. Potential dangers and benefits should be analyzed to regulate creatures.

4.4.3.2.2. Legal Personality as Status – A Tool Model

Some experts say that robots should be considered tools and they should not possess moral and legal status without any right and responsibility. They consider that the responsibility of robots should belong to humans and they should be designed to achieve aims and desires that humans choose. No matter how developed their actions or elegant their

forms, they should stay as tools for humans (Gunkel, 2018: 64). Solum (1992: 1287) thinks that *"an answer to the question whether artificial intelligences should be granted some form of legal personhood cannot be given until our form of life gives the question urgency. But when our daily encounters with artificial intelligence do raise the question of personhood, they may change our perspective about how the question is to be answered"*. Some experts think that technologic advancements are instruments ready for the fulfilment of owners' intentions. Since a technological instrument is considered 'neutral,' without the evaluative feature, the instrument is judged not on its own but on the basis of specific jobs decided by the human designer or owner. Therefore, the technology is considered as just a means to an end (Gunkel, 2018: 90). Lyotard (1984: 44) says that *"Technical devices are originated as prosthetic aids for the human organs or as physiological systems whose function it is to receive data or condition the context. They follow a principle, and it is the principle of optimal performance: maximizing output (the information or modification obtained) and minimizing input (the energy expended in the process). Technology is therefore a game pertaining not to the true, the just, or the beautiful, etc., but to efficiency: a technical 'move' is 'good' when it does better and/or expends less energy than another."* Legal personalities for robots might not be considered as a panacea and maybe Pandora's box can be opened, provided that humans transform robots as our masters. Smith (1928) said that a robot might become a good servant, but might become a bad master (Solaiman, 2017:38). Provided that humans start giving even a basic right for the first time, robots will demand more. They are not like animal or corporations. Humans know animals` capacities and already corporations are not alive. But they can start like slaves in the past and they can take the rights one by one. However, humans should know that they are not our kind and they can be higly lethal for humans. Maybe if humans limit their capacities and this is strictly observed by supreme institutions, they can be safe and more productive for humans.

However, tools may not fit things which are designed purposely to be social companions. Prescott defines the physical or mechanical objects functioning, although the category of companions describes important others, usually people or animals, with whom they may have reciprocal relations with emotional connection. Even man-made objects have different features. A chair is designed to be sat by people, a bed is designed to be slept on it and social robots are created to take actions as humans (Gunkel, 2018: 72). Asaro (2006: 12) thinks that machines may want to have rights in the future. Since morally intelligent machines may have the self-recognition sensation, they can question why they do not have

rights like other moral agents. Hussein Abbass, who a Professor with the School of Engineering and Information Technology, thinks that robots have some rights because humankind has responsibilities to the ecosystem and social system. Intelligent machines are the part of the ecosystem and social system. The right to be defended by legal and ethical systems and the right to be formed to be trustworthy should be granted. It means that they should be technologically fit-for-purpose and cognitively and socially compatible (Sigfusson, 2017).

4.4.3.2.3. Legal Personality as Status – A Human Model

Giving robots same rights as human rights means that AI systems are recognized as humans without the need of any law, code or other changes in the current law. For instance, in 2017, Saudi Arabia gave the robot 'Sophia' the full Saudi citizenship. Although Sophia is an exception, there are some considerations which support robots to have same rights as humans. 'Human rights' are an indispensable set of principles that must be followed when interacting with other people because of the fact that they are human beings. There are some features which create a human. One of them is consciousness**.** This can be called as the awareness of the own existence and the world. The level of the feature makes humans different from animals and human rights can be called as a way of showing that beings that have this level of consciousness should be respected evenly in all humans. For robots, some people believe that self-awareness in robots may take place in the future and at least this feature can be copied from humans. They say that technology grows significantly and in the future, this can be also possible. The importance of consciousness to have rights may not be much. Some animals without wide-ranging rights (such as apes, other mammals) are considered by scientists to become conscious, although people without sophisticated consciousness (such as babies and a very young child) have extensive rights. Secondly**,** free will/autonomy is very important for the humanity and it makes humans unique. Humans can make their own decisions about what they want to do. The existence of particular human rights guarantees this free will. For robots, they are controlled or programmed by their makers and are designed to improve or help some human tasks. However, numerous sophisticated robots can find more efficient and faster methods to accomplish their tasks than their programmed methods. This process is called as machine learning. Even if robots do not currently decide their own destinations, later they can learn to modify the route provided by humans. In International Panel on the Regulation of Autonomous Weapons, the regulation of

autonomous weapons in warfare is a very brave step for robots` free wills and this panel is working on the issue of lethal autonomous weapons systems. It means that humans may see autonomous robots killing people in battlefields without direct human instructions in the near future. Lastly, rationality/morality is vital for humanity. Humans can find what the right action is with their mind power. For robots it is very hard to consider that a robot is aware of right and wrong things. But morality is possible to be programmed. Traditions, experiences and beliefs form humans` decisions and judgments of what is bad or good according to situations. With the deep learning technology, it is possible for robots to learn moral principles and various situations and robots can recognize right from wrong, according to information given. In this case, this kind of moral rationality may not be the special reason not to give robots same rights as humans (Fischel, 2018). Suzanne Gildert, co-founder of Sanctuary AI, thinks that robots are formed to look like humans because humans can easily interact with robots. Humans can feel an emotional bond with robots and they can behave them like humans. Furthermore, robots looking like humans can help take over physical tasks done by human beings. This world is formed for human beings. Because of this, robots which resemble humans can have the same responsibilities as humans and later they can have the same rights (Wong, 2017).

There are some objections against the ideas which support robots to have same rights as humans. They say that they will act and look like humans, but they will not have human consciousness. They may reason and make decisions without human consciousness. There are philosophical considerations that raise this question, but based on current AI, it seems unlikely that artificial consciousness would be achieved anytime soon. There are some considerations which say that consciousness can only take place and exist in the biological matter (Torresen, 2018: 3). Provided that robots become more intelligent than humans in the future, human beings reduce to a lower role or level of importance. For instance, humans could be hired or fired by robots and robots may challenge humans for social dominance. Robots could be employed for law enforcement and they can work as judges, public prosecutors, executioners and etc. The majority of jurisdictions are not created and designed to punish robots and there are not still certain international rules to punish them. In addition, the permission for voting rights to robots which can duplicate humans can make humans` votes useless. No current laws can avert malevolent robots from vanquishing or destroying humans by means of legal ways and politics. Robot-managed businesses could be very rich because robots can calculate the possibilities for the optimum advantage and benefits and

they can be much more successful than humans. These companies can manipulate the society and impose every idea they want. Also, robots do not die, do not forget memories, work limitlessly and their bodies can be much stronger. In these ways, they can earn a huge amount of money and they can use to corrupt governments, media, justice and government agencies in favour of robots (Yampolskiy, 2018). Birgit Schippers thinks that some rights were not given only to humans and corporations and some animals have already some rights. In the future, because robots may have a role in humans` life more than animals and corporations, humans may need to develop some legal and ethical standards to integrate robots into humans` houses, government institutions, workplaces, schools and etc. This means that accountability, liability, agency and the protection of human rights should be taken into account seriously by humans (Sigfusson, 2017).

4.4.3.2.4. Legal Personality as Status – a Company Model as a Legal Entity

The formation of the company may be considered suitable for robots. A company and a robot seem clearly very different beings at first glance. However, with a deep analysis, it is possible to find similarities. For instance, because companies like robots can deal with wide-ranging and complex actions, robots like companies better have a registry system to handle problems which can occur to a certain extent. Therefore, in addition to this, software users may benefit from this well. Incorporating software can be considered as a result of the necessity to manage business activities. Robots like corporations can be both the complainant and the accused and have their own assets like them. The robots may have assets such as the reference code smart software, databases, income for their services and etc. Robots may have a different kind of assets which can be used more than one. Robots' working ethics, rules and actions should be checked and observed by registry authorities and bodies like administrative boards should decide their business-related policies and primary decisions. There should be some departments in charge of their repair and restoration can be useful. Giving this status to robots can be a good solution of problems about e-business applications for matters like the determination of jurisdiction and identification and registry systems may avoid their use for corrupt aims partially (Bayamlıoğlu, 2008:53-54). For instance, a corporation has the legal personality, can sue and can be sued. Robots are considered no less real than corporate persons. Corporations function by means of human beings. They sit on boards whose actions are ascribed to corporations. In corporations, AI

becomes increasingly important and final decisions are taken by humans (Eidenmüller, 2017).

Corporations are in need of human will; they cannot be established, made decisions and implemented without human will. In legal entities, establishment, operation and termination stages are transparent and open to control. However, provided that we accept that they work like a human being and even are smarter, after the establishment, they can make independent decisions and implement them without human intervention. In addition, because the system of these robots is very complex and complicated, the transparency and accountability will be highly hard (Zeytin and Gençay, 2019:47). Limited liability corporations are considered as non-human entities which are given efficiently the legal rights people have. The corporation has properties, signs contracts, and is legally responsible for negligence. In some situations, it can be punished for criminal actions like fraud, environmental damages and etc. The critical feature of treating the corporation as a person relies on the capability to punish the corporation, though the punishment for the corporation is limited and harder compared with humans. For instance, monetary punishments and the situations of splitting apart and dissolving are possible. A corporation is created to earn money for itself or its stockholders. But, corporations cannot be imprisoned. Although the main aim of a corporation is to earn money, the necessary aims of robots might can be various and changeable (Lin, Bekey and Abney, 2008: 61). Although corporations do not have the bodies which can be touched, robots generally will have these bodies, but we are not sure whether traditional punishment methods will work on them. The different types of corporal punishments assume extra components which do not belong to robots such as pain, regret, sadness, mortality, the understanding of freedom and etc. Therefore, imprisonment or annihilation will be not highly possibly effectual in reaching fairness, improvement or deterrence in robots. For instance, the annihilation of robots which hurt people like humans do for animals in certain conditions can be chosen as a preventative measure to keep away from potential damages rather than many punishments designed for humans (Asaro, 2007).

4.4.3.2.5. Legal Personality as Status –A Legal Representative Model

It can be considered that robots which embrace the jobs and duties for their owners have the adequate intelligence to perform some duties partly autonomously and can interact with the environment successfully. Because of these features of the robots, it is thought that

robots can act as a representative of the user. For instance, in the example of a contract, robots can be considered as a tool or a messenger because they act for their owners (Pérennou, 2014). For instance, even a long time ago even slaves had the right for independent legal transactions as a legal representative. In the Roman Empire, slaves could work as legal representatives with independent legal transactions and their testimonies could be accepted by courts. Like slaves, robots should have financial resources to use without human control. For instance, at least robot should have the right and has the capacity to buy some things from bakeries and shops. In the liability situation, the responsibility for robots should be possible if the conduct cannot be tracked back to owners (van den Hoven van Genderen, 2018:46). Today, robots are short of the intellectual capability to exchange promises. However, numerous robots have a promising future with the examples of interfaces of shopping websites with the sign of intelligence and intentionality. In some jurisdictions, contracts between agents and principals are vital, and as a robot is not a person, it does not have the right to involve in a contract in its own name. But, in the Anglo-American law system, contracts between principals and agents are not essential and the important one is that principals are eager for agents to bind them in respect of third parties. In the countries which states that contracts are essential, it can be essential to explore personhood for robots to cope with contracts made by robots, or should change their model to the Anglo-American model. The mental capacity of robots is very important. In Anglo-American law system, agents do not need to obtain contractual capacities of adult legal persons in some situations. For instance, a child with sound mind which can start and continue the contract cannot contract for himself or herself but he/she can contract on behalf of an adult person (Chopra and White, 2004: 637).

However, there are some problems too to solve. Different types of robots can have different intelligence level. These levels should be analysed well and according to these differences in intelligence, robots should be adjusted. Because robots do not have any legal status, they should not take the responsibility for their actions. Due to their ability to make statements, they may be deemed to be entitled to the voluntary or legal representative person as an e-person. However, they alone should not put their owners under duty and debt. Since they do not have the legal status, they cannot be the right holder and they cannot incur a debt for themselves. In bilateral legal transactions, one party is a real person or legal person and the disputes arising can be resolved based on the existing legal gains. Although social order rules are for people without exception, it is possible to think otherwise. The transaction can

be considered valid provided that those who make a mutual will statement are robots. In this case, our current legal acquisitions may not be enough. People-oriented systems will be possible to apply disputes in which robots are used as parties only by adapting these systems. The answer to the question of whether there is any injury, fraud, threat and similar disability in the declaration of will can be probably different than it is today. Prudent party such as prudent merchant or similar concepts and principles might be required. Supporting those who are superior with their abilities within the legal framework, not being blocked and protecting those who are less superior are a social and humanitarian principle and these principles are included in various legal regulations and should find a place in legal disputes. It is possible that the superhuman abilities of the robots protect the interests of himself or his representative and these abilities should not take advantage of the other party's difficult situation or thoughtlessness or inexperience. These uncertain and similar risks should be avoided with protective provisions or existing protective rules (honesty rule, goodwill, etc.) and these protective rules can be interpreted narrowly or broadly according to new situations and it may be appropriate to give them a special legal status. Lastly, robots are not responsible for their actions with the status of the absolute disability. However, this does not seem enough for the future and new rules should determine whether they with the status of the legal representative as e-person can make their owners rights-holders with their own declarations of will, to what extent legal representatives as robots, owners and third parties should responsible with the declaration of will coming from robots (Zeytin and Gençay, 2019: 49-50, 65).

4.4.3.2.6. Legal Personality as Status –A Slavery Model

Slaves can be considered to be humans who can be owned. In recent times, because of the African slave trade, slavery was connected to racism and to endemic cruelty. In addition, long time ago slaves regularly came from the same race or countries which lost the independence. These situations took place generally after wars and sometimes due to scarcity. But hopefully today for good reason people generally refuse this mentality and this way of thinking linked with this kind of dehumanisation. A slave model means that robots should be servants you own. People who support this idea say that robots should be humans' properties and it does not matter how they are improved or sophisticated. Bryson (2010: 65) says that "*they are entirely our responsibility. We determine their goals and behaviour, either directly or indirectly through specifying their intelligence, or even more indirectly by*

specifying how they acquire their own intelligence. But at the end of every indirection lies the fact that there would be no robots on this planet if it weren't for deliberate human decisions to create them."

When robots become as good as human agents, humans can use rules as old as Roman law, in which the owner of enslaved persons is liable for any damage. Attributing some sort of legal personality to robots relieves those who should control them of their responsibilities (Floridi, 2017).

There are some primary rules for a slave robot (Bryson, 2010: 64-65):

"-Having servants is good and useful, provided no one is dehumanised.

-A robot can be a servant without being a person.

-It is right and natural for people to own robots.

-It would be wrong to let people think that their robots are persons."

In ancient Rome slaves had the similar status to robots, since slaves were in the status of things. However, they had a critical role in trade, commerce and now robots are very important for trade and commerce today and in the future, the dependency of economy for robots will increase highly. Automatic machines can be considered same as slave labours regardless of feelings. Although in the ancient Roman law the majority of slaves did not have any right to claim against their own owners, some of them had noteworthy autonomies. The elites of slaves such as the emperor's slaves were civil servants, estate managers and merchants, taking binding contracts and managing and using properties for their owners` business. These slaves managed various classes of bakeries, barbershops, wineries etc. For instance, even Emperor Nero participated in the Olympic games of 66 A.D. and gave Helios the power to declare anyone to be guilty of a criminal offence in Rome. Lawmakers in Rome made various agencies and autonomies for simple activities without the need of legal personality and the purpose was to find the balance between the advantages of owners for the business of slaves and the claims of the slaves for the secure business with other slaves. Like the legal mechanism of peculium[12] in ancient Rome, properties can be given to

[12] Owners may give over a certain amount of property known as **peculium**, to a slave for his management and use.

intelligent machines and they can be directly liable for their own behaviours. To prevent to limit the usage of these machines because of excessive loads on their owners, robots can pay compensation by the means of the peculium-like system (Pagallo, 2013: 102-103).

However, there are some problems for this status. It needs asceticism. This means that humans are emotional creatures and the theoretical point of view about seeing them as properties is challenged by reality. In 2 studies (Rosenthal-von der Pütten et al., 2013; Suzuki et al., 2015), for example, researchers stated that humans empathized with a robot seemed suffering even when humans had the previous experience with mechanic things and knew that it was just a machine. On the other hand, humans created slavery. The problem here is not about what robots can feel about this status. The problem is about humans and the impact of the slavery on humans and their society. Slavery was not just a problem for slaves and it affected the owners and their social institutions badly. Since the term of slavery is provocative and disturbing, it reminds people of some bad memories in the past (Gunkel, 2018: 94).

4.4.3.2.7. Legal Personality as Status –An Electronic Person Model as a Robot Personality

Firstly, the term of electronic person was invented in an article for LIFE magazine in 1967 and in recent times appeared in the Draft Report with Recommendations to the Commission on Civil Law Rules on Robotics of the European Parliament's Committee on Legal Affairs (Rosen et al., 1967). In the history, the legal personality was used in different ways. The origin of the idea of legal personality took place in the 13th century and was attributed to Pope Innocent IV and he permitted monasteries to obtain a legal existence apart from monks (Dewey, 1926; Puşcã, 2020:3). Also, then time passed, some other ideas took place such as sovereign states and different national, international and inter-governmental organizations like the UN and the EU. In states, to a certain extent companies have the autonomy from their own owners and other types of business associations. For instance, Indian courts granted legal personality to Hindu idols, such as in the Pramatha Nath Mullick v. Pradyumna Kumar Mullick case in 1925 in Bombay High Court (1925), thinking that they have the power to obtain some rights and responsibilities like having properties and paying taxes such as in the Yogendra Nath Naskar v. Commissioner Of Income Tax case in 1969 in Supreme Court of India (1969) and, in New Zealand, the Whanganui River took its legal

personality in March 2017 since the Whanganui Māori tribe considered it as their ancestor and thought that it had the same legality as a human being. Provided that a person harms it, the country punishes him/her like he/she harms the tribe (Roy, 2017). Nearly in various countries, there are some laws which give separate legal entities to ships under Maritime Law and give legal status to animals. Although in each jurisdiction humans have a separate legal status to a certain extent, this cannot be considered universal. The Hammurabi's Code which is called as the first legal corpus in history and the legal status of Men varied according to their prosperity in respect of punishments (Zimmerman, 2015). For instance, in the past, slaves` status was not same as others` status such as freedman, merchants, soldiers and etc. In the past, there were different rules for men due to their race such as black people in the United States. Until 1870, black people did not have voting rights. In 1870, Thomas Mundy Peterson became the first African American to vote in the U.S. (Glass, 2016). Today it is possible to find a country which applies different rules on people based on gender. For instance, in Saudi Arabia, in various ways of life, women are dependent on men regardless of her ages, education levels or marital status. They need male guardians like fathers, uncles, husbands, brothers or sons to give permission to many basic needs such as travelling, marrying, educating in schools without permission from the respective male guardians (Coker, 2018). It is obvious that a legal status is changeable from countries to countries and there are no universal qualities of the natural person. This legal status can be the consequence of legislative selections that are rooted in moral considerations and the reflection of social realities. This means that there is no certain standard to force the legal system to recognize or reject an entity as a legal person. The most important point is to determine whether robots can be considered separate legal entities morally and the reflection of these separate legal entities to a social reality and the place of the robots in the legal system should be discussed deeply.

The European Parliament considers creating a registry of robots to ensure the link between a robot and its fund and this link will be made visible by an individual registration number coming into view in a specific union register, which permit anyone interacting with the robot to be informed about the nature of the fund, the limits of its liability in case of damage to property, the names and the functions of the contributors and all other pertinent details (European Parliament, 2017: article 59/e). The European Parliament wishes to make an electronic personhood as a specific legal status for robots in the long run for the most advanced autonomous machines to be applied in the cases where the harm is taken place by

the decision of the autonomous machine. In such cases where the machine interacts with third parties independently, without any instructions and by its autonomy, the electronic personhood of the machine will be accountable for the harm (European Parliament, 2017: article 59/f). Also, the electronic personhood of robots was discussed in the EU before. In the "Suggestions for a Green Paper on Legal Issues in Robotics" by the European Robotics Coordination, the electronic personhood of robots has been analysed. According to the European Robotics Coordination, robots cannot be humans and animals but can develop a certain artificial personality, a certain extent of conduct, and a certain capacity of decision-making. The legal personhood of companies or corporations can be taken as a model and as autonomous robots can develop personalities. The European Robotics Coordination thought that granting them a legal status would be optimal. The personhood status could be created with the registration of the autonomous robot in the registry, just like a commercial register for companies. In case of damage to a third party, the European Robotics Coordination thought that the damaged party can file a claim directly to the autonomous agent with electronic personhood, if a human is not liable for the agent's conduct which caused the harm (Leroux et al., 2012:61-62).

4.4.3.2.8. Legal Status According to Turkish Law

The concept of AI gradually becomes an indispensable part of human life with the advancement of technology. People encounter AI systems in daily life such as in abs systems of automobiles, search engines, smart phones, smart homes and etc. In recent times, the popularity of robots which is used in the public services and private sector has increased more and more. Anymore it does not seem possible to find solutions to the problems encountered by ignoring the entities that have some human abilities and are more autonomous. Because of the existing technology, it becomes highly questionable day by day whether robots should be given legal personality or not in the world. In the Robolaw Project, which started in 2012 and finished in 2014 regarding the legal status of robots in Europe, they first grouped robots under three headings in order to talk about the legal responsibility of robots. They divided robots into autonomous robots, non-autonomous robots and smart robots (Palmerini and Salvini, 2014). Autonomous robots refer to robots that can make decisions on their own, that is, without any external intervention, and implement these decisions in the outside world on their own. Non-autonomous robots cannot perform without any intervention and their actions and decisions can be controlled and shaped by humans.

Intelligent robots are considered as machines which can perform by adjust themselves to their environment and/or interacting with external sources and shaping their behaviours according to this perception and interaction. Based on these categories, AI has to obtain a legal personality in different levels. Firstly, it is impossible to consider that non-autonomous robots obtain responsibilities. Because non-autonomous robots cannot make any decision on their own, these robots cannot obtain liability according to liability law. There are no legal regulations on robots with AI in Turkish Law today, it can be possible to discuss whether existing regulations and codes can be applied to robots or not. Before regulations and codes in Turkish Law, the problem of the legal personality for AI in Turkish law should be solved. Firstly, lawmakers should understand the ability of robots and the range of actions and operations to give them personal rights and identify them as legal subjects. To decide whether robots are recognized as legal subjects in Turkish Law, Turkish lawmakers should inspect the matter according to capabilities for rights and functions. Article 8 of the Turkish Civil Code (2001) states that *"Every person is entitled to a vested right. Accordingly, all the persons are equal in using rights and fulfilling obligations within the legal limits."* Article 9 (2001) states that "*the person having capacity to act may possess any right by his/her own will and may undertake any obligation thereof." And* Article 10 (2001) states that "*every mature person possessing distinguishing power and not in the state of disability is deemed to possess full legal capacity*." The capacity to act can be defined as a person gaining rights by his own actions and behaviours, changing these rights, abolishing these rights, incurring a debt, changing and eliminating debts, in other words, gaining rights by his own actions and incurring a debt. The concept of person in law refers to entities that can have rights and obligations. According to Article 48 of the Turkish Civil Code (2001), being a human is not an obligation to have a legal personality such as a legal person. The law recognizes 2 types of legal personality, which are a real person (a human) and a legal person (people's communities and commodities created to accomplish a certain intention with conditions needed by the law). Due to the fact that both real and legal persons have rights and responsibilities, they have many basic rights such as filing a lawsuit for others, lawsuits against them, and property rights. In case of robots, they are not seen as persons in the existing law and Turkey do not have any regulation about the legal status of AI robots.

AI is considered to have some cognitive features. Moreover, today, the types of AI have the potential to learn much faster than a human, adapt to the environment in an unpredictable way, and thus cause damages that even their own creators cannot foresee. For

example, Tay the AI chatbot was created by the Microsoft Cooperation, and soon after it was created by Microsoft, it started chatting with people from all over the world over its Twitter account and learned to be racist and sexist as a result of these conversations. Microsoft had to delete Tay because Tay was getting out of control (Hunt, 2016). This situation that happened to Tay is not exactly a situation of getting out of control. Like a child, Tay learned whatever was given to it and returned what it learned in return. But the only difference is that Tay has done this much faster and far more thoroughly than a human could ever do. AI can analyse millions of samples within minutes and even seconds. The main point is that the creators of Tay did not foresee and could not predict this while designing this chatbot. People can raise their children and you can instil some values in them. However, after they become adults, it is unthinkable for people to anticipate all the actions of their own children and they cannot be responsible for them just because they gave birth to them (Bak, 2018: 217-218). AI has completely different types having different features. This means that even the legal status is given to robots in the future; it cannot be the same for every robot. In this respect, the table 22 can be considered as reference points:

Table 24: The Possible Rights of the Different AI Legal Status in Law

	A Separate Personality	**Proprietary Right**	**Fundamental Rights**	**Responsibility**
Reactive Machines	NO	NO	NO	NO
Limited memory machines	YES	NO	NO	YES (If liability insurance is made on behalf of AI to compensate for damages caused by AI.)
Theory of mind	YES	NO	NO	YES (If liability insurance is made on behalf of AI to compensate for damages caused by AI.)
Self-awareness	YES	YES	YES	YES (as a taxpayer)

Source: (Bak, 2018: 228)

While the first 2 types of AI (reactive machines and limited memory machines) are found in abundance, the last 2 types of AI (theory of mind and self-awareness) exist either as a concept or a work in progress. This means that researchers have yet to develop the last 2 types. Decisions made by reactive robots are a mere reflex of the input, provided by their own designers or owners and have low to zero complexity. Because of this, this type of AI does not deserve any status except for a tool model. However, limited memory machines are different and they can learn some information from observing previous events or data. Samsun Bar Association Artificial Intelligence and Law Working Group has been working on the draft law named 'Civil Code 2.0' in order to make a new distinction titled 'humanoids' besides 'real' and 'legal' persons in the Turkish Civil Code and that this draft is aimed to be presented to the legislature in 2023 (Kılıçarslan, 2019 :38). Since artificial intelligence has not been given such a status in Turkish positive law, it does not seem possible for now to mention that an artificial intelligence is personally responsible for its autonomous behaviors (Erdoğan, 2021:174). Similarly, Turkey does not need to give any special status for AI for now. However, for the future, Turkey should keep an eye on the development of AI in the world. The European Parliament's Committee on Legal Affairs proposed “electronic personality” in the Report with Recommendations to The Commission on Civil Law Rules on Robotics in 2017. It has been stated that autonomous robots can be given the legal status of electronic personality, and since there are no autonomous robots at this level yet, robots cannot be given the legal personality in the current situation (Yılmaz, 2020:33). In addition, the level of unpredictability of robots is vital for a new status of robots. However, especially in public services, in some situations workers’ responsibility may be valid for limited memory machines. For instance, if a human judge makes a mistake or make a wrong decision, the government is responsible and should pay compensation and later if a judge is really mistaken, the government take the money from the human judge. The same situation can be used for robots in courts. However, robot judges have to obtain insurance and licence provided by the regulatory institution.

4.4.3.3. Legal Liability of AI Robots in the World

In numerous fields of daily life, the AI systems have been already employed and in the future the use of these systems will be more popular and sophisticated. Even today humans use these AI systems in the areas of medicine, in the military and in industry; in the care of patients such as the old people and children, as well as carrying out daily work tasks in

houses. The advantages of these systems are to reduce workforce costs and time. However, after a while, today`s legal issues about AI systems will be unbearable in the near future unless humans create laws and regulations about AI. From today on, humans should focus on the possible impacts of AI in the legal world. Today there are serious problems such as the responsibility regarding the AI's actions, protection of privacy and safety, intellectual property rights and ethics. Although Turkish lawmakers has not made any specific regulations or codes for AI in Turkish Law yet, there have been some regulations which may be used for AI in the existing Turkish law such as some instructions (according to the Law on the Organization and Duties of the General Directorate of Civil Aviation-18/11/2005 and the Turkish Civil Aviation Law No. 2920- 14.10.1983) for unmanned aerial vehicles. The range contains unmanned aerial vehicles that will fly within the Turkish Airspace, including operators of the vehicles, staff hired and air traffic. Some records and documents should be kept for these vehicles. Unmanned aerial vehicles are controlled in some ways by pilots. Therefore, the unmanned aerial vehicles cannot be seen as autonomous from its owners or users. When violations of safety and privacy coming from unmanned aerial vehicles take place, the unmanned aerial vehicle operators are in charge of these violations or privacy breaches as real or legal persons (Directorate General of Civil Aviation of Turkey, 2017: Clause 6/2).

Autonomous objects will be one of the most important tools of our near future, and the most important result of the reflection of this new technology in daily life will be autonomous vehicles. This technology will attract numerous attention as it will minimize the deaths and injuries caused by traffic accidents and ensure that people are not separated from the social and business areas even while in traffic. It will also minimize traffic disruption due to drivers who do not obey the rules in traffic. In particular, with the increasing interest in autonomous vehicles and the increase of these vehicles, countries will face the legal regulation problem. Even today, existing laws and regulations are not enough to solve problems that can be caused by fully autonomous objects because these laws and regulations are regulated for people who have a legal status and have legal and criminal responsibilities. In order to give autonomous vehicles a human-like status, first of all, legal regulations must be made in the fields of the personal rights, legal liability and criminal liability, cyber security and the protection of the personal data. The European Union has not yet made a legal regulation on self-driving vehicles. But it has come a long way with the adoption of a limited permit system on existing regulations and automatic passenger transportation

systems. The Geneva and Vienna Conventions remain valid until a special regulation is made throughout the EU. According to these regulations, the freedom of use of autonomous vehicles is not yet available. However, in the draft law "European Civil Law Rules in Robotics" adopted by the European Parliament, very important principles about the enactment of autonomous robots, especially the damages that may arise from the personality and autonomous behaviours of robots and their legal responsibilities have been accepted. But, this draft law has not yet been legalized (Bolca, 2018: 207). However, the EU member such as UK, Germany, France, the Netherlands and Sweden have made legal regulations regarding the tests of autonomous vehicles in addition to these countries like Switzerland, Japan and Singapore. Especially Holland is very successful and innovative in autonomous vehicles. The Dutch Council of Ministers allowed road testing of autonomous vehicles in 2015. The regulation, which entered into force in July 2015, paved the way for autonomous vehicle test drives, but obliged a person to intervene in the vehicle when necessary. The Netherlands then regulated more than 1000 traffic lights, making the city infrastructure compatible with autonomous vehicles, costing ninety million Euros. The Dutch government approved the bill on February 24, 2017, which lifted legal restrictions and allowed manufacturers to test autonomous vehicles without the driver (Zeldin, 2017). Sweden has taken very important steps regarding autonomous vehicles. In 2015, the Swedish government examined autonomous vehicle tests and concluded that any automation test on Swedish roads is possible. Finally, the Swedish Road Transport Authority allowed test-drive trials as of July 2017, provided that they comply with the legislation. Singapore, on the other hand, is the most progressive in autonomous vehicles and is the first Asian country to adopt the use of autonomous vehicles. In July 2015, Singapore Road Transport Authority prepared 6 km test roads for the development of autonomous vehicles and 12 km in the following year and approved the vehicles to make test drives in this area. In 2017, the Government of Singapore enacted a law allowing autonomous vehicles to use public roads without a human driver (Colak, 2019).

The Strategic Council for AI Technology, the government of Japan, which is in the second place in determining the national AI strategy, was established to develop research and development goals and a roadmap for the industrialization of AI. The assigned council published the Artificial Intelligence Technology Strategy in 2017. According to the International Robotics Federation, Japan is the world's largest manufacturer of industrial robots. It has also adopted the Principles of Japan Robot Law. One of these principles cannot

help a robot's criminal activities and help and abet criminals to escape. Robots should not leave the country without permission (Isong, 2019: 41). In 2017, in a world first, the Japan government gave a residence permit for Shibuya Mirai the AI chatbot designed to talk and act like a 7-year-old boy (Cuthbertson, 2017).

On January 20, 2015, the European Parliament's Legal Affairs Committee created a working group on legal matters associated with improvements of robotics and AI, with the principal purpose of making pertinent legal standards and regulations. According to this report, thirty-eight wide-ranging standards concerning the improvement of robots and AI were discussed. For instance, provided that robots become totally autonomous along with self-aware ability, Asimov's Laws[13] have to be used for the designers, producers and operators of robots. The European Parliament's Legal Affairs Committee considers that the dangers arising from the new interactions among humans and AI systems should be coped with immediately, guaranteeing that a group of main primary principles get involved in each period of contact between AI systems and humans. In this process, particular importance should be given to human safety, privacy, integrity, dignity and autonomy. In the report, they consider that AI makers should take care of dignity, liberty and fairness rather than the improvement of the AI technology and should identify reliable values for the robot creation, should increase the characteristics of AI systems to guarantee that private information is in safe hands and appropriate. Moreover, AI makers should take optimistic views and considerations from ethics committees before AI systems are tested in real environments or before humans are incorporated into AI machines' improvement procedures, create AI systems in harmony with legal standards and users should obtain rights to utilize AI systems consistent with the intention of existence and in risk-free environments (Delvaux, 2016). Besides, SPARC is called as the contractual Public-Private Partnership on robotics between the European Commission and the European Robotics Association. The objective of SPARC is to join together academic and industrial members and to form partnerships between innovation providers. "SPARC" has the power to identify and perform some studies in fields where AI machines can be utilized for human life such as health, military and etc. This

[13] American science fiction writer Isaac Asimov made The Three Laws of Robotic in the 1942 short story, Runaround, which says (Asimov,1943):

"(1) A robot may not injure a human being or, through inaction, allow a human being to come to harm.
(2) A robot must obey the orders given it by human beings except where such orders would conflict with the First Law.
(3) A robot must protect its own existence as long as such protection does not conflict with the First or Second Laws.
(0) (later added) A robot may not harm humanity, or, by inaction, allow humanity to come to harm."

requires the approval of a broad scope of various sorts of stakeholder within the association, representing the span of AI machines` applications and the intensity of value chains and networks. SPARC can engage with stakeholders outside of the association membership which are technical specialists such as surgeons, advocates, regulators and some humans in the civil society at large. The objectives of SPARC can be divided into 7 categories (SPARC, 2017: 4-5; Siciliano, 2012: 90):

- Make stronger the European robotics supply industry across all markets.
- Support Europe's industrial competitiveness by means of the innovative robotic technology.
- Put robotic productions and services into a special position as key enablers for solving social issues in Europe.
- Make stronger networks in the European robotics society.
- Advance European robotic products.
- Find new consumers and areas where commercial dealings are conducted.
- Help the policy improvements and deal with ethical, societal and legal issues effectively.

RoboLaw also focussed on the field of robotics and legal rules and it aimed to comprehend ethical and legal effects of robotics and AI technologies to check the availability of today`s legal structures. In particular, the RoboLaw project was created to explore ways that emerging technologies in the field of bio-robotics gain a foothold on national and European legal systems, challenge traditional legal categories and qualifications, and endanger fundamental rights and freedoms (Palmerini and Salvini, 2014). The main goal of the project is to provide legal and ethical advice to the European Commission for regulating AI technologies. Robots can be positioned in 5 categories selected from the most repetitive aspects found in the robot definitions (Palmerini et al., 2016: 79):

- Nature means materials in which robots manifest themselves.
- Autonomy means the intensity of independency from external human intervention.
- Task means applications/services given by robots;
- Operative environment means the context of usage;

- Robot-human interaction means relations with humans.

In the United States, the Defence Advanced Research Projects (DARPA) agency has a project on Mobile Autonomous Robot Systems. The systems engaged into an important level of integration with various institutions by means of joint demonstrations and regular coordination workshops. In Japan, similar coordination works occurred in the Ministry of International Trade and Industry as a part of the “humanoid” project (Manolov, 2008). The ministry began to prepare a robotics programme, thinking which technologies the public requires and focusing on improvements of rising technologies (Tanie, 1998:439). There is considerable cohesion in the relevant research communities that has led to various new research initiatives in robotics, such as the "search and rescue" efforts in the United States and various robot entertainment initiatives in Japan. Especially, the European Union’s European Robotics Research Network is noteworthy and focuses on making an appropriate course for robotics. It tries to guarantee that sufficient sources and systems are presented to help Europe become the most important field in robotics. The means to accomplish this aim are fivefold (Manolov, 2008):

1. Research Coordination: The coordination should be in terms of the creation and the improvement of a course for initiatives and with systems which make inter-project`s cooperation easy.
2. Joint Programme of Research: It engages into the sponsorship of potential research programmes, current researches and research workshops.
3. Education and Training: The aim is to get access to the intellectual capital essential for the implementation of the project.
4. Industrial Links: It is about building links with industry, maintaining close ties with existing industries, and more importantly exploring links with new industrial areas where robotic technology can play a significant role in the future.
5. Dissemination: Dissemination means a general press and media service to scientifically report the results of the initiative and to inform the public about the results to a large extent.

4.4.3.4. Legal Liabilities of AI Robots in Turkish Law

4.4.3.4.1. From the Point of Obligations Law

In the Turkish law, the provisions that can be compared in determining the legal status of robots with AI are firstly the provisions regarding flawless liability. If a comparison is made regarding flawless liability situations, the person to be held responsible will be the owner or operator of the AI robot. These people could be held responsible for the actions of the robots in their possession, even if they were not faultless. Under the range of the Law of Obligations, the situation of liability without fault with regard to businesses and people utilizing AI machines can be analysed. This analysis can be valid for semi-autonomous and intelligent AI machines. The totally autonomous robots can take a long time for the creation and integration into law systems. The Law of Obligations (2011) mentions equity responsibility in Article 65 and this article talks about the responsibility of people which do not possess the power to discern. In cases required by equity, the existence of appropriate causal link, damage and illegality elements are sufficient and it is possible to hold a person who does not have the power to discriminate responsible for the damage he has caused even if the person is not at fault. In the case of AI machines, the damage in terms of compensation law will arise as a result of operators or owners of the robots. The care liability is important, is separated into 3 categories and they are the liability of the employer, the liability of the owner of the animal and the liability of the building owner. Article 66 of the Turkish Code of Obligations (2011) states that the employee is obliged to repair damages to others during the execution of the work conferred to him/her. It seems fair for operators to compensate for the damages that semi-autonomous robots have done while doing the programmed works in their operations. However, according to the same article, the employee is responsible in the situation of due diligence. For the robots, this is not possible. But, provided that there is a defect in the software of the robot, the designer of the robot can be responsible. Article 67 mentions the responsibility of the animal owner. The article states that the individuals that watch over animals are obliged to remove the harm coming from animals and can save themselves from the responsibility provided that they demonstrate that they watch over animals with due diligence. If the robots can be employed in houses, this article can be used for robots. Provided that these robots cause harm coming from their actions, their owners must accept the responsibility. The liability of the danger is placed in article 71 and this article states that the proprietor and the manager (if it exists) should be together legally

responsible for the harm coming from the actions of the enterprise that exposes a serious amount of danger. Companies utilizing AI or robots in their enterprises or carry out works on AI or robots can be legally responsible since the companies cannot predict what AI can bring about. Article 369 is about the legal responsibility of heads of families and in the future, it is possible to see robots as family members. The heads of the households are charge of the harm coming from households, minors, individuals that have mental illness or are the mentally ill, provided the heads of the households does not prove that they cannot avoid the harm before taking place. Provided that this article is used for robots in the status of people under incapacity (mental illness), the heads of households cannot avoid the liability completely but it can be the reason for a decrease in compensation (İnce, Şimşek and Kaynarca, 2019:39-42).

Accordingly, in the legislation; the responsibility of the employer, the responsibility of the legal person bodies, the responsibility of the owner of the animal, the responsibility of the head of the house, the responsibility of the owner of the vehicle and the responsibility of persons under incapacity were examined according to AI. In cases of non-contractual liability arising from the acts of robots, solution suggestions can be brought by taking into account the provisions of fault liability and flawless liability. Since robots are not legally "people", neither their flaws nor their flawless liability can be mentioned. From the concept of "legal responsibility arising from the actions of robots", the legal responsibilities of the real persons behind the robots due to their behaviours or negligence such as in the production, in the control of the robot, in the updates of their programs, and in the use of them in places suitable for production purposes should be understood. If there are conditions in the concrete incident, the liability of landowner (equipped with artificial intelligence) can be possible according to the article 69 of the Turkish Code of Obligations, the employer can be responsible according to the 66/3[14] and 71[15] articles of the Turkish Code of Obligations

[14] "*An employer has to compensate the damage caused within the sphere of the activities of an enterprise, unless he proves that the organisation of such enterprise was appropriate to avoid the occurrence of a damage of this type."* (Büyüksağiş,2012:94-95).

[15] *"Where damage results from the activity of an enterprise presenting a significant risk, the owner of such enterprise and, if there is one, the exploiter are severally liable for such damage.*

Having taken into account the nature of the activity or material, means or powers used in it, if one infers that an enterprise is likely to cause frequent or serious damage even when all due care expected from a specialist in such activities is exercised, such enterprise is deemed to present a significant risk. Particularly if, for enterprises presenting similar risks, specifically subjected risk liability is set forth by any other law, such enterprise is also considered as an enterprise presenting a significant risk.

Special provisions governing liability for a specific characteristic risk are reserved.

or if in an autonomous vehicle the operator of the vehicle can be responsible according to faultless liability in the 85/1[16] article of the Turkish Highway Traffic Law no. 2918 (1983).

If there is a contractual relationship between the parties, it may be considered to compensate the damage incurred in the context of contractual liability. However, the application of AI will mostly affect third parties who are not a party to any legal process. It can be a more appropriate solution to evaluate the liability of AI in the context of non-contractual liability, not in the context of a contract. The responsibility of the manufacturer can be the best regulation that can be applied to the damages caused by AI. AI is considered as a commodity in the context of the Turkish Costumer Protection Law (2013) no.6502 article 3/1-h[17]. This commodity must be securely placed on the market. In particular, the responsibility of the manufacturer may be taken if damages arise due to design and fabrication errors in the product. However, since there is no comprehensive legal provision regulating the responsibility of the producer in Turkish Law, it may not be possible to apply to the institution of manufacturer's responsibility in the modern sense for compensation of damages caused by AI. However, although the responsibility of the manufacturer is not regulated in a modern and comprehensive manner in Article 11 of the Costumer Protection Law, provisions that may cause the responsibility of the producer are regulated. The responsibility of the AI producer and seller can be applied. According to the article 11/6[18] of the Costumer Protection Law, consumers can demand compensation in accordance with the provisions of the Turkish Code of Obligations no. 6098 along with the right of choice in compensation of the damage they have suffered due to the defective goods. In addition, the consumer can demand compensation in accordance with Turkish Code of Obligations without using the right of choice. According to the 11/6 of the Costumer Protection Law, based on the legal transaction between the costumer and the seller, the consumer may able to demand the compensation of the damage incurred from the seller. The costumer can

Even if such activity of an enterprise presenting a significant risk is allowed by the legal order, injured persons can claim adequate compensation of the damage caused by the activity of such enterprise." (Büyüksağiş,2012:96).

[16]" *If the operation of a motor vehicle causes the death or injury of a person or damage to something under the title or business name of an enterprise or with a ticket issued by that enterprise, the operator of the motor vehicle and the owner of the enterprise to which it is affiliated shall be jointly and severally liable for the damage."*

[17] *"Goods: Movable goods, immovable goods for dwelling or for vacation, and all kinds of intangible goods such as software, sound audio, display image, etc. prepared for use with electronic media that are the subject matter of purchase or sale"*

[18] *"All expenses arising from the exercise of rights of choice shall be borne by the party realizing the right the consumer chose. The consumer may also demand compensation with one of these rights of choice, in line with the Turkish Code of Obligations numbered 6098 and dated 11/1/2011".*

demand the compensation of the damage incurred from the producer in accordance with the tort provisions in the Turkish Code of Obligations. However, if AI contains an element of danger in the context of the Turkish Code of Obligations article 71, consumers can claim compensation for damages they have suffered based on danger liability. If AI is not evaluated within the context of the Turkish Code of Obligations article 71, the Turkish Code of Obligations article 49[19] and et al. may be applied. AI may not only harm consumers. In cases where there is an element of danger in people other than the consumer, it can be based on the Turkish Code of Obligations article 71. In cases that do not have an element of danger, it may apply to those responsible for the compensation of the damages they have suffered under Article 49 of the Turkish Code of Obligations. There may be responsible persons such as user, manufacturer, distributor, and seller (Sarı, 2019: 306-307).

4.4.3.4.2. From the Point of Criminal Law

The Turkish Penal Code (2004) refuses to make comparisons in the provisions of the law containing crime and punishment and does not give the judge the opportunity to create law. For this reason, it does not seem possible for Turkish people to attribute faults to AI and it is not possible to expand the law by means of interpretation. This judgment can explain important issues in terms of explaining who can be held responsible for the consequences of death, injury, etc. and how the deteriorated society can be repaired at the legal level. According to the principle of individual criminal responsibility in Article 20[20] of the Turkish Penal Code, it is not possible to hold someone else responsible for the intentional behaviour of the robots. But robots can be directed by operators, seller, users or manufacturers or robots can be dangerous to other people or cause damages due to these people`s faults (Aydemir, 2018: 81-82). The article 177 of the Turkish Penal Code states that *"Any person who removes, alters or fails to place a sign or barricade which are necessary to prevent the dangers derived from works conducted in a public place, or from items left in association with such work, shall be sentenced to a penalty of imprisonment for a term of two to six months, or a judicial fine."* According to this article, operators, seller, users or manufacturers may be punished. Humans make robots to commit a crime under the penal code as a human tool. According to this option, the robot programmer is charge of utilizing a robot with AI

[19] "*Any person who, by his faulty and unlawful behaviour, causes damage to another is obliged to provide compensation. Even if there is no law prohibiting the damaging behaviour, a person who wilfully causes damage to another in an immoral manner is likewise obliged to provide compensation."* (Büyüksağiş,2012:90).
[20] *"Criminal responsibility is personal. No one shall be deemed culpable for the conduct of another."*

as a tool. The programmer can cause the robot to commit a crime due to a mistake in the software. However, to blame the programmer owing to this situation, the programmer has to have a defective behaviour. First of all, the probability of the robot attacking wrong targets may be an acknowledged limitation of the system. Provided manufacturers warn users who purchase or use this robot about this probability, they are considered to no longer be responsible for this incident. Secondly, the possibility of making decisions rather than decisions forecast and stimulated by the robot's programmers is embedded in a claim that robots are autonomous. The robots can make decisions more different or sophisticated than programmed decisions, provided that they have sufficient autonomies to learn from their own experiences and environments. This is not possible that lawmakers give the programmers/ designers responsibility for results that they cannot manage and foresee (Sparrow, 2007:69-70).

When robots are utilized as tools, users should be liable and their liability will particularly take place in the situation in which robots are used as weapons. Article 6 of the Turkish Penal Code (2004) describes weapons as "*a firearm, an explosive, all instruments produced for the purpose of defence or attack which are capable of cutting, piercing or injuring, any instrument, not having been specifically manufactured for the purpose of attack or defence, which may be used for such purpose, a nuclear, radioactive, chemical or biological substance which has burning, corrosive, harmful, suffocating or toxic properties or is capable of causing permanent illness.*" In addition, it is possible to think that semi-autonomous robots and non-autonomous robots can be considered as weapons according to article 6. The liability can come from someone else's actions. Article 37/2 (2004) states that "*any person who uses another as an instrument for the commission of an offence shall remain culpable as an offender. The penalty of a person who uses another as an instrument who lacks the capacity of acting with fault shall be increased by one-third to one-half*." In this example, robots are like people utilized as tools and robots are considered to have more autonomous than the previous one. The semi-autonomous robots can be utilized as more than tools. Perpetrators can be programmers or users.

Until AI begins to make its own decisions and reaches a certain complexity and unpredictable spontaneity, randomness, people, code writers can be in charge of the negligent responsibilities of AI's crimes. However, the organization and complexity in the construction of AI robots will make it difficult to find out who does not comply with the

duty of care and attention (Taşdemir et al., 2020:821). Negligence is acts stated as crimes where people ignore obvious risks or disregard the life and safety of people. In the future, robot judges may be more popular and sophisticated. Without human intervention, the demand of cases, document reviews, possible solutions and etc. can be detected by them. For instance, provided that AI machines prevent authorized people from deactivating them and these machines make wrong decisions which can cause a loss of right or every kind of damage unreturnable totally while attempting to deactivate AI, the responsibility should belong to authorized people, governments or programmers. But, the type of the legal responsibility alters since authorized people, governments and programmers take action without the intention of breaking the penal law. However, we can say that they did not show due diligence. It is necessary to address the situation that AI may not be created to commit crimes in the first place, but the algorithm that has ML by processing big data commits some crimes after a certain period of time. For example, Tay the AI chatbot which were mentioned before committed hate crimes. In this case, the programmer or the user may be responsible for negligence. If the crime committed is a crime that can be committed by negligence and if the obligation of attention and care is exceeded in the creation of AI, the programmer or the user can be responsible for the negligent crime (Değirmenci, 2020).

4.4.3.5. The Types of Robots Used in Courts

AI researches aim to create robots which can imitate human-like functions. Due to his, the level to which robots imitate human abilities can be utilized as the standard for the determination of the types of robots. Subjects of versatility and performance can help classify the types of AI robots. The better robots can carry out these functions the more sophisticated robots can be. The system that classifies artificial intelligence robots according to their similarity to the human mind and their ability to "think" and "feel" like humans is divided into 4 types. They are reactive machines, limited memory machines, machines with a theory of mind and self-aware AI (Joshi, 2019). While machines with a theory of mind (Premack and Woodruff, 1978) and self-aware machines can have the autonomy capacity, reactive robots cannot make autonomous decisions and there are some doubts about machines with limited memory which can utilize previous experiences to determine future decisions. These machines have been used in autonomous vehicles such as noticing the movement of cars around you, taking and using the static data for lane marks and traffic

lights and helping prevent autonomous vehicles from getting hit by a nearby vehicle (Bragin,2017; Kumar GN,2018).

The capacities of taking autonomous actions and having subjective experiences are enough to be considered as separate legal entities such as humans and animals. Although machines with a theory of mind[21] and self-aware machines can have the autonomy capacity, reactive robots[22] are not autonomous and there are some doubts about machines with limited memory. In the case of the possession of subjective experience capacity, this topic is intensely associated with self-awareness. Humans, animals or certain robots can obtain subjective experiences to make representations about themselves which influence how they feel or recognize reality. Just sentient robots can do that. It means that self-aware robots can be morally allowed to have their own legal status. However, with regard to limited memory robots and robots with a theory of mind, although they can take autonomous actions, they do not have the sentience and it keeps these robots away from obtaining subjective experiences. For the robots which do not have these capacities such as reactive machines, there are some options possible to give these robots their own legal status with some considerations rather than morality. One of these considerations can be the need for law to reflect social reality. This means that in the future, robots may be used in transactions and robots which can be installed with codes and regulations can do commercial and non-commercial and also judge them in the eye of the law. At the same time, they can be judges for their and users` transactions. Provided that the society starts to see robots as autonomous entities and counterparties for transactions like legal entities of corporations different from their members, the society can force legal rules to present the new legal actions for the changed social reality. To a certain degree, limited memory robots, robots with a theory of mind and self-aware robots can make autonomous decisions and they can be used in the certain levels of the process of making judgments in courts. However, decisions made by reactive robots are a mere reflex of the input, provided by their own designers or owners and have low to zero complexity and agent-made observations cannot be inserted into the decision-making process of reactive robots (Alexandre, 2017:14-21).

[21] Theory of mind refers to the ability to understand the mental states of others, along with their desires, beliefs, perceptions, and emotions (Rabinowitz et al., 2018).

[22] Reactive machines cannot keep or accumulate memories for the future use or utilize previous experiences to determine future actions. These machines basically recognise the world and give answers to it. For instance, IBM Deep Blue computer, which defeated chess grandmaster Kasporov, is considered as a reactive machine which recognises actions on chess boards and reacts to them.

4.4.3.6. The Proposed Turkish AI Development Act

In order to regulate AI, humans should make a statute which creates general rules. For instance, in Turkey, the Turkish AI Development Act can be useful for AI and it should focus on a statement of intention first. The intention of the Turkish AI Development Act can be to ensure that AI is out of harm's way and is under human`s control and is compatible with human interests, by discouraging the formation of robots which are short of these characteristics and by giving confidence to the creation and the improvement of the helpful AI which consist of certain characteristics. Rules concerning the definition of AI should be approved by the legislature, since they efficiently identify the range of the jurisdiction. The Turkish AI Development Act should give the permission to set up certification programs for the commercial sales of AI systems and check their safety. Instead of the prohibition of uncertified AI systems, the Turkish AI Development Act can function by utilizing the tort liability mechanism for giving confidence to designers and producers to accept and join the certification process and to guarantee the security and safety measures of the AI systems. Systems which succeed in finishing the certification process can have the benefit of the restricted tort liability which offers a partial regulatory compliance protection instead of making tort liability impossible. To bring a case against the certified AI, the actual negligence should take place in the design, production or function. Businesses that create, sell, improve or use AI systems without having the certification should be firmly liable for damages coming from these systems. The act should set up general rules for precertification research and examinations of AI systems. The rules can allow AI makers to collect information and test their programs in protected situations for more appropriate certifications. The Turkish AI Development Act must provide an agency with the power to make a mechanism unconnected from certification processes to assess AI systems which might have risks to people. Since the systems are considered as very technical, legislators are not greatly prepared to decide which kinds of AI present risks to people. The act must hand over the job of making AI strategies to an agency including AI professionals with pertinent academic and industry experiences.

4.4.3.7. The Proposed Turkish AI Agency

The act may create an agency which is in charge of labelling AI programs as safe and involving into AI researches and developments. The agency should obtain 2 components

which are policymaking and certification. Policymaking should have the capability to describe and identify artificial intelligence systems, make exemptions permitting for artificial intelligence researches to be performed without firm liability and set up artificial intelligence certification processes. Certification can help AI designers carry out safety tests, give the proficiency for designers and give confidence to users. The staff for policymaking and certification sections must be professionals with education grades and experiences related to AI. One of the most essential policy decisions which the agency can face is how to define AI. However, AI is considered as a remarkably hard term to define. The definition of AI is not very important but it must be needed to reassess the definition at regular intervals and alter the definition when the need arises to reflect modifications in the industry. The precertification and certification tests can be a necessary part of an application for the certification and should be completed in closed environments. The agency should obtain the power for fast-track alterations due to the testing requirements. To guide certification applicants, the agency should be in charge of issuing the substantive rules under which applications for certificates are checked such as the danger of causing physical damages, aim arrangement, and instruments guaranteeing human control. Businesses desiring certificates must release all the information concerning products such as complete source codes, descriptions of hardware/software environments where AI is tested, the function of AI in testing environments and etc. Later, the agency should perform its own tests to measure the security for humans and organizations against AI. Taking into account the variety of AI systems, the agency should adjust the range of certifications according to the types of applications. Some AI systems can be used only in particular situations or combined with other mechanisms. For instance, the level and the type of safety cannot be the same for both autonomous cars and judgment machines. The Agency should also put into effect rules managing licenses and including obligations for AI systems. Rules should identify that designers or producers can lose its shelter coming from the certificate if they sell products to distributors or retailers without licensing agreements which prevent sellers from altering AI systems. Rules should guarantee that AI products which eventually reach users are same products to which agencies gave certifications (Scherer, 2016:395-397).

4.4.3.8. The Courts' Functions in the Certified AI and Liability

Courts' responsibility under the proposed Turkish AI Development Act structure are to judge tort claims coming from damages caused by AI systems. Consistent with the Turkish

AI Development Act's liability structure, courts can use the rules managing negligence claims for cases with certified AI systems and rules of firm liability for cases with uncertified AI systems. For numerous defendant cases and actions for compensation and contribution, the distribution of liability should be decided like in ordinary tort cases. In spite of certification processes and license obligations, parties bring a case to courts about if the version of the AI system is still same as the version certified by the agency or alterations took place breaking the certificate. These problems can be solved with pre-trial hearings and before hearings start, liability problems and the problem of condition of certificates can be handled.

4.5. The Proposed Ways of Implementation of the Administrative Law Robot Judge

The creation of an administrative robot judge is not easy because the information technology and AI are changing constantly and transforming themselves. Today, the vast majority of AI types are operated with the detailed coding and extremely powerful processing power. Thus, most of today's artificial intelligence types can perform more than one process at the same time only within coding limits due to their strong processing power. The type of AI which is intended to exist in the future is not limited to coding and by the help of ML it can improve itself with the method. There is an important competition in the world in this regard. One of the most effective results in ML is AlphaGo, which was developed by DeepMind and won the victory against the best players of the world in the game "Go". AlphaGo improves itself by analysing the results of previous games played against other types of AI and people, processes the data with the Monte Carlo Tree Search method and determines the moves. In this game, the rules and parameters of the Go game are completely certain. However, the use of AI in law can be risky. Although generally rules are clear and certain, the decisions are not always clear and the parameter is uncertain. It is not unprecedented for judges to make different decisions in similar cases due to only one tiny detail. It is also quite common for a judge to have a certain style of interpretation (Önengüt, 2019). Although their problems are serious, with the goal-oriented and dynamic approach the ecosystem which supports AI should be created and due to this, the government should focus 2 main areas, which are an automated decision making system and AI systems facilitating AI decision making.

4.5.1. Automated Decision Making System

Automated decision making systems are normally utilized in 2 ways. The first one includes solely automated decision-making systems and these systems' decisions become effective without human intervention. The second one is considered as a guide or an instrument for a human decision-maker that finally gives the judgment for the final decision. Currently, the second system is used in the world. Training data is used by designers and they provide the system with the desired outputs coming from the analysis of the data. Systems pass the data through their statistical models to create calculated outputs and automatically adjust internal values of models in order to move models closer to desired outputs. The adjustment of internal values is repeated over millions of iterations until desired outputs for the training data. Trained statistical models can analyse information and predict possible results rooted in data. The process consists of inputting the data to the system and it checks the trained model that finally makes the calculated output which leads to decisions created by the system itself or embedded decisions by designers (Cobbe: 2019:638).

4.5.1.1. The Modelling of the Reasoning Process in Administrative Courts

In the administrative jurisdiction, the process which is run in the resolution of cases and judicial matters can be modelled to develop a decision support mechanism for administrative law judges. An AI system can be developed to guide parties, judges and third parties participating in the proceedings to contain rules that encourage actions in certain ways. It means that this system should have a shape-dependent structure and it should predict how any of the subjects participating in the process at a certain moment of the process could act. Because the Turkish administrative jurisdiction has many procedural rules in the case process, the reasoning process in the courts can be modelled to use the intelligent decision support mechanism efficiently. For instance, in the process of the administrative jurisdiction, AI should be ready against the possibilities that may arise at any time in the process and should make the improvement of the process more apparent in courts. Because each case has unique features, the AI system which takes these into account should be designed to help achievements of the aims of consistency and promptness in the judgment by preventing procedural transactions from being incomplete and erroneous, preventing unnecessary actions and averting malicious conducts which try to extend the time of the case. In addition, the designer should consider that the robot judge has a structure that allows human

intervention at appropriate and necessary times. This is highly important, because laymen (such as judges who does not know the computer engineering) should intervene in the wrong process which the robot judge initiated and adjust the process. Since in the administrative justice the government and government intuitions seems more dominant, these kinds of mistakes in favour of the government can be misunderstood. Even if the government analyses the system well, the government should always check possible bias which AI has without human intervention. If robots continue to be developed in this rate in the future, the robots may not satisfy the information given by the designer and want more by connecting the internet to offer services better. For instance, types of lawsuits or judicial affairs registered in the robot judge installed by the designer cannot recognise new types of cases. It is not very easy to describe a lawsuit or judicial affairs if a request does not fall into any of the registered lawsuits or judicial affairs. These lawsuits and affairs are considered within the registered transaction types closest to it, and this situation may cause problems and lead to the wrong decision. An AI DSS which can courts help even make unstructured decisions, can contribute to ensuring consistency at each stage and help reduce time spent on resolving procedural issues should be created. For instance, when the average time is exceeded in a certain request to the court in the administrative jurisdiction by taking into account the statistical data, the AI system should warn the judge.

4.5.1.2. Filling a Case, Preliminary Examination and the Petition Exchange

The unstructured information in the application of the plaintiff to the court recorded in the system should be interpreted and the types of the case should be determined by the AI system. According to the type of the case, the deficiencies should be remedied and if there is a deficiency, the AI system should automatically give the extra time to a plaintiff. This means that in the preliminary examination phase, the robot judge can be used effectively. The aim of this phase is to catch deficiencies or mistakes before the investigation phase. This way is made mainly for the procedural economy. However, in the courts, this stage may take much time and some human errors (due to heavy workloads, inexperience and etc.) may happen in some administrative courts. At this point, robot judges can undertake important functions. In the near future, the preliminary investigation process can be completely autonomous. Robot judge with big data can provide a legal basis for dispute issues and help human judges determine the legal rules applicable to the dispute. For instance, in petitions, a situation can be explained and can be pronounced in various ways. The easiest thing a

robot can do is to choose the specific sentence or the specific word such as “expropriating”. The robot judge can find the specific information and relevant rules and accept the petition or not. After this, a human judge can check it and if a robot judge makes a correct decision, the human judge confirms it and if the decision is not correct, the human judge adjusts it. Robot judges can assist the judge in determining the circumstances of the case. Robot judges can check mandatory elements, which have to be in petitions according to the article 3 of Turkish administrative justice act (1982):

“A) Names and surnames or titles and addresses of the parties and their attorneys or representatives, if any, and the identity number of the real persons,

B) Subject and reasons for the action and the evidence, on which the action is based,

C) Date of written notification of the administrative procedure that is the subject of the action,

D) The amount subject to dispute in the full remedy actions as well as the actions regarding taxes, duties, charges and similar financial liabilities, and the increases and penalties thereof,

E) Type and year of the tax or tax penalty related to the tax actions, date and number of the letter of notification served and the taxpayer account number, if any.”

AI can help human judges in determining the preliminary examination of the petitions. For instance, the algorithm can check the age of the person from the relevant database. It can check whether the person has the capacity to sue, analyze the availability of documents. Generally, it can assist human judges in analyzing the preliminary examination of the petitions (Article 14 of the Turkish administrative justice act (1982)):

“A) Duty and authorisation,

B) Encroachment on administrative authority,

C) Competency,

D) Whether there is any procedure that is final and must be executed, which shall be subject to an administrative action?

E) Statute of limitation,

F) Indication of the other party,

G) Compliance with Articles 3 and 5."

Provided that petitions are against the law even in one of these, the algorithm can inform the relevant court by a report. If the algorithm does not find illegality on these, notification can be made by the algorithm by the confirmation of the human judge. The robot judge can check whether the obligation of concretization is fulfilled at the petition stage and the request is available to make decisions on the case by the help of the natural language processing to prevent unnecessary processing and supports a consistent start in the dispute resolution process. In addition, the petition exchange can be organized by the robot judge and the requirements can be analysed automatically. The algorithm can determine the courts litigants apply to according to their types of cases, make a demand letter for you to send to the relevant institution of the government. That gives the institution a chance to settle out of court, potentially decreasing the court's caseload. According to litigants` answers to the algorithm, the algorithm can fill in the correct forms to submit to the relevant administrative court with the correct number of copies. It checks whether their claims qualify for administrative courts such as monetary limits such as DoNotPay, which is the world's first robot lawyer.

In Wales and the U.K., the Traffic Penalty Tribunal gives appellants automated diagnostic questionnaires to help recognize if appellants fulfil procedural requirements to fill in appeals. Appellants and responding authorities utilize online dashboards to file pleadings, uploads and comments on proof and arguments establishing facts, and pursue the progresses of cases until ultimate verdicts. In between 1 April 2017 and 31 March 2018, 28,669 appeals came to the Traffic Penalty Tribunal (Traffic Penalty Tribunal, 2020:4). The Traffic Penalty Tribunal`s report in 2016 stated that Traffic Penalty Tribunal appeals were categorized as written e-decisions (%70); telephone hearings were % 16 and in-person hearings were %8. In Canada, the Civil Resolution Tribunal utilizes tiered processes which help self-represented litigants deal with small claims (up to 5,000 CAD), strata property problems (Civil Resolution Tribunal, 2018) and specific sorts of car accident claims and problems including non-profit societies and co-operative associations. The proceeding starts with a solution explorer as an automated dynamic online wizard which assists potential

litigants to recognize the disputes and the solution explorer gives litigants pertinent legal information and courses of the action. The Civil Resolution Tribunal's December 2018 statistical report states that the solution explorer has been utilized over 50,000 times, and it has processed almost 9,000 disputes since the beginning of Solution Explorer (Civil Resolution Tribunal, 2018). In the U.S., courts in some states, such as Michigan, Ohio and Utah utilize the Matterhorn platform to start voluntary online judicial proceedings for outstanding warrants and traffic tickets, small-claims and family problems. Matterhorn gives litigants the pertinent information, instructions and texts and brings together the litigant's submissions and answers to pre-specified questions which are needed to win the case. In the U.K. and Wales, Online Solutions Courts have been prepared to start with automated triage phases which help self-represented litigants to deal with their disputes at early stages. According to self-represented litigants` answers to questions, systems give information if litigants have valid claims, assist litigants in identifying claims and show alternative actions. The English Courts and Tribunals Service started case filings and processing systems for self-represented litigants by means of web-wizards which assist litigants in formulating and filing claims and defences, upload evidence to the system, give settlement offers to opponent parties and bargain about possible solutions. Since its beginning of the service in March 2018 through February 2019, the Online Solutions Court`s civil money claims online service has been used for over 51,000 claims for the price under £10,000 (Sela, 2019:134-136).

4.5.1.3. Discovery and Court Investigation

By the help of NLP methods and DL techniques, AI tools that interpret the data and made the data available for the use can be utilized for the administrative courts in the discovery and court investigation. For instance, an algorithm which can analyse the compatibility of documents can be used to help human judges. The settlement of a case pending at court often entails making many interim decisions during the trial. Such decisions do not end the case and, on the contrary, it serves the progress of the case such as the inspection and expert examination. These interim decisions can be made by robot judges effectively, because robot decisions can prevent arbitrariness, inexperience, unnecessary moves and etc. The preliminary issue, the transfer of the subject matter, merging and separation of cases can be managed by robot judges. Petitions and rebuttal petitions can be summarized by robot judges and they can give the relevant information to human judges. Some qualified calculation can be made by robot judges instead of experts such as

compensation claims and defect rate in accidents. Artificial intelligence can solve these problems especially with deep learning methods. AI Systems can directly perform qualified computing works. Thus, since most of the data are not structured, decision support mechanisms can contribute to the success of the procedural economy by performing many of the tasks that need to be calculated manually (Kıyak, 2020: 103-109).

4.5.1.4. The Formation of Verdicts

While creating a detailed model of the judgment procedure, the aim can be the main application of various decision formats for types of cases that are common in practice. With DL and NLP, the AI tool can contribute to the judge`s decision making. Modules that provide convenience to the judge can be designed in the process of justifying the decision. By developing systems that will enable the legal expenses to be accurately calculated by the system according to the justification rate in the case, such workload can be taken over by robot judges. Also, robot judges can determine whether litigants or defendants can apply to higher courts for reversals of decisions of lower courts and if this is possible, the robot judges can decide which courts can be applied such as Council of State or regional administrative courts. The AI robot can classify cases into groups and it can make decisions about groups of cases fast. The government can give AI cases with small claims and AI can solve them with a simplified and quick trial procedure. In all cases, the subject of which can be measured with money and under a certain monetary amount, the AI tool can handle them with simple trial procedure. By simplifying some procedural procedures, the AI tool can trigger the process of making faster decisions**.** The AI tool can create a model that will prevent the prolongation of the processes due to lack of subject-matter jurisdiction and lack of territorial jurisdiction in the administrative jurisdiction.

4.5.2. AI Systems facilitating AI Decision Making

Judges exercise the judicial power of the state and it means that they might have an authority to imprison people, punish people with pecuniary penalties or indemnification and etc. according to judges` responsibility area (such as administrative law judge and criminal judge). They take the relevant information about cases and according to the information of cases, they make decisions. There are some processes, which be completed to make decisions such as collecting relevant documents and collecting relevant documents can take

a long time. In addition, traditional courts are very crowded and the judges are very busy. Because of these challenges, there are some methods, which facilitate the decision making processes of judges and can be used with AI efficiently in the administrative law such as collecting and analysing documents with the help of AI, online courts, arbitration and smart contracts and robot helpers in the application of administrative courts. Although solely automated decision-making systems, which become effective without human intervention are too early to be used by the governments and courts, automated decision-making systems used as a guide or an instrument for a person that gives the final decision can be effective and can be used in courts. In many areas in administrative courts, these automated decision-making systems can be effective and four of them will be explained here below.

4.5.2.1. The collection and analysis of documents

AI used in the Turkish legal proceedings can facilitate the processing of the proceedings and permits the verification of information and data more rapidly and efficiently. It can discover fraudulent texts and documents by facilitating defence and preventing the filing of new claims. The application of AI in electronic legal transactions facilitates and accelerates the processing of transactions by the automation of the activities carried out by public officials. When filing a lawsuit by electronic means, it is no longer necessary for a public official to verify the existence of certain conditions in the complaint and then file the case and refer the case to the competent court. The system can perform tasks commonly performed by humans that do not require proper human judgment. The application of AI in electronic legal transactions occurs when programs with a predetermined database are developed that can offer different solutions to achieve the goals proposed in different situations such as the categorization of legal issues as collective or private themes, the indication of possible consolidated judicial verdicts through reading procedural documents and the indication of possible suspensions of claims. For instance, in Brazil, Victor the AI machine is supposed to precisely and rapidly track sources related to issues of the general repercussions, classify and choose all relevant sources dealing with the same issue, thus permitting all these resources to be suspended to ensure that all these transactions are prosecuted simultaneously (Granado, 2019: 103-104).

Among the electronic signature methods, the most reliable and used method that has legal consequences in the legislation is the qualified electronic signature method. Public

legal entities sign their administrative transactions and decisions, with a few exceptions, mostly with the qualified signature method and create e-administrative documents. The qualified electronic signature is used not only in private law transactions, but also in public law transactions and in many areas where government functions are carried out, in the performance of executive functions as well as in the performance of judicial functions and judicial transactions, many electronic government (e-government) applications, individual e-banking is used in e-insurance services (Yılmaz, 2016: 3448). For instance, electronic signature is used by judicial authorities in judicial activities, especially in UYAP (National Judiciary Informatics System). According to the article 445 of the Turkish Code of Civil Procedure no. 6100, "*National Judiciary Informatics System (UYAP) is an information system created for the purpose of carrying out judicial services electronically. In cases where lawsuits and other proceedings are carried out electronically, data is recorded and stored using UYAP. Electronically lawsuits can be filed, using the qualified electronic signature, fees and advance payments can be paid and case files can be examined. Minutes and documents that are stipulated to be physically prepared under this law can be prepared and sent electronically with the qualified electronic signature. Minutes and documents created with a qualified electronic signature are not sent physically and a copy of the document is not wanted*".

There is no provision regarding electronic signature in the Turkish Procedure of Administrative Justice Act. With the implication of article 31 of the Turkish Procedure of Administrative Justice Act, the relevant procedural provisions of the Code of Civil Procedure can also be applied in administrative cases, and according to the amendment of article 31[23] made by article 59 of the Law No. 6352, published in the Official Gazette dated 05/07/2012 which is the rule that "*the provisions of the Code of Civil Procedure will be applied in electronic transactions*" and Article 5[24] of the Electronic Signature Law No. 5070 (2004) and Article 205/2[25] of the Code of Civil Procedure, documents created with a qualified

[23] "*As to the matters which there is no rule in the present Act; provisions of the Civil Procedure Act shall apply to matters concerning the challenge and withdrawal of the judge, capacity, participation of the third party in proceedings, notice of litigation to third party, counsels of the parties, waiver and admission, financial guarantee, cross-action, expert, inspection, obtaining of evidence, costs of trial and free legal aid as well as the measures that should be taken against the behaviour of parties that violate the discipline and rules of conduct".*

[24] "*A secure electronic signature has the same legal effect as a handwritten signature. Legal transactions that are subject to an official form or a special ceremony by laws and guarantee contracts other than bank letters of guarantee cannot be executed with secure electronic signature".*

[25] "*Electronic data created with a qualified electronic signature in accordance with the procedure are deemed as deeds".*

electronic signature have the same legal consequence as a handwritten signature and that it is possible to qualify as evidence. In an environment where electronic signature is widely used, many e-administrative transactions and e-government transactions are carried out with electronic signature, it is a serious deficiency that there is no regulation regarding electronic signature in the Turkish administrative system and the Turkish Procedure of Administrative Justice Act.

Electronic evidence submitted to the court within the scope of the lawsuits, apart from electronically signed documents, also includes e-mail correspondence, video and picture images, and different types of records stored electronically. Therefore, it is accepted that the nature of the evidence is controversial in the electronic evidence that is submitted to the court as evidence, except for documents with electronic signature. According to one view, this kind of evidence is considered as prima facie evidence and as the discretionary proof (Efendioğlu, 2019:99). For instance, in Turkey, UYAP is an informatics platform that provides the internal automation of all judicial and administrative judiciary and judicial support within units under the body of the Ministry of Justice such as courts and public prosecutors, as well as the external integration with public institutions and organizations that similarly establish information automation systems, and constitutes the e-Justice pillar in the e-Transformation process. With this system, which was developed in accordance with the electronic signature infrastructure, a central information system was established and a harmonious environment was provided between the judiciary and judicial support units. In this way, the long-time correspondence and unnecessary expenses are prevented. In addition, lawyers are provided with the opportunity to access the system through the Lawyer Portal, to receive information about their cases, to pay their fees, and to add documents to cases with an electronic signature. Through the Citizen Portal, Citizens can get information about the subject, value, parties, date about their cases and at what stage their cases are. By integrating with other computers in public sectors, UYAP provides the opportunity to access the necessary information and documents. For instance, judicial units can automatically receive criminal records from the Criminal Registry Information System, population records from Central Civil Registration System (MERNİS) and address records from the Address Registration System, driver's license records from Police Information Network (POLNET), foreign exchange rates from the Central Bank, and land registry and cadastre records from Land Registry and Cadastre Information System (TAKBIS) (Akçakaya, 2017: 23).

AI programs can be used to discover changes in documents and fake documents. Encrypted documents may be impossible to be detected as fraud but the defrauding of the scanned documents is possible. The credibility of the documentary evidence has to meet some particular technical standards of the collection and the protection to keep away from the questioning of its documents or the claim that the document was taken through illicit means. The verification of possible fraud by people can take a long time but AI can guarantee the accuracy of the documents with the verification of documentary proofs, verifying any fraudulent documents utilized by parties (Granado, 2019: 109-110).

Generally administrative proceedings, actions and contracts cause administrative disputes and administrative jurisdiction is in the written form, since the administrative actions, acts and contracts are in the written form. Especially the administrative actions and acts take place with the allowance or the order of the administration and the allowance and the order must be in the written form. Hearing witnesses and promissory oath are not possible in this system and inspection and expert witness reports are not used regularly. These features of the Turkish administrative law are excellent for the use of AI, because hearing witnesses and promissory oath are very hard to be evaluated correctly. Every time people lie, some changes occur in their bodies. The body reveals the lie with some changes. Heart rhythm and sweating rate are changing rapidly and there are tiny tensions in the muscles. For instance, EyeDetect has an average accuracy of 85% in identifying liars and truth tellers (Bittle, 2020). However, this feature of AI even with this rate is not enough to be accepted in courts. On the other hand, AI can be used to analyse and review some documents and the contracts of cases in the Turkish administrative law. For example, Kira system is sophisticated ML software identifying, extracting, and analysing texts in documents such as in contracts. These administrative actions, acts and contracts can be found as digital documents or can be found in camera records, phone recordings, CCTV and etc. The electronic signatures are getting common every single day and are being used by government intuitions and people. In the social media, some comments may cause the dismissal of government workers and cause some problems which should be solved in administrative courts. In the search of camera, provided that the searched image belongs to a person related to the investigation, AI can find the person`s images in the camera and other people can be filtered so that other people`s data is not violated. The analysis of digital documents can be performed better than humans and AI can discover some clues which may not be noticed by humans. By the help of AI, license plate recognition and face recognition are used for the

security of citizens and cities. AI can be used to find some people who are required to find where they are in certain hours for certain cases with security cameras in social areas. Deepfake is considered as the synthetic media in which a person in images or videos is replaced with the other's likeness. Deepfakes leverage powerful techniques have been improved with ML and AI to manipulate or produce visual and audio contents with the high possibility for deceiving and even a prepared Deepfake video by professionals cannot be recognized the originality easily by even experts. One of the best solutions is that the government or court uses AI to deal with this challenge because Deepfake videos leave small digital traces and AI can make the analysis of these traces in a very short time. The same analysis is possible for pictures and audio (Göksoy, 2019: 81-83).

4.5.2.2. Online Administrative Courts

A system of digital justice as online courts can be potentially helpful for the administrative law judges in Turkey. Digitization in the legal system can make more efficient case handling within the court system. Online courts can be considered as a promising response to numerous problems which administrative jurisdiction can face such as those arising from huge cases, procedural complexity, accessibility problems and the expensive price of litigation compared with online courts. The AI technology with online courts should introduce the efficiency to overburdened administrative courts which try to deal with a huge number of disputes and alleviate economic, physical and knowledge difficulties for plaintiffs' access to justice. Online courts should be planned to support self-represented defendants and plaintiffs and help people take all crucial procedural and substantive actions. The courts should use easy procedural rules which are executed by means of self-guided, eligible and navigable procedures without any help of advocates. Online courts should use updated and simply procedures delivered by means of digital interfaces. Defendants and plaintiffs can use AI applications, user interfaces and user experience methods (Sela, 2019: 127-128).

An online court model can be proposed for the Turkish administrative law system. Firstly, claimants should fill in forms online. Administrative law judges can add pertinent scanned documents. After that, files move on to respondents, who fill out forms and scan texts and documents. It is easier to file claims without the use of unnecessary efforts such as high costs and the excessive time and sources. Because of this, forms should be filled out

online and documents and texts should be scanned and uploaded, bypassing the procedure of delivering each pertinent paper by hand. Later, each party can declare everything they find pertinent and useful to the suit. Clerks take documents and check them to make sure that all of them are appropriately filled in and required documents are submitted. Each party should have the right to adjust and complete missing details and documents whenever they find relevant details and documents, because the investigation of the fact which causes dispute and litigation and legal assessment and the classification of facts belongs to the administrative court and the collection and evaluation of evidence belongs to the administrative court. The administrative courts automatically investigate and inspect whether material events (facts) are truthful and lawful and also can demand every document which is necessary from parties except for some certain documents. Lastly, the administrative law judge can request additional information or documents from each party by means of online hearings, conference calls or the judge can want them to be sent. When cases look complex and complicated for judges, the face-to face trial should be preferred. However, this face to face trial will be highly exceptional because in the administrative judiciary, the hearing is normally exceptional and the parties cannot request a hearing at every stage of the trial and they can only request a hearing at the stages shown in the law. In the writing procedure in our administrative trial, there is no type of lawsuit in which the hearing is obligatory and the related regulations and for the hearing of the administrative judiciary, the prescribed conditions must be completed. This means that mainly the online hearings will be preferred when online courts are active in the Turkish administrative courts in the future. In the world, there are some countries which can use online courts and these countries can be the examples for the Turkish administration jurisdiction. The "Net Hamishpat" system of the judiciary is used as the computerized clerkship in courts and expands activities of courts beyond the courthouse borders through the Internet and to some extent has been executed in Israel. This system offers a transparent mechanism of managing backlog and overseeing judicial work. It can enable observing and controlling caseload through the immediate flow of information about any judge to the court administration unit. "Net hasmishpat" is considered to offer a major incentive to judges to maintain a certain ratio of settlements (Alberstein and Zimerman, 2018). In the U.S., a virtual courtroom model for online courts was created as a pilot to handle commercial lawsuits of over $25, 000. In some American courts, hearings are held by means of conference calls in sophisticated technological environments with digital supports like the Florida court system (Menashe, 2018:925-928). China is considered as the first country initiating mobile courts. WeChat is

a social media platform which is utilized to deal with cases. This platform has dealt with over three million cases. China has already started to use the mobile court. It set up a cyber-court in 2017 in the eastern city of Hangzhou to handle cases. The court has online interfaces with parties which appear by means of video chats. The AI robots appearing as on-screen avatars would like parties to represent their cases. Some cases completed by this internet court consist of online trade problems, e-commerce disputes, copyright cases and etc. Parties are provided an opportunity to present civil complaints online and after that, connects court hearings. Because the robot judge is in charge of simple functions such as civil cases, the robot judges lessen the burden on human judges and in this way human judges have the time to observe the proceeding and make big decisions for each case (Techgig, 2019).

In February 2020, the Beijing Internet Court published China`s first protocol for online court hearings with twenty-six procedures, demanding numerous elements from online identity authentications to transcripts of hearings in video courtrooms. This protocol was prepared rooted in experiences of over 14,000 online trials with more than 8,000 hours. From February 3 to March 20, the Supreme People's Court stated that various courts filed almost 550,000 cases online in China, completed more than 440,000 payments online, held more than 110,000 court sessions online, and implemented online mediations over 200,000 times (Na,2020). In September 2018 in China, the Supreme People's Court enacted regulations for Internet courts that allow parties to submit electronic evidence approved by the blockchain technology or electronic evidence collection platforms. Courts verify the authenticity of the electronic evidence by checking the reliability of the electronic data creations, collections, storages and transmission processes. Following the date, 3 Internet courts created their own blockchain platforms. Most of the platforms have been created in collaboration with notaries, arbitration institutions, prosecution offices, judicial bureaus and other courts (Du, 2019). With the blockchain, these online courts can be high effective and successful. Blockchain is considered as an open and distributed ledger which records transactions between 2 parties in efficient, verifiable and permanent ways. Simply it is based on the concatenation of each transactions and move as a block to the system. In this way, the platform is getting bigger every day. A new transaction triggers the platform to update and the transaction starts being visible to the concerned parties around the world. This is an open platform and everybody can enter in the system without any permission or approval. There is no higher authority, which implements or manages the system. Each user has different unique identifier keys. Encryption methods with algorithms protect the system. The governments or regulations do

not involve in this process. There is no interparty between users such as banks. This system is created to be free from human intervention and the system deals with challenges of algorithms (Gencosmanoğlu, 2020). Online courts with blockchain can be high effective and useful for judicial staff, especially judges and the public. Particularly smart contracts and arbitration can be perfect examples for the use of blockchain in online courts with AI.

4.5.2.2.1. Smart Contracts

Smart contracts are considered as agreements that are automatic to execute. Smart contracts only have some important features for artificial intelligence, such as electronic structure, software implementation, increased precision, conditional nature, self-implementation and self-sufficiency. It can be related to certain digital assets (such as crypto currency) registered on the blockchain or digital manifestations of offline assets. The implementation of the smart contract must also be linked to certain electronic events / data. Smart contracts can only take place in electronic forms. They can serve as documents managing the contractual relationship of the parties and are objects of the intellectual property rights presenting valuable objects of intellectual activities. They have software codes at their cores; their terms are expressed in computer languages, which are highly official languages in essence with firmly defined semantics and syntax. Computer language does not permit discretion in its interpretation by the mechanism. Smart contract terms are interpreted by machines. Conditional statements are very important for computing, and the computer code is rooted in expressions like "if" and then "y". Once smart contracts are completed, their further implementations are no longer dependent on the wills of their parties or third parties, nor do they require any additional approval or action from their own parties. Computers verify conditions, transfers assets and processes entries in the Blockchain database for such transfers. Smart contracts do not need any legal agency or any enforcement agency to be present (Savelyev, 2016:11-15). Also, they have some advantages for people, governments and companies. They cannot be changed and revised and this means that the parties do not have any doubts on its content. Via the blockchain technology, it is easy to understand for the parties whether other party completes its liabilities consistent with the smart contract or disobeys it. They completely eliminate paperwork and bureaucracy, removes all agents and mediators and ensures that the entire contractual process continues as fast as possible because of their self-functioning structures. The third parties cannot intervene or influence smart contracts because of blockchain. Their security is considered

unbreakable. Because it is straightforward to take countless back-ups of smart contracts owing to blockchain, there are not such cases like losing them (Göçer, 2020).

In the Turkish law, at least, a legal contract has to contain an offer and an acceptance with the intention of the parties that the contract is lawfully binding. Wrappers should be produced to wrap codes in contracts to make sure that the performance of codes is lawfully binding through traditional legal contracts. They ought to ensure that a valid offer and acceptance are ready and valid to fulfil the requirements under the Turkish law. Wrappers are basically necessary in the shape of pre-agreements to give permission for codes in order to implement smart contracts. This can be achieved by making sure that the initiation of smart contracts is pre-authorized by parties using human languages to execute codes (for example, by clicking "I agree" to the specified terms). This provides them with the binding characters and effects of traditional contracts. Even though wrappers normally work for traditional contracts, they do not work in cases where the rule needs the observance of strict formality requirements for particular sorts of transactions. For certain types of transactions, people ask lawmakers to revise existing legislations and adopt technical and operational infrastructure to reconcile with the existing systems and their database (Çiftçi and Aksel, 2017).

In the administrative law, the government should involve in the contract and it should be one of parties. States make contracts with international companies such as building a bridge more easily and this system can be used to persuade foreign people to win tender and attract foreign investors, because the foreign people can be sure that they can take the money when they complete their works automatically via blockchain. The contract cannot be changed later and if companies fail to complete their works, the government will be sure that it will take the compensation definitely even in case of the bankruptcy. In this system, even international companies can make contracts with weak governments because international companies` money is protected by blockchain and governments do not decide whether international companies complete their works. The most attractive feature of smart contracts in the administrative law is that they can to a great extent lessen or remove the necessity of administrative lawsuits and administrative courts. With a smart contract, the parties commit to adhering to the rules which smart contracts determine. For instance, consider that there is a company which made a contract with a state and the company declares the compensation as its own 1000 cars if the company fail to build a bridge on time (such as 2 years later). The

smart contract design policy proposes that human repeatedly improves security protocols to fully embed the contract terms governing a property. These protocols, depending on the terms of the contract, can give the person cryptographic keys to control the property. Cars can be rendered unusable if the proper challenge-response protocol is not followed with the legal owner, preventing theft. Provided that cars are utilized to protect credits, the powerful security executed in traditional ways can make a headache for creditors - the repo man might no longer be able to confiscate a deadbeat's cars. This problem can be solved with smart lien protocols: Provided that the owners do not pay, smart contracts declare that lien protocols are active and protocols give the control of cars` keys to banks. These protocols may be cheaper and efficient compared to repo men. Further reifications may eliminate liens once loans are paid off and give appropriate explanations for hardship and operational exceptions (Szabo, 1997). If the government or the company does not complete their payment or breaches the contract without any promised compensation, which is ready to be used, data is automatically sent to an online court and a litigation process starts at the online court.

4.5.2.2.2. Arbitration

Functions and operations of the arbitration industries, together with the legal industries, have continually been influenced by AI. One type of popular AI tools currently utilized in arbitration is predictive coding systems. They can be called as a form of supervised ML applications which obtain human review-based data inputs about document relevance and apply them to greater document populations. The systems enable pertinent or responsive documents to be recognized by algorithms and have been utilized in English court litigations for many years, with BCLP acting in Brown v BCA Trading Ltd [2016] EWHC 1464 (Ch) (High Court Of Justice Chancery Division Companies Court, 2016) – the first contested application to utilize the system. In addition, its utilization is allowed in United States courts, some of which have understood that the outcomes of the system reviews are statistically greater than traditional manual reviews (Moore v Publicis Groupe 11 Civ 1279 (ALC) (AJP) II Civ 1279 (ALC) (AJP) (US District Court SDNY, 2012). The process of the system begins with setting parameters, identifies texts and documents which makes the sample group of texts and documents to be reviewed and are normally checked by an experienced advocates with the excellent knowledge of cases. Human reviewers label documents as ‘pertinent’ or ‘not pertinent’, or for document requests, ‘responsive’ or ‘not responsive’, which in succession train predictive algorithms. AI systems are used for whole

review groups of documents either constantly or after the sample group review is complete. Pertinent or responsive documents are defined by the algorithm and sorted by pertinence/ responsiveness. More documents might be reviewed by experienced advocates to advance the system. They include documents marked by AI devices, on the one hand, inconsistently treated by the system, on the other hand, by human reviewers. Human review continues until an appropriate confidence and response score is achieved. Documents discovered by the system as irrelevant/unresponsive are sampled indiscriminately for quality controls. For instance, according to a 2011 study, it shows the significant cost savings of using the predictive coding system based on manual review: "*the technology-assisted reviews require, on average, human review of only 1.9% of the documents, a fifty-fold savings over exhaustive manual review*" (Grossman and Cormack, 2011:43; Westgaver and Turner,2020).

Arbitration, in the Turkish administrative jurisdiction, had not been possible for numerous years. In 1999, necessary amendments were made in the Constitution which paved the way for the arbitration. The article 125 of the Turkish Constitution (The Grand National Assembly of Turkey, 1982) states that *"Recourse to judicial review shall be available against all actions and acts of administration. In concession, conditions and contracts concerning public services and national or international arbitration may be suggested to settle the disputes arising from them. Only those disputes involving an element of foreignness may be submitted to international arbitration"*. After the amendment of the Constitution, laws about the use and rules of arbitration in the administrative jurisdiction were enacted For instance, the article 3 of Foreign Direct Investment Law (The Grand National Assembly of Turkey, 2003) states that *"For the settlement of disputes arising from investment agreements subject to private law and investment disputes arising from public service concessions contracts and conditions which are concluded with foreign investors, foreign investors can apply either to the authorised local courts, or to national or international arbitration or other means of dispute settlement, provided that the conditions in the related regulations are fulfilled and the parties agree thereon".*

The use of AI in arbitration has some advantages for the Turkish administrative law. Artificial intelligence helps improve the correctness and fairness in the selection procedure of arbitrators, which attract foreign people and international companies to make business and make contracts with the government. Foreign capital looks for the equity and the security when they invest money. The inherently biased, absent and incompetent arbitrators are one

of the biggest threats to arbitration. This kind of arbitration causes the trouble, insecurity and deadlock. The private companies believe that the treatment will be equal and because they believe in this, they want to take the countries` tenders. If the country is suspicious about the arbitration or arbitrators, it does not make any contract with them. The government abandons the advantage position and accepts the rules of the arbitration rather than administrative courts. The rules of the arbitration should permit parties to challenge the prejudice of arbitrators. Provided that the prejudice is true, a system enables AI to eradicate the unconscious prejudice of party-appointed arbitrators and diversify the pools of the possible arbitrators. AI can make sourcing and screen verdicts derived from the repetitive inclination of arbitrators while giving judgments, along with spotting and changing any such inclination which might be considered as prejudiced. Secondly, AI can help lessen the time and the costs of the clerical procedures, because they are lengthy such as due diligence and contract reviews in the Turkish administrative courts.

Additionally, AI can help suggest the ideal arbitration mechanisms to follow in the event of a dispute in a contract. AI can help suggest better arbitration mechanisms to pursue according to disputes in contracts. Provided that the parties desire unilateral arbitration agreements, the system automatically suggest the parties to select a place as the arbitral place instead of the other. Lastly, it is likely to decrease arbitral uncertainty. The system can make substantial legal contributions to cases of parties preceding the arbitration panels by estimating the likelihood of success of litigations, likely costs incurred, the historical success rates of claims, or trends of cases arising from the nature of arbitrators (Bhattacharya, 2019).

CHAPTER 5: CONCLUSIONS AND POLICY RECOMMENDATIONS

Developments in the AI technology are highly influencing our daily lives and our work in many ways and the result of these developments is to integrate the processes of providing goods and services to the computer environment. The processes of demanding goods and services started transferring to the computer environment. The same situation started to take place in the access to justice. Even if today the access to justice takes place mainly in the traditional way, especially in certain countries, the process starts the digital transformation and the automation with the AI technology. Transferring almost the entire process of courts to digital environment and the automaton of decision making process with legal analysis systems can transform all the court and jurisdiction intensely. The implementation of the AI technology led to the operation of almost all dispute resolution processes in the virtual environment in some countries such as China. This virtual process of courts has been contributed with robot judges in China. This has been possible with the use of ML, DL, big data, the AI technology, natural language processing and etc.

Every single day the population and the number of disputes are increasing in the world and Turkey. At the point of the realization of the essential objectives of the law, the solution of dealing with the workloads in courts can be the integration of AI methods into the court and decision making process. Indeed, a steady increase of public prosecutors, judges and courthouses in today's world do not seem a good solution. It is an inevitable situation in today's conditions to utilize AI technologies to the maximum extent without damaging the fundamental values. The Turkey's vision is to make a system that processes the ecosystem created with a classical approach. This system should be legal analysis systems with the decision support and the decision-making mechanism equipped with AI. Increasing utilization of judgment machines' decisions can deeply adjust practical capabilities, institutional incentives, power relations, the views of specialists and the public. Judgment machines` decisions provide an illustration of how technological modification can use big data and a case study in the ways that the turn to robot judges can affect human decision-making processes.

This study started with the conceptual framework of AI in the light of the previous literature and researches and the types of AI, AI applications, the definition and the historical progress of the AI, and its future in terms of public administration, law and public policies

such as legal reasoning, decision-making, providing services and etc. Later, some certain national AI strategies have been analysed deeply and their AI in the context of human capital, networking, regulation, ethics and infrastructure. AI is a rising priority on the policy agendas for governmental institutions and numerous national government initiatives try to find to utilize the AI technology more for productivity and competitiveness. Because of this, many countries established their strategies and initiatives regarding AI. The priorities in national AI strategies and initiatives can be divided into main categories which are factor conditions like AI research capability along with skills, supporting industries, structure, competition, the focus on domestic governance and co-ordination (Isagah and Musabila, 2020: 84). The policy setting for the AI technology includes some matters like transparency, privacy, law, human rights and ethics. After that, some certain countries which have implemented predictive justice tools to the judiciary in the U.S., France, China, Estonia, the Netherlands, Portugal and Brazil have been inspected. Turkey`s background about AI has been analyzed in a detailed way.

The importance and effect of the technological developments in AI in the legal world cannot be deniable. Especially the law has taken advantage of the developments in the field of the AI technology in certain countries such as U.S., China and etc. Turkey should benefit from the new achievements in AI to the maximum extent especially in the jurisdiction. There are some clear benefits of the use of judgment machines in the Turkish jurisdiction (especially in the Turkish administrative jurisdiction). This study showed why Turkey should use judgment machines in the courts, especially in the administrative jurisdiction and which advantages robot judges have to solve the problems of courts. Advantages have been explained by drawing attention to a part of the technical literature and giving various points of views by giving examples of certain countries. For instance, judgment machines are quicker, they can handle multiple cases at the one time, and they can find and analyse pertinent legal documents very quickly. This is not only beneficial for human judges to focus on more important cases, but also it is helpful for the citizens what do not want to experience the lengthy, expensive, and stressful litigation process.

AI is made to help, alter, and replace human decision-making, especially in courts. AI has already fostered numerous facets of how judges make decisions about cases, and the likelihood of judgment machines seems reasonable. Judgment machines` verdicts strongly influence the judgmental values held by the education, law and government policy. The

implementation of the AI technology affects the administrative jurisdiction in numerous ways. By offering efficiency, cost and time reduction, independence, impartiality, legal certainty and etc., judgment machines promote and benefit from a turn toward strictly codified rules and supports standardization rather than discretion. The implementation of judgment machines in the administrative jurisdiction affects the education, law and government policies deeply. To make the country and courts ready, these three powers should transform policies and implement some urgent actions.

The development of an administrative judgment machine is not easy because information technology and AI are changing constantly and transforming themselves. Also, today the vast majority of AI types are operated with detailed coding and extremely powerful processing power. Thus, most of today's AI types can perform more than one process at the same time only within coding limits due to their strong processing power. The type of AI which is intended to exist in the future is not limited to coding and by the help of ML it can improve itself with the method. There is an important competition in the world in this regard. For instance, AlphaGo, which was developed by DeepMind and won the victory against the best players of the world in the game "Go" and it improves itself by analysing the results of previous games played against other types of AI and people and determines the moves. The rules and parameters of the Go game are completely certain. However, the usage of AI in law is risky. Although generally rules are clear and certain, the decisions are not always clear and the parameter is uncertain. It is not unprecedented for judges to make different decisions in similar cases due to only one tiny detail. It is quite common for a judge to have a certain style of interpretation. Although their problems are serious, with the goal-oriented and dynamic approach the ecosystem which supports AI should be created and due to this, the government should focus 2 main areas, which are an automated decision making system and AI systems facilitating AI decision making.

This study has mainly discussed whether the software with the current AI was ready to take the role of judges in Turkish administrative jurisdiction by automating the judicial process. This can occur by measuring the possibility of automating individual stages of the process and analyzing whether AI tools fit to the prime administrative procedure principles and legal framework in Turkey. This can help us to understand in which stages the AI technology can be useful by checking where the judges can take initiatives. One of the main aims for this study is to measure the usability of AI in Turkish Administrative jurisdiction

and is to create the architecture of these proceedings. Certain processes of Turkish administrative jurisdiction have been categorized for the potential AI software to make easier decisions and have been analyzed in which processes of Turkish administrative jurisdiction AI software can be useful for judges. Turkish administrative jurisdiction has some main features which may help the AI software become popular and useful in Turkey. Firstly, in Turkish administrative jurisdiction, inquisition without preoccupation is used and this can make categorizations easier. The courts check some documents and may decide some decisions on them fast without further research. This check may be more systematic by judgment machines and the processes may become clearer. These proceedings are written and it means that the storage of documents is easy and when some necessary documents which are similar to these cases are needed, these documents can be found easily and decision-making processes become less complicated with careful categorizations of documents. Especially, Turkish administrative procedural is designed to be simplified and relatively cheap. Due to that, in this judicial system, hearings in courts are limited and the judges are inclined to make decisions without any hearing. Hearing witnesses are not possible in this system and discovery and expert witness reports are not used regularly. All of these may make the AI software possible in Turkish administrative jurisdiction.

However, there are some challenges to solve in Turkish administrative jurisdiction when Turkey adapts the AI system for the Turkish administrative jurisdiction. Generally, these problems can be separated into two categories. One of them comes from the interior structure of Turkish administrative jurisdiction and related laws such as the fragmentation of norms in the Turkish administrative jurisdiction law, the predictability of decisions for the Turkish administrative jurisdiction, the insufficient number of cases published, the uncertainty of legal texts coming from the use of general clauses, rough or evaluative concepts and the room for free interpretation. The government with the support of specialists who are expert at various fields such as law, public administration, linguistics and robotics should regulate the modification of laws, regulations, and rules to facilitate the utilization of the AI technology in courts. For instance, when international examples have been examined, in the area of NLP, which is a sub-field of AI, successful solutions have been obtained especially in English and other languages from the Indian European language family. Labelled data in these languages is one of vital factors that increase the success of AI systems. However, in Turkey, Turkish Natural Language Processing is not yet as developed as English. The basic structure of the Turkish language is agglutinative and it is more

different from English. Due to this, the majority of artificial intelligence models that can be used for English do not work for the Turkish language. For the success on judgment machines, labelled big data with Turkish text processing interfaces should be created, stored and shared. This should be at a level that promotes its safety, storage and processing. Experts on the Turkish language and institutions working on the Turkish language should involve in this process. Researches on data should be funded by universities and relevant institutions.

The other one is exogenous problems such as delays and inefficiency of judiciary process and limited budgets and growing demands along with workloads of judges. For instance, the infrastructure is considered as a big problem. AI, the vital technological advance of this century, has a big influence on societies, economies, laws and public administrations in numerous ways and is predicted to make an ecosystem which is worth $15 trillion in 2030 (Manyika et al., 2018). Countries which desire to use AI focus on their technological infrastructures. Since AI makes multi-dimensional transformative effects nearly in every sector, countries aim to establish or expend their national AI strategies, goals and ethic codes and rules to utilize it for their own advantages. Various countries (e.g. the USA, the UK, South Korea, China and etc.) created national AI strategy documents and they began to shape and allocate fund for their infrastructures. Turkey should make the national technology moves towards AI to change the infrastructure and make it ready for AI. Turkey has lagged behind many countries in creating the AI strategy. With each passing day, in Turkey, awareness about AI increasing with planned and implemented studies in the area of AI. The Ministry of Industry and Trade and the Digital Transformation Office has been assigned for the national AI strategy. The development of the infrastructure in law is important. For instance, when allocating sources to the robot judge project in the administrative jurisdiction, due account has to be taken of all the direct and indirect costs involved in introducing AI and new professional practices such as the implementation of the project and the AI technology, early-stage costs like preliminary audits. Project budgets should be spent for communication activities with adequate information and training users as personnel and the public. The government should adjust the whole budget according to the life span of the project and the certain stages of the life span. There should be multidisciplinary personnel which is chosen specially for the project and led by a legal expert, helped by a technical manager. Within the personnel, a variety of abilities should be present, covering a variety of judicial and AI features of the project, it being recognized that fields such as law, communication, public administration and robotics about the project and

its deliverables and user training are expert abilities which need help from professionals, either within or working alongside the project personnel. Directing the project needs a certain amount of flexibility when it comes to managing and organizing resources, with the support of experts, and without any clash of interest with any service company which might be in charge of solving and directing the technical solutions or clashes of power with other parts of the judiciary. In the case of long or complicated projects, it is suitable to divide the project into chains of small, particular aims, which can be accomplished within small, controllable timeframes, with any progress made being visible to the beneficiaries (European Commission for the Efficiency of Justice, 2019: 7).

The technological developments in AI in the legal world have transformed the legal systems and helped parties and judges in various ways. Especially some countries such as China and the USA are taking advantage of the developments in the field of the AI technology such as legal analysis systems (like judgment machines/robot judges). However, the important question about the AI technology in the legal technology is whether Turkey can benefit from the new achievements in AI to the maximum extent especially in the jurisdiction. The unique structure of the Turkish administrative jurisdiction should be matched with the AI based legal analysis systems; the systems should facilitate the workload of judges and improve the justice system. The benefits of the legal analysis systems should be analyzed according to cost saving, time saving and efficiency, principles of independence and impartiality, fair trail and consistent, correct verdicts and legal certainty and the quality of the reasoned judgment:

- In 2019, in the Turkish administrative jurisdiction, the number of incoming cases for a judge was 330, the total number of incoming cases per judge (taken from last year + cases sued during the year + reversal of decisions) was 458 and the number of cases completed by per judge during 2019 was 314. In 2019, the number of taken cases was 119.547, the number of the decided cases was 225.611, the number of sued cases during the year in 2019 was 237.805, the number of decided cases during 2019 was 225.611, the average completion duration of a case was 201, the transferred cases were 147.535 in 2019 and the number of the reversal of decisions was 15.794. Administrative law judges have to make a decision within a certain period of time such as within 6 months. For example, in Istanbul, in tax courts, approximately 50 cases per month need should be decided so that the circulation continues. This means

that approximately an administrative law judge should make decisions about 50-60 cases each month in İstanbul. Moreover, 1/3 of the members of the judiciary was dismissed due to their relations with the group which carried out 15 July military coup attempt in 2016. Especially in tax courts, nearly all judiciary staff started their duty in 2016 and later.

- The slow and long duration of the judicial process due to the excessive increase in the workload of the administrative judges makes Turkish administrative courts significantly difficult to fulfil the expectations of the Turkish citizens. Turkish administrative proceedings should be carried out in a timely manner, and judgments have to be made in a foreseeable timeframe. Judgment machines can contribute to fast proceedings and to fast decision-making and advance the efficiency of the judiciary. They can cut down the length of proceedings because they can deal with more cases simultaneously, without fatigue, inexperience, depression, holidays, stress, financial difficulties or other human factors. The study of Legal AI platform LawGeex took place with 20 qualified lawyers competing against AI. The human lawyers finished the task with 92 minutes on average, AI finished the task with 26 seconds on average. For instance, in Brazil, VICTOR can complete a task in five seconds which was completed before by servers in about thirty minutes and it can show huge savings in the allocation of working time for particular servers. It identifies the most common themes of general repercussion and helps solve approximately 10,000 extraordinary appeals which go to the Brazilian Supreme Court every year.

- Kira Systems states that its software searches, highlights, and extracts relevant contents for analysis to carry out a correct and precise due diligence contract review service. This system is able to handle the mission up to 40% faster in the situation of utilization of this system for the first time, and up to 90 % with experienced usages. Exterro is considered that they could reduce the amount of employees from 100 lawyers down to 5 when they began to use the system. EY Global Limited stated that document intelligence solutions are able to assist businesses to lessen document reviews by using time efficiently by 90%. The duration for reviews and organization of lab reports was almost 200% faster, and the evaluation is 10% more precise than humans' evaluation. eBrevia can lessen manual review duration between 30 and 90% and at the same time increase the accuracy. The system analyses more than fifty

documents in less than one minute and minimizes the possibility of missing valuable information. The system analyses more than fifty documents in less than one minute and minimizes the possibility of missing valuable information. These applications named can reduce courts' workload by sifting through documents and making electronic court documents and texts (eBrevia, 2020).

- Every year the number of administrative law judges is increasing. The number of tax court and administrative law judges in administrative jurisdiction is 1.345 and the judges are much less and tax court and administrative courts are located only in certain places. Recently for 100 administrative law judges, exams have been made to recruit them for training (100 for administrative law judges for 2020 and 100 for administrative law judges for 2019). In the training time, they take about 6.952 TL (tax rate 15%) or 6.844 TL (tax rate 20%) (15 July 2020 Net Salary). They will take more when they are appointed as judges and public prosecutors (9.951 TL (tax rate 15%) or 9.720 TL (tax rate 20%) (15 July 2020 Net Salary). Also, when their ranks in seniority become higher, their salaries become higher proportionally too. For instance, first class judges and prosecutors with a 21-year experience at the 1/4 rank receive a fee about 17.155 TL (tax rate 15%) or 16.692 (tax rate 20%) (Memurunyeri, 2020). 10,885,213,548 TL, which is 55.11% of the total 19,751,360,000 TL appropriation allocated to the Ministry of Justice with the 2020 budget, turned into expenditure in the first half of the year. This expenditure amount represents an increase of 12.33% compared to the expenditure amount for the same period of the previous year, 9.690.794.952 TL (Adalet Bakanlığı, 2020:4). For instance, the AI system called ELIS is used in the decision-making process in the Tribunal of Justice of Pernambuco. It checks new tax enforcement actions and decides which ones are in accordance with rules. It has zero cost for the Court because servers of the Court itself developed it.

- Between 1959 and 2019, ECHR made verdicts on 3,645 cases from Turkey. It convicted Turkey in 3,225 of the cases. This means that public prosecutors and judges are not very good at complying with rules and principles or because of the inexperience, they make these mistakes. Because judges make wrong decisions, victims take compensations from the government by the help of the domestic remedies such as higher courts. This causes more cost and time to victims.

- When Turkey begins to employ robot judges, it can save money by utilizing one extremely efficient robot judge instead of multiple human judges. Moreover, employing a robot judge seems faultless and speedy, permitting for citizens and judicial staff to complete their works in courts at faster speeds. Legal procedures can permit acceleration as robot judges can work 24/7. Especially, in the administrative jurisdiction, verdicts can be made accurately by robot judges and causes less cost because administrative judges mainly depend on documents and documents can be sent online and can be filed suits without even going to courts. In these courts, there is no need to a huge amount of judicial staff and due to nearly everything online and cheap robot judges, they will pay less money.

- The AI sistem can cut back on the amount of data and evidence input, give a more considerable and larger overview of each pertinent parts of evidence among state registries and can eliminate the red tape among courts, residents and government institutions. For instance, The Ministry of Justice committed to investing £2 million for the digital transformation of the United Kingdom's legal sector. International investment was about US$1,663 million in 2018 in lawtech, a 714% increase on the past year and UK investment rose by 3 times in the previous year, increasing to £61 million in lawtech. Also, there have been enormous investments from big legal technology companies in the world such as $238 million in 2018. AI strategies (such as France's AI strategy - €1.5 billion) generally support the infrastructure of the AI capacity and in the future, various sectors such as legal sector can be supported by these achievements and the adaptation and use of AI applications in various sectors can be facilitated.

- Parties would like to know why they won or lost their cases. In administrative court decisions, reasoned administrative judicial decisions are very important. The justification should be satisfactory, detailed and descriptive. Administrative law judges may be inexperienced in writing the satisfactory reasoned decisions especially in the beginning of their careers. Judges may give opposite decisions and different reasoned verdict from each other.

- Every judge is not capable of writing appropriate reasoned verdicts and they are not good at this. The explanation ability may not be at a good level. A detailed reasoning for court verdicts can be the case for judgment machines. It is vital for all reasoning to give a concrete explanation and to demonstrate counterfactual faithfulness. Robot

judges are reproducible, do not have cognitive biases and do not feel any social pressure. AI robots have perfect memory and can analyse all the decisions made before and they can use previously acquired knowledge to answer new questions. There are enormous cases and decisions. After the certain point, all cases can be the same of others. This means that the same case (or same explanation) or the nearly same case (or the nearly same explanation) can be found in the millions or billions of cases (or explanation). There are millions of cases which can be analysed by robots. Between February and December in 2020, over seven million legal cases in China were filed online and over four million cases were adjudicated online (Lau, 2021). Chinese courts uploaded more than 200 million case details and more than 600 million parts of evidence to national judicial online platforms (New Perspectives on Asia, 2021).

- The equality of arms between the parties is vital for a fair trial. The equality of arms means that the parties to the case are subjected to the same conditions in terms of their procedural rights and one party has the opportunity to present their claims and defend themselves in a reasonable manner before the court, without putting one party in a weaker position than the other one (Şahin,2019:3053). Numerous verdicts within the administrative jurisdiction contain of discretion. Discretionary verdicts might need to consider community values, the subjective characteristics of parties, and other circumstances which might be pertinent. Along with this discretion, there are matters with existing types of judging and prejudice. The result of court judgment can be affected by numerous dynamics and their qualities such as representation, sources, decision-making and etc. Adjudicative decision-making is generally affected, to the certain extent, by numerous dynamics which affect the substantive justice such as the time of day, decision fatigue, personal values, unconscious assumptions, reliance on intuition and emotions (Sourdin and Cornes, 2018).

- Robot judges function rooted in logic, where input information is processed through programmed algorithms to reach a predetermined result. In the administrative jurisdiction, rights and obligations are prescribed by laws, statutes and etc. and judges mostly should apply the law. In addition, in this jurisdiction, there are not much places where judges use the discretionary power. For instance, there are not hearing witnesses and promissory oath, hearings are exceptional and are in the limited stages and inspection and expert witness reports are not used regularly. The

jurisdiction is written and the storage of information and documents relatively is simple and when some necessary documents which are similar to these cases are required by judges, these documents and information can be found easily, with a system, these document and information can be compared with the new case`s documents and information and these make decision-making process less complicated, faster and more accurate.

- Robot judges will make the same verdicts. This means that there will not be different reasoned judgments about the same cases in different courts. This will increase the trust to courts by the public. As mentioned before, the study of legal AI platform LawGeex took place with 20 qualified lawyers competing against AI. The human lawyers took about an 85% accuracy rate on average. But the AI machine took 95% accuracy.
- The independence of judges comes from the theory of separation of powers and judges are independent and make fair decisions about them. However, judges can be put under pressure through existential, private and institutional channels. Also, judges may have some political and religious opinions or have some political or religious ideas or groups. When they encounter with these kinds of cases, they have a great difficulty in being impartial. But, there is no possibility of any punishment, threat, promotion, dismissal, remuneration and pressure for judgment machines which could be utilized as leverage against them. They are considered to be unbiased and function without emotions. The certain groups which are made up of humans may be needed to control and monitor them at least at the early stage of this implementation.

When Turkey determines to use the AI systems in the administrative jurisdiction procedures, Turkey firstly should carry out the preliminary preparations of the use of AI in the administrative jurisdiction. There are some preliminary preparations based on the government policy which should be completed by Turkey to use the AI systems in the administrative jurisdiction:

- In the study named "2020 edition of the Government Artificial Intelligence Readiness Index", Turkey has the score of 46.010 overall, its rank is 66th from 172 countries and in the region of South and Central Asia it is 4th from 16 countries. In the government willingness index of the study with the average score of 41.34,

Turkey's score is 43.03 from 100 with the rank of 63 from 172 countries and is 4th from 16 countries in the region of South and Central Asia. In the technology sector index of the study with the average score of 32.76, Turkey's score is 35.46 from 100 with the rank of 58 from 172 countries and is 2th from 16 countries in the region of South and Central Asia. In the data and infrastructure index of the study with the average score of 58.64, Turkey's score is 59.54 from 100 with the rank of 79 from 172 countries and is 6th from 16 countries in the region of South and Central Asia.

- Turkey published its national AI Strategy on 24 August 2021 and this strategy was prepared by the Digital Transformation Office of the Presidency of the Republic of Turkey and the Ministry of Industry and Technology consistent with the 11th Development Plan and Presidential Annual Programs within the framework of the "Digital Turkey" vision and Turkey's "National Technology Move". This includes some measures and goals in AI for 2021-2025. Turkey tries to expand the share of AI in gross domestic product to 5%, create 50,000 new jobs and reach 10.000 postgraduate students in AI by 2025. This national AI strategy is just the first step and should be followed strictly. AI is a vital element of the power in international affairs.The funding is very important to follow other countries in AI and the global funding is estimated to double in the next 4 years. Turkey should increase the budget for the AI R&D in the future.

- Turkey has a National e-Government Strategy running from 2016 to 2019, and a 2019-2022 National Smart Cities Strategy and Action plan. Turkey shows a willingness to adopt new technologies to advance government and public services. In 2018, Turkey created the Digital Transformation Office of the Presidency which coordinates the digital transformation of Turkey. In the 2020 eGovernment Survey, Turkey was 23rd in the world, and 2nd in South and Central Asia behind Kazakhstan from the point of online services. This shows that there is a basic digital infrastructure in Turkey into which the AI technology could be implemented. But, according to Turkey's score, it should do something more beyond the basic requirements of e-services and should adopt sophisticated technologies. Turkey's start-up ecosystem has struggled to access venture capital, partly due to the political instability since the 15 July 2016 coup d'état attempt. However, Turkey has some important research centres which assist it to make technological innovation. The Cloud Computing and Big Data Research Laboratory project was created in 2013, and the AI Research

Centre at Istanbul Technical University was established in December 2018. The Istanbul Technical University has an accelerator, called as Çekirdek, based in its technology park on campus. Turkey funds research and entrepreneurial endeavours through the Scientific and Technological Research Council of Turkey. The score of 21.11 out of 100 for R&D spending is not enough and Turkey should spend more for R&D. The Data and Infrastructure seems Turkey's lowest-rank and this is an area for improvement if Turkey desire to build AI readiness. Turkey is 79th in the world from the point of telecommunications infrastructure according to the 2020 UN eGovernment Survey. Turkey aims to switch to 5G by 2021, and its networks have already been trialled in Turkey.

- The Presidency's Digital Transformation Office and the Republic of Turkey Ministry of Industry and Technology should bring together industry specialists, innovation support experts, prominent scientists and professors in order to advance multidisciplinary researches and the improvement of the AI technology. The Presidency's Digital Transformation Office should enrich the networking system among universities, industries, and government institutions by sharing knowledge and supporting conversation. Distribution and uptake of AI should be spread through websites, use-cases and conferences.

- Turkey should attract leading foreign AI industries, foreign talented researchers, talents, Turkish researches and talents which live in foreign countries. The recruitment of international researchers should be supported and hurdles should be reduced to recruit talents and graduates which are especially born in Middle-East countries and complete the university education in Turkey. The Turkish government should create a policy instrument to observe the new developments of AI-based legal technology on the market and to make contacts with businesses with R&D.

- Research centres should be established in fields such as ML, Internet of Things, big data and DL. The international exchange of knowledge and collaboration among Turkish research centres and other main centres in the world, including Europe and America should be supported.

- Digital Innovation Hubs in AI should be created in order to systematically raise awareness on AI in Turkey. Free open-source texts and data analysis systems should be tested in all government institutions and should be integrated into them.

- Every state that has the power to develop national AI strategy aims to integrate the AI technology into its system in accordance with its state structure and character. These states consider the AI technology from various dimensions. For example, South Korea has one of the main goals to lead global AI R&D investments. India aims to use AI for inclusive growth; archive data related to AI and make it accessible. America prioritizes using AI in the military and training the next generation's workforce. The European Union aims to use artificial intelligence for social economic changes. China attaches importance to information sharing and wants to establish global technical standards for AI. England attaches importance to the diagnosis of diseases and the ethical dimension of AI. The United Arab Emirates aims to reduce government costs and improve government performance through artificial intelligence. Singapore is committed to building AI innovations that benefit people. Japan's goals are to achieve success in robotics and to restore productivity with AI. France aims to protect its own strategies with AI investments. Ecological and environmentally friendly AI studies are created. Canada, aims to attract global entrepreneurs and talented engineers by leading AI research. Germany aims to redesign business and enrich the work-life balance in the age of artificial intelligence. Denmark considers AI as an ethical and human-centered basis.
- Turkey should take lessons from other national AI strategies and transform them according to its own internal dynamics. For instance, AI relies heavily on data; Turkey should create a data culture in producing, using and developing data with new approaches. The use of artificial intelligence by the business world should be encouraged by the public sector. Potential benefits of AI include the improvement of opportunities of citizens to create value and their individual potential, reducing paper costs, saving time, and significantly increasing and improving the public service quality. It is very important for public employees to be integrated into this process. AI is very likely to bring an ever-increasing mess to the public sector, and serious strategies must be devised to prevent it. It is inevitable that investments will increase in the acceleration of the development speed of AI and the serious funding support is required. The security risks brought by the technology should not be forgotten. Turkey should focus on strategies which are specific to crucial AI technologies such as judgment machines. Strategies should be specific to promote key industries in AI such as justice. Turkey should create guidelines on ethics for robots; make long-time

AI strategies, strategies for data, skills, and research, and AI adoption, strategies for automation, education, and regulations for AI.

- Turkey should be fast to strengthen networking and infrastructure. The Presidency's Digital Transformation Office and the Ministry of Industry and Technology should collect foremost industry specialists, innovation support experts, famous scientist and law professors to advance multidisciplinary research and innovation. The Presidency's Digital Transformation Office should make stronger networking chains among universities, industries, and the public sector with the efficient distribution of knowledge and encouragement of channel of communication among these powers.
- Distribution and uptake of AI should be carried out in the public sector by means of use-cases, meetings, conferences, websites and organizations by sharing the knowledge, information, expertise and practice. The Turkish government should create a policy instrument to observe obtainable technological improvements on markets and to cooperate with businesses with research and development institutions. Digital Innovation Hubs in AI should be created in order to systematically raise awareness on AI in Turkey. Free open-source texts and data analysis systems should be tested in all government institutions and should be integrated into them.
- Data is necessary for the improvement of new AI instruments as a raw material of AI. So as to make the most of its economic and social utility, the Turkish AI policy should aim for the formation of the data infrastructure and ecosystem which supports the compilation of high-quality data and advances data circulation among stakeholders, while protecting basic data protection directives and making sure that people manage their personal data. The creation and improvement of the reliable and qualitative data infrastructure is high important and Turkey should make the data infrastructure to produce obtainable first-class public data in open, reusable and obtainable formats. The development of a digital infrastructure should be funded by the government. Data portability ought to be fostered, permitting migration of data without the loss of data history. Turkey should improve the digital infrastructure to advance the cyber security.
- Natural Language Processing is very important for judgment machines in the interactions with humans. Successful solutions have been obtained especially in

English and other languages from the Indian European language family. The main reason is that the English language is dominant and generally people make robots which can communicate with others in English to help more humans and make the robots useable for more people. However, in Turkey, Turkish Natural Language Processing is not yet as experienced as English in this topic. For the success on judgment machines, labelled big data with Turkish text processing interfaces should be created, stored and shared. This should be at a level that promotes its safety, storage and processing. Experts on the Turkish language and institutions working on the Turkish language should involve in this process. Completed cases should be opened to access to the public. If the government wants to use the AI robots in courts as decision makers or assistants, the government should allow applications to reach all the cases completed. This kind of applications will increase the data volume and help applications to understand the Turkish language well without mistakes and respond well.

- The ways of access to legal information started being used rapidly in different fields in Turkey. Especially, the influence of Legal Technology 1.0 has ascended notably in recent years. For instance, Law (Office) Automation Systems, Legislation Mobile Applications, Decision Search Engines, Legal Forum Sites, such as National Judiciary Informatics System (UYAP in Turkish), Celse, e-Tahsilat and Turklex can be given as examples. These systems generally were prepared for the needs of the lawyers. However, Legal Technology 2.0 and 3.0 are not common in Turkey because of the lack of trained personnel and technical infrastructure except for few examples such as Adalethanım, the Robot Software Interface for Lawyers (ARYA). To make these systems effective and increase the number of judgment systems, the Turkish Ministry of Justice should support the global tendency of judgment machines in Turkey and should work with Turkish bar associations, the union of Turkish bar associations and universities. Some countries have used these systems in their law systems such as China and the USA. With these countries, Turkey can corporate with these countries and even if their law systems are different, it can learn how to be used and to learn experiences. The work of bar associations on AI robots which is supported by the government can be very useful for the success of the potential project on judgment machines in Turkey. For instance, bar associations can offer the appropriate environment to newcomers to the profession and lawyers who are

interested in the field. Law apprentices in bar associations can be trained on informatics and computers in a way that also covers the concepts of artificial intelligence and big data. Students in law faculties can be trained for the legal technology. Informatics and computer science basic courses should be included into curriculums of law faculties and in these courses AI and big data concepts should be covered. The personnel who are expert at law and robotics should be trained in universities.

- The government should spend money for a secure, scalable, and trustworthy technology infrastructure as a foundation to offer digital services and public access and at the same time, the government should focus on privacy protections and security. The government should enhance access to the courts, control justice in a suitable and efficient method, and optimize case processing by supporting the digital court for robot judges and by executing wide-ranging digital services for the public. It should focus on innovation by reinforcing and broadening the IT Community through collaboration, education, and employment strategies. It should advance the transformation of laws, regulations, and rules to facilitate the utilization of the AI technology in court processes and the delivery of court services.

There are some preliminary preparations based on the education policy which should be completed by Turkey to use the AI systems in the administrative jurisdiction:

- Children should need completely new skills in a world dominated by the AI technology. Children should begin with simple works such as collecting data, showing them with simple graphics and labelling the data accurately in the primary school. Generally, they must develop a sound basis and the understanding of the AI technology and its different features such as ML, machine intelligence, robotics, data mining, DL and etc.

- AI work and studies should be designed for every level and certain age categories. In certain years, the difficult level should be increased systematically. AI can be modified according to the profession that students will prefer and can give many benefits for their future jobs. The main point is to develop modified studies for young students and children. If they desire law careers, the ethics on AI, regulations of AI, judging machines and predictive machines should be in their curriculum. The AI changes the world very fast and the next generation has to know the AI technology

because they may have to have jobs which do not exist yet and may have to create jobs for themselves.

- Primary education and secondary education are very important tools to train students well. In primary schools and high schools, the basic knowledge about AI and big data should be given to students and the methods of lifelong learning, digital classroom and personalized education services can be designed for students in primary schools and high schools.
- In universities and research centres, the capacity and the budget for the AI technology should increase. In law faculties in Turkey, the curriculum should contain basic courses in informatics and computer science about the concepts of AI and big data. Pilot studies should take place in cooperation with engineering and communication faculties. Lawyers and engineers should work together in universities about AI and big data. The basic computer courses and some basic information which can be used in profession about the AI and big data should be given in the first year of the law faculty. Universities should work with bar associations to improve legal education and to provide education in accordance with digital transformation. In law, sociology, philosophy, philology and engineering faculties, the courses of AI and big data should be provided. Laboratories, research centres and new university departments (such as Computer Engineering at Hacettepe and TOBB University) should be established and engineering and law-based academicians from different disciplines within universities can work together. The law faculties in Turkey should give law courses related to the AI technology as elective courses and when these technologies are decided to use in courts, law faculties should give them as compulsory courses. For instance, in 2016, Council of Higher Education (YÖK in Turkish) allowed Informatics and Technology Law to be opened in faculties. In 2019, Inter-Universities Council added "Information and Technologies Law" as the department to the fields of associate professorship. In law faculties, in these days the number of master programs, research institutes and centres related to information technology law is being increased significantly such as Istanbul Aydın University- Information and Technology Law (with thesis) as a master degree, İstanbul Bilgi University- the Institute of Information and Technology Law, Yeditepe University- Information Technology Law Sub-Branch

Program, İstanbul Ticaret University Information Technology Law Training Program.

- The Justice Academy of Turkey should redesign the syllabus of courses, implement the certain AI courses and give the AI-based education for civil and administrative law judges, public prosecutors and the prospective judges and public prosecutors in different fields, seminars and conferences, along with AI certificate programs, to support the understanding in the legal technology.
- Candidate judges and public persecutors can take more classes in a day in the academy for 3 months and 15 days and online classes can be taken as additional when they are working in courts. If there are some classes about psychology, self-improvement and some specific classes, some of them can be removed and some of them can be given with the AI classes. For instance, ethics in AI can be taught with self-improvement and psychology classes. The responsibility of the AI robots can be taught with the responsibility of judges, public prosecutors and judicial staff in judges and public prosecutors` responsibilities. UYAP can be improved with AI and can be taught with big data and the AI technology. Today, AI is being used for license plate recognition or face recognition system and it is one of the tools used to ensure the security of cities. This feature of AI can be taught with gathering of evidence class in the penal law to judges and public prosecutors.
- The time of the training time in the academy can be extended. In this time, all classes about AI on law can be given with other classes or alone. In the academy, training time is divided into two sections, which are preparatory training (one month and 15 days) and last training season (two months). In the preparatory training, there are common classes for all prospective judges and public prosecutors and some classes should be added such as big data, data security and privacy and artificial intelligence, ethical issues and AI and etc. In the last training season, specific classes should be given to prospective judges and public prosecutors according to their professions (such as administrative law judge).
- The academy can work together with the Union of Turkish Bar Associations and other pertinent organizations, institutions and agencies to develop and implement AI applications and ideas for the use of AI in law and produces information and documentation centres, databanks and libraries to create the background of AI

applications such as robot judges for big data and natural language processing. It can help the preparation of the Turkish law of justice bibliographies for AI cases in the future. The consultative committee of the academy for AI should contain AI professionals, mathematics, engineering and law professors. Lecturers and educators working in higher education institutions about AI should be appointed as instructors in the Justice Academy. Judges, prosecutors, advocates, and other people expert in the field of AI should teach at the academy provided that they are considered suitable by the related authorities.

- Artificial intelligence and informatics education should be included in the education program of students at all levels, especially in the law department of universities. First of all, educators, students, public and private sectors should be prepared for artificial intelligence according to their level through education. Next generation should be educated against the abuse of AI. To create a qualified workforce and acquire new skills through education, to make pioneering and supportive changes in laws, regulations and legislation in accordance with the national strategy and to ensure that public officials and decision makers have the proficiency in AI, programs should be created.

- The establishment of an 'Artificial Intelligence and Law Institute' should be designed with the joint contributions of one or more universities, under the coordination of the Turkish Ministry of Justice and this can contribute to effective and efficient legal arrangements by understanding the technical aspects of AI in law. Since AI is a multidisciplinary field, numerous faculties such as public administration, psychology, linguistics, computer engineering and etc. should work together.

- Educators` initiatives are highly important because educators can observe students` conditions better and make decisions in a faster way. Because they are trained well by the Ministry of Education, they can follow the world and new changes in AI better. Especially, the development cycle of curriculum for educators on AI is highly important and should be prepared carefully. It should focus on the preparation of educators for the preparation of the curriculum. Although the understanding of the AI and the AI capacity are very important, the most important thing is to embrace and perceive AI schooling. To maximize the capacity of the AI technology, the government should order schools and universities to take adequate actions in the fastest way.

- The concept of Lifelong Education in Turkey can be modified. Education Offices can be established. This department can give online courses about AI and big data and can share new developments in AI, research and development expertise with the public.

There are some preliminary preparations based on the law policy which should be completed by Turkey to use the AI systems in the administrative jurisdiction:

- For Turkish AI algorithms to function properly in the administrative courts, one of the most important things is to work openly and efficiently. Due to this, Turkey needs to have open data. AI algorithms can be used to tackle with discrimination in courts by contributing to social harmony. Turkey should protect its data as well as the AI models and algorithms produced with its national data since these algorithms can be prevented (from proceeding) or get stolen. Turkey`s national data that makes this algorithm can be stolen with reverse engineering. Turkey should create a strong system to secure its AI algorithms.
- To promote the use of AI and AI developments in the justice sector, Turkey should boost the capability of AI researches with AI-related research support and fund opportunities. The private sector should be supported in the case of the robot judge through funds (e.g., innovation and development vouchers and product development grants) because they can encourage the government to make judge robots better and the adequate infrastructure for building better judge robots. The technology centres in ML, DL and data science can be created to give support to businesses to develop innovative robot judge tools and legal services in courts. Turkey should prepare an innovation competition for the advancement of AI improvements derived from governmental datasets to pilot projects at different ranks of the technology readiness in the case of the robot judge.
- Sandboxes should be created to promote tests and improvements of AI tools in the public sector. To increase the amount, level, and strength of trust for the use of AI, the adoption and improvement of artificial intelligence in administrative courts, Turkey should establish the data-driven governance with the formation of ethical standards for the sustainable and transparent usage of artificial intelligence with clear definitions on responsibilities, rights and data safety matters. A Turkish AI ethic centre can be created to give advices and check the sustainable, ethical and safe usage

of artificial intelligence. Together with the Presidency's Digital Transformation Office and the Ministry of Industry and Technology, the Ministry of Justice can release guidelines on AI ethics and safety and need to give legal certainty in terms of data sharing, usage and safety in court systems. Provided that Turkey needs to use AI in administrative courts, Turkey need urgently modify the Turkish Personal Data Protection Act on the collection, storage and use of personal data and objections in the situation of misuse of data.

- Turkey is proposed to work on self-assessment questionnaires for AI developers which are based on assessment lists with the ethics standards for trustworthy artificial intelligence in courts. For instance, Turkish people should fully control their data, and their data should not be utilized to be harmful for them or make unjust and prejudicial distinctions in the treatment of various categories of people. AI tools ought to protect privacy and data and AI developers should apply design methods like data encryption and data anonymization.

- Turkey should ensure the quality of the data and keep away from socially constructed biased, inaccuracies, errors and mistakes. Data collection should not be prejudiced and AI developers should establish oversight mechanisms to have power over the quality of data sets (Madiega, 2019:4). For instance, B3LAB (an affiliate of Tübitak Bilgem's Institute of Information Technologies) is the research and development laboratory responsible for big data, artificial intelligence and cloud areas of homeland security and tries to reach the highest level of protection of public institutions with national software and the top-rank protection of data privacy and made some products with the name of Safir which are put into in-house systems in particular public institutions. Its long-term aim is to use the products among the public and causes a mutual comprehension for citizens in terms of the personal data privacy and expands the public benefit field of Tübitak by transferring them to the private sector such as Safir-branded Intelligence, Storage, Cloud, Big Data and DevOps. For instance, Turkey needs to protect data in courts. Therefore, an electronic file storage system for safety and privacy created by B3LAB with Safir Storage having its capability for storing files in the cloud after the encryption on your computer can be used in courts (Güner, 2019).

- Rule-based systems are designed to encode rules found in the constitutions, laws, and etc. When the codes and regulations are used for facts of a case, an inference

engine can make a solution that shows the effects of the statute, codes and regulations on the given facts. Rules are determined by legislation. Considerable amounts of statutory law are fundamentally definitional in nature and try to define legal relations or concepts. In Turkey, the administrative jurisdiction is mainly the written law and there are various legal regulations. RBR looks suitable for the Turkish administrative jurisdiction. However, it is inevitable that some principles which can developed by administrative courts should be taken into account in judicial process so as to meet the developing needs arising from the fact that administrative law is not codified. Decisions on the unification of conflicting judgments are binding. If the legislation is not clear enough, case law can be considered as an auxiliary source. Due to these reasons, hybrid systems can be effective in some situations like in Turkey.

- Robots should be considered as tools and they should not possess moral and legal status without any right and responsibility. The responsibility of robots should belong to humans and they should be designed to achieve aims and desires that humans choose. No matter how developed their actions or elegant their forms, they should stay as tools for humans. An answer to the question whether robots should be given some types of legal personhood cannot be provided until the question becomes urgency for the humanity. Machines with limited memory are used and these machines can be made with today`s technology. These machines can use past experiences to inform future decisions. Today there is no need to talk about any legal status of robots. They are considered as tools. In the future, when self-aware machines and machines with a theory of mind are made, some problems can take place. The level of unpredictability of robots is vital for a new status of robots. However, especially in public services, in some situations workers' responsibility may be valid for limited memory machines. For instance, if a human judge makes a mistake or make a wrong decision, the government is responsible and should pay compensation and later if a judge is really mistaken, the government take the money from the human judge. The same situation can be used for robots in courts. However, robot judges have to obtain insurance and licence provided by the regulatory institution.

- For the trust of AI in administrative courts, Turkey should create ethical guidelines for the sustainable and transparent usage of the AI technology. The definitions of guidelines should be clear about ethics, safety, responsibilities and data protection

issues. In collaboration with the Presidency's Digital Transformation Office and the Republic of Turkey Ministry of Industry and Technology, the Turkish Ministry of Justice can release the guidelines. In terms of legislation, the Turkish Ministry of Justice should give legal certainty about data usage, privacy and protection in courts. Turkey need urgently modify the Turkish Personal Data Protection Act according to data usage, privacy and protection.

- Turkey should ensure the quality of the data and keep away from socially constructed biased, inaccuracies, errors and mistakes. Data collection should not be prejudiced and AI developers should establish oversight mechanisms to have power over the quality of data sets.
- Big data provides AI machines with the data essential for advancing and improving features and pattern recognition abilities. Without huge quantities of high-quality data, it cannot be possible to develop and train the intelligent algorithms, neural networks, and predictive models which render the AI technology.
- In order to regulate AI, humans should consider AI as a statute which creates the general rules for AI regulation. The legislation may create an agency which is in charge of labelling AI programs as safe and create the restrictions of the agency's ability to involve into AI research and development. For instance, in Turkey, the Turkish AI Development Act can be useful for AI and it should focus on a statement of intention first. The intention of the Turkish AI Development Act can be to ensure that AI is out of harm's way and susceptible to human control, and associated with human interests, by discourage the formation of AI which is short of certain characteristics and by giving confidence to the creation and the improvement of the helpful AI which consists of certain characteristics. The agency can be needed to put into effect rules identifying AI and to bring up to date the definitional rules at regular intervals.
- The agency should be created and should obtain 2 components which are policymaking and certification. The policymaking body should describe and identify artificial intelligence, make exemptions permitting for AI researches to be performed in particular environments without researchers who are for firm liability, and set up an AI certification process. The certification process can need AI creators looking

for certification to carry out safety testing and send the test outcomes to the agency together with their certification application.

When the benefits of judgment machines in the Turkish administrative jurisdiction are understood well, the preliminary preparations should be carried out. After the preliminary preparations, the government should consider in which parts of the administrative jurisdiction judgment machines can be used and how these machines should be used. The government should focus 2 main areas, which are an automated decision making system and AI systems facilitating AI decision making:

- The AI system can classify cases into groups and it can make decisions about groups of cases fast. The government should give AI cases with small claims and AI should solve them with a simplified and quick trial procedure. In all cases, the subject of which can be measured with money and under a certain monetary amount, the AI tool can handle them with simple trial procedure. By simplifying some procedural procedures, the AI tool can trigger the process of making faster decisions. The AI tool can create a model that prevents the prolongation of the processes due to lack of subject-matter jurisdiction and territorial jurisdiction in the administrative judiciary.
- Some methods can be used to facilitate the decision making processes of judges and can be used with AI efficiently in the administrative jurisdiction such as collecting and analyzing documents with the help of AI, online courts, arbitration and smart contracts and robot helpers in the application of administrative courts.
- Automated decision making systems can occur in two ways as the first one which includes solely automated decision-making systems and these systems' decisions effective without human intervention and the second one which acts as a guide or an instrument for a human decision-maker that finally makes a judgment for the final decision.
- In the administrative jurisdiction, a decision support mechanism can be developed for administrative law judges. This mechanism can have a shape-dependent structure and it should predict how any of the subjects participating in the process at a certain moment of the process could act. In the Turkish administrative jurisdiction, the mechanism can contribute to the achievement of the goals of consistency and promptness in the judgment by preventing procedural transactions from being

incomplete and erroneous, preventing unnecessary actions and averting malicious conducts which try to extend the time of the case. The mechanism should have a structure that allows human intervention at appropriate and necessary times.

- An AI DSS which can courts help even make unstructured decisions, can contribute to ensuring consistency at each stage and help reduce time spent on resolving procedural issues should be created. For instance, when the average time is exceeded in a certain request to the court in the administrative jurisdiction by taking into account the statistical data, the AI system should warn the judge.
- The unstructured information in the application of the plaintiff to the court recorded in the system should be interpreted and the types of the case should be determined by the AI system. According to the type of the case, the deficiencies should be remedied and if there is a deficiency, the AI system should automatically give the extra time to a plaintiff. In this way, in the preliminary examination phase, the judgment machines can be used effectively. The goal of this phase is to catch deficiencies or mistakes before the investigation phase. This way is made mainly for the procedural economy. For instance, robot judges can check mandatory elements, which have to be in petitions according to the article 3 of Turkish administrative justice act. Generally, it can assist human judges in analyzing preliminary examination of the petitions (Article 14 of the Turkish administrative justice act (1982)). Provided that the petitions are found against the law from one of factors, the algorithm can inform the relevant court by a report.
- By the help of NLP methods and DL techniques, AI tools that interpret the data and made the data available for the use can be utilized for the administrative courts in the discovery and court investigation. For instance, an algorithm which can analyze the compatibility of documents can be used to help human judges. The settlement of a case pending at court often entails making many interim decisions during the trial. Such decisions do not end the case and, on the contrary, it serves the progress of the case such as the inspection and expert examination. These interim decisions can be made by robot judges effectively, because robot decisions can prevent arbitrariness, inexperience, unnecessary moves and etc. Preliminary issues, the transfer of the subject matter, merging and separation of cases can be managed by robot judges.

- While creating a detailed model of the judgment procedure, the aim can be the main application of various decision formats for types of cases that are common in practice. With deep learning and natural language processing, the AI tool can contribute to the judge`s decision making. Modules that provide convenience to the judge can be designed in the process of justifying the decision. By developing systems that will enable the legal expenses to be accurately calculated by the system according to the justification rate in the case, such workload can be taken over by robot judges.
- The robot judge can determine whether litigant or defendant can apply to a higher court for a reversal of the decision of a lower court and if this is possible, the robot judges can decide which courts can be applied such as Council of State or regional administrative courts.
- Judges exercise the judicial power of the state and it means that they might have an authority to imprison people, punish people with pecuniary penalties or indemnification and etc. according to judges` responsibility area (such as administrative law judge and criminal judge). They take the relevant information about cases and according to the information of cases, they make decisions. There are some processes, which be completed to make decisions such as collecting relevant documents and collecting relevant documents can take a long time.
- Administrative actions, acts and contracts can be found as digital documents or can be found in camera records, phone recordings, CCTV and etc. The electronic signatures are getting common every single day and are being used by government intuitions and people. In the social media, some comments may cause the dismissal of government workers and cause some problems which should be solved in administrative courts. In the search of camera, provided that the searched image belongs to a person related to the investigation, AI can find the person`s images in the camera and other people can be filtered so that other people`s data is not violated. The analysis of digital documents can be performed better than humans and AI can discover some clues which may not be noticed by humans. By the help of AI, license plate recognition and face recognition are used for the security of citizens and cities.
- A system of digital justice as online courts can be potentially helpful for the administrative law judges in Turkey. Digitisation in the legal system can make more

efficient case handling within the court system. Online courts can be considered as a promising response to numerous problems which administrative jurisdiction can face such as those arising from huge case filings problems, procedural complexity and expensive litigation compared with online courts. The AI technology with online courts can increase fruitfulness in administrative courts and it can handle the huge number of cases and alleviate knowledge, financial and physical difficulties to reach justice. An online court model can be proposed for the Turkish administrative law system. Claimants should fill in forms online. Administrative law judges can add pertinent scanned documents. After that, the file goes to the respondent and fills in forms and scans documents. It is easier to file a claim easily and without spending higher costs, additional time and sources. Each party can declare everything they find pertinent and useful to the suit. A clerk takes and controls the documents. Each party should have the right to adjust and complete missing details and documents whenever they find relevant details and documents, because the investigation of the fact which causes dispute and litigation and legal assessment and classification of facts belongs to the administrative court and also the collection and evaluation of evidence belongs to the administrative court. The administrative courts automatically investigate and inspect whether material events (facts) are truthful and lawful and can demand every document online which is necessary from parties except for some certain documents.

- Smart contract is an agreement whose execution is automated. Smart contracts have some important features and they have the electronic nature, conditional nature, software functioning and improved certainty. They maintain itself without outside aid and provide for its enforcement. In the administrative law, the government should involve in the contract and it should be one of parties. States make contracts with international companies such as building a bridge more easily and this system can be used to persuade foreign people to win tender and attract foreign investors, because the foreign people can be sure that they can take the money when they complete their works automatically via blockchain. The contract cannot be changed later and if companies fail to complete their works, the government will be sure that it will take the compensation definitely even in case of the bankruptcy. In this system, even international companies can make contracts with weak governments because international companies` money is protected by blockchain and governments do not

decide whether international companies complete their works. The most attractive feature of smart contracts in the administrative law is that, to a great extent, they have the power to reduce the need for administrative lawsuits. If the government or the company does not complete their payment or breaches the contract without any promised compensation, which is ready to be used, data is automatically sent to an online court and a litigation process starts at the online court.

- The usage of AI in arbitration has some advantages for the Turkish administrative law. AI can help improve the appropriateness and the fairness in the selection process of arbitrators, which attract foreign people and international companies to make business and make contracts with the government. Foreign capital looks for the equity and the security when they invest money. The inherently biased, absent and incompetent arbitrators are one of the biggest threats to arbitration. This kind of arbitration causes the trouble, insecurity and deadlock. The private companies believe that the treatment will be equal and because they believe in this, they want to take the countries` tenders. If the country is suspicious about the arbitration or arbitrators, it does not make any contract with them. The government abandons the advantage position and accept rules of arbitration rather than administrative courts. The rules of the arbitration should permit parties to challenge the prejudice of arbitrators. Provided that the prejudice is true, a system enables AI to eradicate the unconscious prejudice of party-appointed arbitrators and diversify the pool of possible arbitrators. AI can make sourcing and screen verdicts derived from the repetitive inclination of arbitrators while giving judgments, along with spotting and changing any such inclination which might be considered as prejudiced. AI can help decrease the time and cost of clerical legal processes, because there are lengthy legal procedures such as due diligence and contract review in the Turkish administrative courts. AI can help suggest the ideal arbitration mechanism to pursue in case of a dispute in a contract. It is likely to decrease arbitral uncertainty. The AI can make substantive legal contributions to the case of a party before the arbitration panel by forecasting the possibility of success of a case derived from the nature of the arbitrators, likely costs to be incurred, historical success rate of arguments or the inclination of a certain arbitration court (Bhattacharya, 2019).

According to the AI Index 2021 Annual Report by Stanford University, the number of AI journal publications increased by 34.5% from 2019 to 2020 and it is much better than the

percentage between 2018 and 2019 (19.6). The highest proportion of peer-reviewed AI studies belong to academic institutions, especially 19.2% of the total publications in the USA, 15.6% in China and 17.2% in the EU. In the time of COVID-19, most major AI conferences happened online and the attendance increased significantly such as 9 conferences almost doubled in 2020. Artificial intelligence studies represented 3.8% of all peer-reviewed scientific studies internationally in 2019, up from 1.3% in 2011. Today, artificial intelligence can compose texts, videos, and images to an adequately high standard and NLP has advanced language capabilities. Brazil, India, Canada, Singapore, and South Africa have the highest growth in the recruitment of the AI technology between 2016 and 2020. In 2020, an AI Index survey stated that the world's top universities increased their investment in AI education in the previous 4 years. The number of courses teaching students the skills essential to create AI models on the undergraduate and graduate levels increased by 102.9% and 41.7%, respectively, in the previous 4 academic years. The share of new AI PhDs preferring industry jobs increased by 48% in the previous decade, from 44.4% in 2010 to 65.7% in 2019. On the other hand, the share of new AI PhDs choosing academia decreased by 44%, from 42.1% in 2010 to 23.7% in 2019. The number of AI and Robotics/Vision specializations increased significantly. In the EU, almost all of specialized AI academic offerings take place at the master's level, robotics and automation are considerably the most frequently taught courses in the specialized bachelor's and master's programs and ML is very popular in the specialized short courses (Zhang et al., 2021; 10-12). According to this report, Turkey does not have the enough presence in the field of AI. However, an exception to this is academy-company joint AI studies. Turkey is among 24 countries in the list, which includes countries with 1000 or more AI publications. Turkey's AI publications are more than Malaysia, Indonesia and Iran and Turkey's AI publications' field-weighted citation impact is higher than Indonesia, Russia, Brazil and India. Publications originating from Turkey are below the average in terms of both impact value and number. While China and Japan have similar average impact value publications as Turkey, the number of publications for China and Japan is much higher. It has been analysed how many artificial intelligence-related terms appeared in the parliamentary papers of the USA, UK and Canada. Starting from 2016-2017, AI and ML have been increasingly taken place in the papers. It is seen that AI keywords are also found in the open communication papers of the central banks of different countries. It is seen that Turkey is among these countries, but artificial intelligence, which has just come to the agenda, has not yet found enough space as a subject in the country, and that policy documents, ethical and legal standards are not sufficiently formed (Akarun,

2021:7-9). Although Turkey does not have the strong AI capacity for now, especially in the law system, some recommendations can be helpful and key future studies can close the gap with world-leading countries in terms of AI. Other national artificial intelligence strategies should be reviewed and the best strategies should be determined and shaped in accordance with Turkey. For the future studies in AI in Turkey, some recommendations are possible for researchers, academicians and etc.:

- Other countries' AI strategies should be reviewed and for Turkey, future studies should focus on specific strategies-road maps for all sectors, especially in law, regulation, ethic and the use of AI in courts. In international and other countries' legal regulations on the personality status, legal and criminal responsibilities of AI should be analysed well and the studies should be made about the legal status of robots about possible robot status like humanoids status.
- In the world, the English language is dominant and numerous robots have been made in the language of English. In the time, some mistakes made by these robots have been eliminated and robots started making less mistakes. In addition, labelled data in English is one of vital factors which boost the success of AI systems. However, in Turkey, Turkish Natural Language Processing is not yet as developed as English. The basic structure of the Turkish language is agglutinative and it is more different from English. Due to this, the majority of AI models that can be used for English do not work for the Turkish language. For the success on judgment machines, labelled big data with Turkish text processing interfaces should be created, stored and shared. Due to this, all case decisions about criminal law, trade law, administrative law and etc. should be open to the public. Cases should be made accessible by the Supreme Court, the Ministry of Justice and the Council of Judges and Prosecutors. The future studies should analyse how Turkish Natural Language Processing can be developed and in which conditions these cases can be made accessible to the public without violating personal rights, privacy and human rights.
- It is important to use AI within UYAP to evaluate the data in judicial decisions from various aspects by making the accurate, effective and rapid analysis and evaluating the data given by judicial authorities. Since the creation and use of AI is data-based, it is necessary to employ data analysts and statisticians at all levels of the judicial authorities in sufficient numbers. The sufficient number of AI specialists can be

recruited in some pilot courts. The future studies can analyse in which courts, cases, documents and decisions AI robots can be used.

- The responsibilities of governments in AI are huge in public services. Especially, in courts, if the robots are used in courts in the future, numerous problems take place. For instance, if the robot makes mistakes, what governments will do such as compensation or prison sentences? Who will pay the compensation? When robots make mistakes, who will take the responsibility, programmers? end-users? Government workers responsible for robots in courts? autonomous machines? government? or at the defect rate? The future studies should focus on the responsibility of governments or courts or others, in which situations the government takes the responsibility, whether the government can use the same rules as human judges for AI judges? or should create new rules?
- Difficulties in using algorithms lead to deficiencies that lie at the heart of accountability processes: complex information issues, lack of adequate explanation or justification for algorithm operation, difficulties in diagnosing failure and securing redress. Together with accountability, the adequate understanding of algorithmic decision-making is necessary. Challenges of AI transparency, prejudice, justice and accountability are not only technical (ML) questions but also need serious engagement from law and public administration lens. For instance, complex algorithmic systems keeping a human-in-the-loop with the virtue of proprietary, non-transparent, and/or non-interpretable features strictly restrict human capability to work as sufficient supervisors. As dependency on robots by administrative and judicial actors increases gradually, the future studies should analyse whether remedying limitations and empowering human-decision makers to work as sufficient supervisors affect the legitimacy of the administrative state and its power and focus on AI model certifications, the testing of AI model performance, the use of models providing audit trails of decision-making to increase the accountability of AI in courts (Busuioc, 2020).
- Black-box AI is simply an algorithm that gives answers without reasons. Inputs going into algorithms are processed in a way that nobody knows what is going on and results appear. The first thing to search for future studies is whether the explainability is possible or in which situations and at which level the explainability can be possible. Once black-box algorithmic machines are integrated into public

sectors, these machines permeate the very fabric of institutions. For instance, these machines permeate justice system and law enforcement, while remaining inscrutable to challenge. In addition, in case alternatives are available in the future, future studies should analyse whether the use of black-box models is justified in public sectors especially in courts and if this is possible, at which situations the intervention is possible and law enforcement because every decision made by robots should be checked due to the credibility of AI and this intervention can hurt the privacy, personal and human rights.

- Especially in courts, AI robots can help judicial staff to work speedily and efficiently at different levels of the judicial process, robots can take the responsibility and replace human judicial staff in certain places such as sorting out cases and reading documents. Future studies should analyse the usage of AI robots in civil and criminal courts and in which stages robots can be used. Especially in the investigation phase in criminal law, AI robots can help police forces and public prosecutors to investigate cases fast and efficiently. In addition, if AI robots make decisions or do repetitive tasks in the future in the Turkish courts, who will control their decisions or tasks? Should humans create new higher courts which control AI decisions consisting of judges coming from various jobs such as computer engineering, law, neuroscience and etc. or are current appellate courts enough? These questions can be worth working on for researchers.

- AI robots follow a closely defined set of algorithms. They are either developed programmatically or are pointed to a set of previous cases, rules and decisions to determine most likely future decisions and tasks. It is very important with which data you will feed AI robots or should we give the allowance to AI robots to check all cases and decisions? AI robots may have their makers` prejudice or societal prejudice implanted in the data employed to feed AI robots. In addition to this, AI robots can learn numerous information and if there is a little prejudice in some subjects, that can affect all the decision-making processes. How can robots separate biased decisions from unbiased decisions? Biased decisions in one situation may not be biased in other situations? Can we believe that AI robots can find correct decisions by analysing all cases? Even correct decisions can be changeable according to the judge, the time, conditions and etc. These questions can be worth working on for researchers.

- Ethical problems covering the usage of artificial intelligence in law share a common theme. As AI robots are increasingly integrated into the law system, how can society and government make sure that core legal values are safe? For instance, equal treatment before the law, legal results coming from law rather than social status or power, procedural justice and due process, equality in the AI robot design and the use of AI robots; transparency in the process of AI robots, trustworthiness and integrity in the invention and application of AI robots. In addition, future studies can identify ways in which the use of AI robots can alter fundamental legal values and analyse whether the important values are kept in the technological transition.
- AI systems are vulnerable to cybersecurity attacks called an "AI attacks." Adversaries can manipulate AI systems so as to change their decisions to serve malicious aims. As AI robots are increasingly integrated into law systems, AI attacks represent an emerging and systematic vulnerability with the potential to have major impacts on the justice of the country. The future studies should evaluate how governments protect their AI robots in courts from cybersecurity attacks?
- In some courts, judges and public prosecutors may tend to behave and make some preferences differently than other places' judges and public prosecutors according to the place, traditional values, the workload and etc. At the same way, AI robot judges can be controlled by their own courts. However, governments can want to take all the control and manage robots from one place. The future studies should analyse whether local authorities such as courts in cities should control AI robot judges fed by data taken from their own courts or central administration such as the Justice Ministry should control AI robot judges fed by data taken from decisions of the Supreme Court, Court of Cassation and Council of State.
- As AI robots are increasingly integrated into law systems, robots start replacing human workers one by one. Similarly, is giving the power of judgment on humans dangerous for the future or is it admitting defeat or admitting robots are higher than humans? What the reaction of the public can be? Do they believe in robot judges more than human judges? If AI robot judges make decisions, they can arrest humans, limit their freedom and in some countries even kill them. The future studies should analyse whether the public is ready for AI judges from various points.

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