**Title: “Balancing the scales of Justice through Artificial Intelligence”**

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**Abstract**

Artificial Intelligence (AI) is a field of science, engineering and technology which involves creation of complex algorithms to determine outcomes. Techniques like machine learning, natural language processing, expert systems, and predictive analytics, is making impacts on health-care, transportation, defence, etc. These techniques could be applied to other sub-fields like administration of law for improving governance by bringing efficiency and transparency in the courts system and making law accessible to people. The docket of the judiciary, at all levels, is clogged with unmanageable numbers waiting for final disposals of the disputes. The huge pendency of the cases results from insufficient infrastructure, inadequate manpower and inefficient court management system. AI holds the potential to restructure the justice delivery process and improve the administration & governance in the society.

Integrating AI into judicial system requires digitalisation of Courts and online repository of courts documentation. In almost all major jurisdictions of the world this task is either completed or is under way towards completion. AI techniques could be employed to facilitate litigants in online filing of their claims, after which the suits would be evaluated online by judicial officers who are trained to use technology for evaluation. These officers could then instruct the litigants on the positives and negative aspects of AI dispute resolutions models and offer choice to the litigants to either settle their claims through online dispute resolution or take the conventional route of litigation. The AI driven technologies would facilitate better time-management if the judges take up the matter on judicial side. The authors in the paper will study and map the usages of AI techniques in dispute resolution and assess its general applicability in administration of law in the society. Justice delivery being the most important function of good governance, cannot be left behind and must be equipped with the latest state-of-the-art techniques of AI for timely, efficient & effective justice delivery in modern democracies.

**Key Words**: Artificial Intelligence, Machine Learning, Logical Rules, Knowledge Representation, Law, Judiciary, Justice, Administration, Good-governance.

**Introduction:**

Artificial Intelligence (AI) is a field of science, engineering and technology which involves creation of complex algorithms, to emulate human reasoning or thought processes. From general purpose areas like perception and logical reasoning, to specific tasks such as playing chess, proving mathematical theorems, writing poetry & diagnosing diseases, AI encompasses them all.[[1]](#footnote-1) But what is AI and what is the role of AI in the administration and governance of law in the legal system? In the first part of the article, the authors will address the question by providing a realistic understanding of AI systems & its major processes[[2]](#footnote-2) which is reflective of the actual capabilities of the state-of-the-art AI technology. The technical aspects of the AI systems are presented in a clear and lucid language so that it is also understandable by non-technical person. The aim is to primarily understand the underlying process of current AI technology and highlight the potential and limitations of existing AI technology, so that the AI processes and techniques can be realistically utilised in the legal domain for solving real-world problems. In the later part of the article, the authors will explicate how AI systems are being used or suggested to be used by lawyers & law firms in the practice of law; by the judges in the administration of law; and by user like ordinary people & businesses, who are governed by law.

**What is Artificial Intelligence?**

Defining Artificial Intelligence is a challenging task, as it has no universal meaning. Some scholars have defined AI as *systems that think like humans.* Haugelanddefines AI as ‘the exciting new effort to make computers think...machines with mind, in the full literal sense.’[[3]](#footnote-3) Whereas, Bellman defines AI as ‘the automation of activities that we associate with human thinking, activities such as decision-making, problem solving, learning.’[[4]](#footnote-4) Other scholars like Charniak & McDermott have defined AI as *systems that think rationally* ‘through the use of computational models.’[[5]](#footnote-5) Whereas, Winston defines AI as ‘the study of computations that make it possible to perceive, reason and act.’[[6]](#footnote-6) Other scholars have given more action-oriented definitions of AI. Primarily, when *systems that act like humans.* Kurzweil defines AI as ‘the art of creating machines that perform functions that require intelligence when performed by people.[[7]](#footnote-7) Whereas, Rich & Knight define AI as ‘the study of how to make computers do things at which, at the moment, people are better.’[[8]](#footnote-8) Lastly scholars have defined AI as *systems that act rationally.* Schalkoff defines AI as ‘A field of study that seeks to explain and emulate intelligent behaviour in terms of computational processes.’[[9]](#footnote-9) Luger & Stubblefield define AI as ‘the branch of computer science that is concerned with the automation of intelligent behaviour.’[[10]](#footnote-10)

Upon assimilation of all the aforementioned definitions, what emerges out is a practical and useful definition of AI. Where AI can be understood as ‘using computer technology to solve problem or make automated decisions or predictions for tasks that, when thought or done by humans, typically require intelligence.’[[11]](#footnote-11) A few illustrations will help in understanding this depiction of AI.

Researchers have applied AI technology to automate some complex tasks like playing chess, translating languages & driving automobiles.[[12]](#footnote-12) What is common in these tasks with relation to AI is that, when people are entrusted with performing these activities, they employ higher-order cognitive processes associated with human intelligence.[[13]](#footnote-13) This ability of computer systems to perform complex tasks associated with human intelligence have led to create an impression that computer systems are intelligent, thus earning a reputation of Artificial Intelligence. But is it correct to assume that an AI is really as capable as a human in performing all complex tasks? *Is AI really intelligent?[[14]](#footnote-14)*

***Is AI actually intelligent?***

Computer scientist who engage themselves in automating complex tasks like translating languages, driving cars, have termed these computers systems as possessing some sort of Artificial intelligence. These computer systems performs complex tasks that looks very similar to that when performed by a human, from the outside, but it employs a completely different ‘synthetic’ process for problem solving, from inside.[[15]](#footnote-15) When people hear the term AI they misconceive AI systems as thinking machines, which produces results through an application of some sort of ‘synthetic’ cognitive ability that matches or surpasses human-level thinking.[[16]](#footnote-16) By contrast the reality is that these systems apply heuristics, i.e. they detect patterns in the given data and use knowledge, rules and logic which are specifically coded into them by people, in computer readable language, to produce automated results.[[17]](#footnote-17) Through these computational techniques, the system is able to perform complex tasks and produce intelligent results, which when done by human would require higher-order cognitive skills. However the computational mechanism followed by the AI system does not match the mechanism employed by humans,[[18]](#footnote-18) while doing cognitive functions.

The AI makers and developers have since long had the vision of making a Strong Artificial General Intelligence (AGI) which can surpass the human-level cognition[[19]](#footnote-19) and can engage in arbitrary conversations about abstract topics like philosophy, can comprehend concepts and ideas, and can perform broad spectrum of functions that are associated with human intelligence. [[20]](#footnote-20) But these aspirational ideas have long since fuelled AI makers to arrive at the current state-of-the-art AI technology, which on contrary is nowhere near achieving strong AGI. Researches in the field of AI suggest that, systems of today excel in narrow, limited settings[[21]](#footnote-21) - where there are clear cut right or wrong answers like playing chess, or where there are underlying patterns and structures, like translating languages, visual recognition, speech recognition. There is little actual evidence which suggests that a strong AGI is anywhere possible within the realistic time frame of five-ten years, from 2019 to the next decade.[[22]](#footnote-22)

**AI technology: Major AI approaches**

Artificial Intelligence as a discipline is considered to be a sub-field of computer science.[[23]](#footnote-23) But recent growth in AI research, indicates that AI isn’t an isolated stream of computer science, rather it is an interdisciplinary enterprise which incorporates ideas, techniques and processes from various fields, like statistics, linguistics, mathematics, robotics, electrical engineering, logic, neuroscience, economics & philosophy.[[24]](#footnote-24) AI in its truest essence, is a bundle of technologies that are compiled together under an umbrella term of ‘Artificial Intelligence’. There are some major under-lying technologies that are at play, when an AI system is used to automate complex tasks like advising judges on sentencing and bail pleas, translating languages court languages & assisting lawyers in e-discovery and e-reviews of court related documents.[[25]](#footnote-25) The most successful artificial intelligence technological approaches can be classified into two broad categories: (a) logical rules and knowledge representation, and (b) machine learning. [[26]](#footnote-26) Let’s us look into each approach in some detail.

1. ***Logical Rules and Knowledge Representation***

A major branch of AI, logical rules and knowledge representation technique is used for modelling real-world processes and phenomena in a computer readable form.[[27]](#footnote-27) The programmer provide the machine with a set of rules which represents the underlying logic and knowledge of the activity which the machine is desired to model or automate.[[28]](#footnote-28) The knowledge is provided deliberately to the machine before hand in a computer readable format, which is used by the machine to process and ‘deductively (use &) reason about them’.[[29]](#footnote-29)

Knowledge representation is the oldest form of AI which is still in use and relevant. It is the underlying process in modern day expert systems.[[30]](#footnote-30) A good example of such an expert system from the field of law which uses logical rules and knowledge representation system is TurboTax.[[31]](#footnote-31) Legal expert systems, like TurboTax is created by software developers in consultation with the tax attorneys and other experts in the field of personal income tax laws, who help in ‘translating’ the meaning logic of tax provisions into a set of formal rules which a computer can use.[[32]](#footnote-32) ‘Most of the laws whether made by legislature, courts, agencies or anyone else- can be understood as if-then statements’.[[33]](#footnote-33) Once the rule gets programmed into the system, the computer can use the rule to filter out relevant information from the data and calculate the appropriate income tax liability of the clients. This tool has been successfully used in USA and a similar tool like this is also being used in Europe to calculate the income tax duties.[[34]](#footnote-34) The tax authorities also defer to the calculations made by these legal “expert systems” in their day to day proceedings.

Important features of knowledge representation system can be summarised here. First, it is a top-down approach[[35]](#footnote-35) of programming where the programmer encodes the logical rules, ahead in time, into the computer software. This is in contrast to the bottom up approach of the ML software,[[36]](#footnote-36) where the system trains itself to identify and use patterns for complex tasks. Second, once the rules are implemented in the system, the computer uses such rules to form deductive chains to come to non-obvious conclusion about the world.[[37]](#footnote-37) The system also engages in complex chains of computer reasoning that is very difficult for a human being.[[38]](#footnote-38) Third, knowledge based systems through use of power of computing can reveal hard-to-detect details- such as contradictions and hidden patterns in the data- which is not obviously visible to a human eye.[[39]](#footnote-39) This makes the logical rules and knowledge representation system a very powerful tool in modern AI systems.

1. ***Machine Learning***

Machine learning refers to a family of AI techniques that share common characteristics.[[40]](#footnote-40) Most of the machine learning methods employs detection of pattern in large volumes of data.[[41]](#footnote-41) These patterns are then used to undertake various complex tasks and produce useful results, like driving cars, recognising faces and speech, translating languages, or detecting fraud etc.[[42]](#footnote-42) Machine learning is a predominant approach of Artificial intelligence, which employs techniques like neural networks/ deep learning, naive Bayes classifier, logistic regression and random forests.[[43]](#footnote-43) However the ability of AI to ‘learn’ does not imply that these systems are replicating the higher-order neural activities that occur in human brains,[[44]](#footnote-44) when a person is in the process of learning. Rather the word learning is used in ML as a rough metaphor for human learning.[[45]](#footnote-45)

Let us look at an illustration for better understanding of how ML works with the help of a very common tool that is used in our daily lives to communicate, i.e. the email. Most of the email suites use ML to automatically detect spam mails (unwanted private or commercial mails) and divert them into a separate spam folder.[[46]](#footnote-46) ML software uses the technique of word probability to detect words and phrases that more often appear in spam mail, than your daily e-mails.[[47]](#footnote-47) However, for this process to kick-in, the software has to be ‘trained’. The training starts when the users receive a mail, and they are given an option to mark a mail as spam or not.[[48]](#footnote-48) Every time the user marks a mail as spam, the ML software detects and analyses the patterns in mail and makes reasonable automated decisions based on its analysis.[[49]](#footnote-49) The result is spam mails are automatically segregated from daily mails and is sent to spam folder without the knowledge of the user.

There two important features of ML software. First, that the software learns a pattern on its own without having a programmer explicitly program the pattern ahead in time.[[50]](#footnote-50) Second, the software learns over time through analysis of more data[[51]](#footnote-51) and drawing of additional patterns. This ability of the machine to learn and improve its performance overtime has been analogously compared to human learning. However it is clear from the illustration, that ‘learning’ in machine does not involve ‘replicating higher order brain function and cognitive processes of human mind’, rather it involves detection of useful patters through statistical analysis of more data.[[52]](#footnote-52)

One limitation of ML also emerges out from the ensuing discussion. The ML software needs data to train itself in identifying useful patterns. It depends upon large amounts of high quality, structured, machine processable data enhance its capacity and improve its performance. It cannot function well in an environment where there is little or poor quality data.[[53]](#footnote-53) This becomes absolutely relevant, when ML software’s are used in the field of law because law is one of those domains where high-quality machine processable data is comparatively scarce in public domain. However recent technological developmental efforts, relating to the digitisation of court systems[[54]](#footnote-54) and creation of online databases[[55]](#footnote-55) in countries like India, have raised hopes for more intensive utilisation of AI systems in improving the administration and governance of law in the society.

**Hybrid Systems:**

Hybrid system as the name suggest is a combination of either ML & Knowledge representation systems or its a combination of Human with the AI hybrids. The authors will explore these two systems in more detail.

***(a) AI Hybrid: Combination of Knowledge based representation and ML***

Modern AI systems today, do not use ML or knowledge representation systems separately, but, rather a combination of these two systems.[[56]](#footnote-56) For example a self-driving car uses a hybrid approach of knowledge representation and ML techniques to run. The system learns to drive itself through a series of training whereby it keeps improving its performance through repeated training of appropriate behaviour.[[57]](#footnote-57) However a majority of its behaviour coded into the system, beforehand by a programmer, through implicit rules and knowledge representation,[[58]](#footnote-58) which the system uses to deduce what is legally and socially appropriate behaviours. For example all self-driving cars are programmed before hand to obey the road signs and signals. They are coded to stop if the signal is red and go if the signal points at green. They are also coded to use indicator lights on a turning and use horns if necessitated by the situation. Thus a successful AI system uses a mixed approach of AI techniques, including machine learning models and encoded knowledge representation rules.[[59]](#footnote-59)

***(b) Human & AI Hybrid***

Another category of successful AI systems are those who are not fully autonomous, but rather they ‘keep a human in the loop’ for decision making.[[60]](#footnote-60) An autonomous system is one which make all the important decisions about itself. However such a system is very rare. All modern systems AI are autonomous to a certain extent after which they defer to human judgements, when a decision making falls outside its area of competency. One such problem is a long tail problem which refers to the idea that there are so many unanticipated and extenuating circumstances while driving on the road that it is impossible to train the AI systems or encode appropriate behaviour in such cases.[[61]](#footnote-61) An illustration will give a clear meaning to the idea. Suppose a self driving car is on running on the road. Due to some road maintenance, the police has diverted all the vehicles to use the pedestrian lane to cross the section. In such a case the self-driving car is unable to make a decision. In such a situation, where the self-driving car cannot make its own decision, it can call for help to a call centre staffed by human experts.[[62]](#footnote-62) The human counterpart is spurred into action, he/she assess the situation in which the car is struck by gathering data from the cars sensors, picks up the control of the car and steers it out of the situation.[[63]](#footnote-63) When the situation is normal for the car to function, he/she delivers the control back the system.[[64]](#footnote-64) This type of system if known as human in a loop, which has lot of utility in situations where the systems is faced with choices which the system is not trained or programmed to do. Such a system is also desirable for the field of law.

**Potential and limitations of AI:**

For optimum and best utilisation of a technology, it becomes essential to understand the strengths and weakness of it. From the ensuing discussion we can deduce the strengths as well as weakness in the state-of-the-art AI technology. This will allow us to assess what tasks AI can fulfill and where AI will fall short when the techniques and process of AI are used in the domain of law.

One thing that has to be clearly put forth is that AI, of today, is a narrow intelligence, i.e., it is narrowly tailored for performing specific tasks with a particular set of characteristics.[[65]](#footnote-65) Just because a machine has automated complex tasks, like playing chess, driving cars and translating languages, it does not mean that the machine can do almost anything. What is important is to understand that different problem areas require different type of approaches and sometimes the approach used in one domain, like self-driving cars, cannot be successful in other domain, like automating legal process. Thus a blanket assumption over the omnipotent capacity of AI technology will lead us to nowhere in the real-world.

***Potential applications of AI systems***

* AI technology works best in areas where there is underlying patterns & rules[[66]](#footnote-66), well defined right or wrong answers[[67]](#footnote-67) and formal or semi-formal structures that make up the process.[[68]](#footnote-68)
* AI performs speedily and with high degree of accuracy, in areas which requires computation, search or calculations.[[69]](#footnote-69)
* AI performs well when there is availability of high quality, structured, machine processable data.[[70]](#footnote-70)

***Limitations in use of AI systems***

* AI is inadequate in areas of abstract thinking, open ended discussion, policy matters which are value laden[[71]](#footnote-71), and equity oriented decision-making.
* AI is inadequate in areas that require common sense or intuition or conceptualization or understanding of ideas & concepts like equality, liberty, justice, reasonableness or good will.[[72]](#footnote-72)
* AI performs inadequately in areas of persuasion or arbitrary conversations or court room argumentation.
* AI performs poorly in domains where there is little or poor quality, unstructured data.[[73]](#footnote-73)

**AI systems in Administration and Governance of Law**

Artificial Intelligence has a lot of potential in the administration and governance of law in the society. For countries where there are huge arrears of cases and the Judiciary is overburdened[[74]](#footnote-74), AI techniques could be employed to ease the burden and reduce the backlog of cases, bringing efficiency in the judicial sector. Up until now administration of law was solely a human activity, but with the increased sophistication of AI techniques like machine learning, logical rules and knowledge representation, administration of law will no more be a human activity, and those who are involved in the process will see a rapid change in their roles. With supportive new technologies like predictive coding, predictive analytics, e-discovery, e-reviews, knowledge representation, natural language processing, deep neural networks & machine learning, AI has changed the way in which lawyers practice law, judges and police administer the law and users assess their accountability towards their legal systems.

Artificial Intelligence in law involves application of computer and mathematical techniques to make law more understandable, manageable, useful, accessible, and predictable.[[75]](#footnote-75) The use of mathematical techniques and formal rules to law was first anticipated and expounded by mathematician Gottfried Leibniz in the 1600’s[[76]](#footnote-76), who was also a lawyer by profession. In the twentieth century, around 1970-80’s, all applications of AI into law was based primarily on logical rules and knowledge representation technique, where legal rules, legislation and legal arguments were essentially modeled into computer readable language.[[77]](#footnote-77) But at the start of twenty-first century, in 2000’s, knowledge representation techniques were supplemented by machine learning techniques of AI in the field of law.[[78]](#footnote-78) From then onwards, a sudden growth was witnessed in the field of AI and law, where interdisciplinary associations began between technology and law in the form of legal-tech start-up’s[[79]](#footnote-79), and public and private universities started interdisciplinary courses and centres among law and technology departments.[[80]](#footnote-80) This led to development of uniques applications of AI techniques, in the administration and governance of law in the society. The application of AI has impacted almost all the domains of legal system- from the practice of law by lawyers, to administration of law by judges and government offices, to common usages of law by ordinary people and businesses in assessing their rights and liabilities in the legal system.[[81]](#footnote-81) Let us discuss the impact AI is making in each of the categories mentioned above:

**(a) AI use by Lawyers and Legal Practitioners**

Lawyers have been an integral part of every legal system. They are traditionally incharge of various roles from client counselling, to gauging the strength of legal positions, to drafting contracts, plaints & other documents, to legal research & document review & analysis, avoiding risks, pursuing litigation, to name just a few.[[82]](#footnote-82) Some of these tasks now face the risk of partial or complete automation by AI.

***E-discovery and e-review of documents***

Law firms and lawyers around the world are now employing tools of machine learning like natural language processing for document discovery and document review.[[83]](#footnote-83) In modern litigation, especially in common law jurisdiction where the primary source of litigation is case precedents, the lawyers spend most of their crucial time in discovery of relevant legal documents and case laws. This is followed by reviewing documents to sort out relevant documents from irrelevant one. Traditionally it was done manually by lawyers or their juniors who did this task by a quick reading,[[84]](#footnote-84) which was not only time consuming & laborious, but also was fraught with inadequacies and prone to human errors.

With the development of electronic discovery which uses machine learning techniques, predictive coding and technology assisted reviews have replaced the manual review of documents.[[85]](#footnote-85) For example ROSS, which is a legal research engine that uses artificial intelligence to automate legal processes making them more efficient and less expensive.[[86]](#footnote-86) It uses natural language processing to search and provide legal information from citations to full legal briefs.[[87]](#footnote-87) These AI tools has changed the way legal documents are analysed completely by quickly review millions of pages of contract, merger documents and others, *en masse,* in real time.[[88]](#footnote-88) This saves lots and lots of man hours which can now be effectively utilised by lawyers in other areas which involves abstraction and conceptualisation, like case argumentation, court strategising, and other cognitive tasks, like client counselling, that AI technology is not good at.[[89]](#footnote-89) Technology assisted document discovery & review has an implicit effect on the time-taken by the court in disposing the case. From initial filing of suits to final dispositions of the suits in the courts, the lawyers are now taking less time to prepare and present their cases before the judges, which has speed up the justice delivery process, by some significant margin.[[90]](#footnote-90)

***Predictions on case-outcome and other related issues***

Also with techniques like predictive coding and predictive analytics[[91]](#footnote-91), lawyers are predicting the success-failure probability of their clients in going to the court. Earlier lawyers used to make case predictions on the basis of their instincts and prior experience in the courtroom, which has now changed as machine-learning algorithms now make predictions about cases based upon facts and data.[[92]](#footnote-92) This has helped the litigants in making informed decision about the cost of litigation, time taken from initial filing to final disposition of the matter, success-failure probability of their case.[[93]](#footnote-93)

***Alternate Dispute Resolution***

The litigants are being prompted to use Alternate Dispute Resolution in resolving their cases[[94]](#footnote-94), based upon the prediction scores generated by AI. Litigants have successfully shifted from court based litigation to AI assisted ADR and have resolved their dispute through AI-assisted ADR.[[95]](#footnote-95) This has effectively reduced the court burden without compromising on the justice needs of the society. There is a decline the number of litigants who visit the court in order to seek justice as their need for justice is being met by other ADR techniques.[[96]](#footnote-96)

**(b) AI use by Judges**

The possibility of using AI system to assist judges in speedily disposing off a case is being explored now all over the world. Government official systems are using AI to make substantive legal or policy decisions.[[97]](#footnote-97) For countries like India, which suffer from huge backlog of cases in the judiciary,[[98]](#footnote-98) the administration and governance of law and justice in the courthouses are in tatters. It’s imperative to use AI systems to speed up the justice delivery process, making it more transparent and efficient, thereby reducing the arrears.

***Risk-assessment of criminal defendants***

There are good examples of AI techniques being used by judges in making sentences and delivering bails for criminal defendants.[[99]](#footnote-99) A judge when deciding whether to release a criminal defendant on bail pending trial has to make a risk assessment if the defendant is likely to re-offend or run-away.[[100]](#footnote-100) For this the judges are employing AI tools to quantify a defendants risk of reoffending or running-away.[[101]](#footnote-101) The machine learning algorithm attempts to make a prediction based on past crime data, which is then presented to a judge in the from of a score.[[102]](#footnote-102) Though the judges are not bound to defer to the automated scores, however these scores play an influential role in the judges behaviour[[103]](#footnote-103) while granting sentences or bails.

***Translations of legal documents***

Other good example is, AI techniques are being employed in courthouses to make good quality translations of court related documents from vernacular languages to English and vice versa.[[104]](#footnote-104) Court houses operate primarily in their official languages, .i.e. English and therefore require all the documents in the same language. For most countries, including India, English is the official language of the Higher Courts. However the Lower Courts use vernacular languages to function on their day to day hearings. The ‘problem of translation’ arises when the case via appeal reaches the Higher courts. Due to paucity of good translators who can translate from vernacular to English and vice versa, there are huge delays in resolving disputes. Judges in India have come up with an effective solution and are using AI systems to translate documents from vernacular languages into English and vice verse. Through natural language processing techniques, the courts have successfully translated hundreds of documents from 9 vernacular languages into English and vice versa.[[105]](#footnote-105) These techniques are working between the accuracy range of 60%-80%, [[106]](#footnote-106)which is likely to increase in future, because the machine learning algorithm keeps ‘learning’ by processing more and more high quality and structured data. The citizens of India can now easily access and read judgments from Higher courts in their native, vernacular language. This AI tool has democratized access to justice by making impactful courts decisions, of the Higher courts, easily accessible to common people in their vernacular language. It has also hastened the process of justice thereby improving the administration of law in the courthouses.[[107]](#footnote-107)

***E-analysis of legal documents***

With the help of technology assisted review and predictive coding,[[108]](#footnote-108) judges can now analyse and extract relevant information from thousands of pages of legal documents, within a matter of minutes. In India, the courts have envisaged an AI system that can sift through thousands of pages of criminal petitions and present relevant information out of them to the judges and judicial officers.[[109]](#footnote-109) Earlier judges had to go through the documents manually which used to take a month or even more to read each and every line of the criminal petition. This AI system ‘trains’ itself by analysing court judgments and learn patterns on- How a judge asks questions in a criminal case? What questions are commonly and most frequently asked in a criminal petition? How a judge is going to react in a particular case? And based upon this ‘training’ the system is able to pick out most relevant information on 150 data points from thousands of pages, and presents the concise information to a judge in not more than 2-3 page. All this process happens in a matter of minutes which earlier used to take more than a month, when done manually. It is estimated that the application of AI system will drastically reduce the time taken by a judge in for the final determination of criminal petitions and appeals, in the courtrooms.

***(c) AI use by Individuals and Businesses***

The third important facet of administration of law is those who are governed by it, i.e. the ‘users of law’. The users of law are ordinary people, organizations, and companies that are governed by the law and use the tools of law, e.g. contracts, wills, grants etc, to conduct their personal and business activities.[[110]](#footnote-110)

Individual users and companies use legal expert systems, like TurboTax, to *calculate their tax liabilities*. [[111]](#footnote-111) Many companies use private expert systems, like business-logic policy systems, that use computer-based rules about company affairs to *assess whether they comply with legal regulations or not*.[[112]](#footnote-112) Governmental authorities are now deferring to the outcomes of these legal expert systems in their formal assessment of rights and liabilities.[[113]](#footnote-113) These legal expert systems use logic based knowledge representation to help identify the violators of law. Also AI is being used in *legal self-help systems*, which uses automated chatbots to provide user with answers to basic legal questions.[[114]](#footnote-114) Also users of law are using *computer generated computable legal contracts* for purposes of online trading and other trade related activities.[[115]](#footnote-115) These contracts are expressed electronically in computer-readable languages,[[116]](#footnote-116) which could be executed automatically without the help of human or legal experts.

**Challenges with the use of AI systems in the legal sector**

It is important to take into consideration emerging issue with the use of AI in the legal field. Although this issue needs a complete treatment on its own, but due to paucity of space, is outside the scope of this article. However the authors would like to briefly point out certain contemporary issues that are emerging out of the use of the artificial intelligence tools and techniques in the legal field.

First, there is *‘potential of learning-bias in algorithmic decision making’*.[[117]](#footnote-117) Many researchers have raised the issue that machines that learns patterns from data can be biased against certain group of individuals due to the biases embedded in data.[[118]](#footnote-118) For instance, a machine learning software that was used for calculating the risk of re-offence of criminal defendants, used large number of judgements from the courts. The judges gave their judgments, which were biased against a certain group of individuals from that of the other group, in a similarly situated situation. This led the machine to pick up bias from the data-set, and perpetuated it in all future automated decision making.[[119]](#footnote-119) All machine learning tools are susceptible to these learn these inherent biases in the data-set, which gets encoded in the machine during ‘training’ processes.

Second, is the issue of *‘transparency & interpretability in algorithmic decision making’*,[[120]](#footnote-120) which is commonly referred as the ‘back box problem’.[[121]](#footnote-121) Machine learning software are designed particularly to train itself with data-sets. This changes the algorithmic design of the systems and it becomes complex as the machine starts to train itself.[[122]](#footnote-122) It so happens that ML software becomes so complex that they become unreadable, even by their own programmers, except by their input or output.[[123]](#footnote-123) This is a serious issue when it comes to making reasoned decision in law, where important questions dealing with life and liberty of an individual is at stake.[[124]](#footnote-124) It is almost impossible to give a reasoned decision of how the machine has arrived at such an outcome. This raises further questions on the transparency of algorithmic decision making, which in the opinion of the researcher, must be interpretable, explainable and transparent at the very least.

Third issue is, *‘the illusion of mathematical objectivity and fairness’* which the algorithmic decision making perpetuates.[[125]](#footnote-125) It is generally assumed that a computer is more neutral, objective and accurate than a human. Quite contrary an AI system’s working is far more obscure and subjective than they appear to be.[[126]](#footnote-126) Government official, individuals and other beneficiaries of AI systems who rely on the mathematical nature of output which the systems provides them, often defer to its decision making without bothering about the processes that are involved in the system to arrive at a certain conclusion. For e.g., if a machine give a result that a person has a high risk of recidivism or he is highly likely to commit a felony if released on bail, a judge will acquiesce to the systems prediction rather than apply his own mind. The judge does not even bother to inquire what parameters were being used to calculate the risk score of the criminal defendant. This raises doubts over keeping a ‘human in the loop as well’, who is placed in the loop to ascertain whether the system maintains its neutral and objective poise. But it seems that human intelligence is quite susceptible to the illusion of mathematical objectivity which the AI system creates.

The last issue is that of *‘data privacy’* related to the use of AI in the legal field. With the development of sophisticated AI tools there is high probability of using personal information of users in ways that can intrude on privacy interests.[[127]](#footnote-127) For example natural language processing tools that are employed in translation of court related documents and other confidential resources, learns patterns and critical information about clients, judges and lawyers, which can be leveraged against them. These datasets might contain some other relevant information that are not visible to the human eyes, but can be picked up by AI system, like political affiliation, sexual orientation, and other likes and preferences, which may then be used to influence their choices and decision making.[[128]](#footnote-128) Also tools like facial recognition which are employed by the police in surveillance at airports, railways and bus-stands[[129]](#footnote-129) also raises privacy concerns about the sensitive information of the users. With the availability of rich data on social media platforms like Instagram and Facebook, these machine recognition software’s have a potential to manipulate sensitive data like retina scans and other facial attributes of individual persons. Another serious concern with the facial recognition technology is the probability of misidentification of individuals leading to their wrongful convictions, which is a ‘damaging prospect for our society’.[[130]](#footnote-130) Such tools, without robust privacy protection policy, also hold the potential to be abused by law enforcement agencies and other governmental and private agencies for constant surveillance of the public.[[131]](#footnote-131)

**Conclusion**

Artificial intelligence has unique abilities to perform tasks with great speed and accuracy. It holds the potential to reform the legal system, reduce arrears and backlog of cases, enhance the capacities of judges and lawyers and serve justice to the litigants’ at-their-door-steps. Since the advent of modern societies, the invention of AI technologies is one of the major revolutions in the Information Technology sector. Its techniques, therefore, must be harnessed to improve the administration and governance of law in the society.

The state of the art AI technologies have certain limitations. It is not good in dealing abstract thinking, open ended discussion, policy matters which are value laden, judgment oriented decision making. Also performs poorly in domains where there is little or poor quality, unstructured data. However, it has been very useful in areas where there is underlying patterns & rules, well defined right or wrong answers, and where there is availability of high quality, structured, machine processable data. Thus AI must be deliberately used, but with caution, in the legal systems knowing its potentials and limitations. Justice delivery institution works primarily on the ‘faith & trust’ of the people. The faith on Judiciary is on the precipice and the ‘scale of Justice’ have long lost their alignment, due to the huge arrears of cases & poor court management, which adds to the long hearing of cases in the courtrooms. It is important, therefore, to ‘balance the scales of Justice’ and re-instate the trust and faith of the people on the Judiciary by making the justice delivery mechanism more efficient, reliable and transparent through the application of AI technologies.

1. S. Russel & P. Norvig, *Artificial Intelligence: A modern approach* (1st edn., Prentice Hall of India Pvt. Ltd. 1995) [↑](#footnote-ref-1)
2. Speculative trends associated with the growth and development of AI’s, suggest that machines ‘synthetic’ intelligence will one day surpass human ‘cognitive’ intelligence and enslave the mankind. This view has been circulated in the popular media like movies and TV shows. These speculative trends give an exaggerated and often misleading view of current state of the art AI systems. Imaginative speculations often distracts the policy-makers & legal experts from taking important AI-law & policy decisions. The speculations also poses a barrier for the non-technical person to truly appreciate and employ the AI techniques in solving real-world problems. *See* Bilge Ebiri, ‘The 15 Best Robot Movies of All Time’ , (VULTURE 6 March 2015)<<https://www.vulture.com/2015/03/15-best-robot-movies-of-all-time.html>> accessed 22 September 2020. [↑](#footnote-ref-2)
3. J. Haugeland, *Mind Design (*MIT Press Massachusetts 1981) [↑](#footnote-ref-3)
4. R.E. Bellman, *An Introduction to Artificial Intelligence: Can Computers Think?* (Boyd &Fraser Publishing Company, San Francisco 1978) [↑](#footnote-ref-4)
5. E. Charniak and D. McDermott, *Introduction to Artificial Intelligence* (Addison-Wesley,Reading, Massachusetts 1985) [↑](#footnote-ref-5)
6. P.H. Winston, *Artificial Intelligence* ( 3rd edn., Addison-Wesley, Reading, Massachusetts 1992) [↑](#footnote-ref-6)
7. R. Kurzweil, *The Age of Intelligent Machines* (MIT Press, Cambridge, Massachusetts 1990) [↑](#footnote-ref-7)
8. E. Rich and K. Knight, *Artificial Intelligence* (2nd edn., McGraw-Hill, New York 1991) [↑](#footnote-ref-8)
9. R.I. Schalkoff, *Artificial Intelligence: An Engineering Approach* (McGraw-Hill, New York 1990) [↑](#footnote-ref-9)
10. G.F. Luger & W.A. Stubblefield, *Artificial Intelligence: Structures and Strategies forComplex Problem Solving* (2nd edn., Benjamin/Cummings,Redwood City, California 1993) [↑](#footnote-ref-10)
11. H. Surden, Artificial Intelligence and Law: An overview (2019) 35(4) Georgia State University Law Review 1305 [↑](#footnote-ref-11)
12. For instance, when a person is playing chess, he employs a range of cognitive functions including reasoning, strategising, planning and decision-making. *See* J.M. Unterrainer et al., ‘Planning Abilities and Chess: A Comparison of Chess and Non-Chess Players on the Tower of London Task’ (2006) 97 British Journal of Psychology 299, 299–300, 302. Likewise when translating a language, a person activates higher-order thinking to process context, symbols, language and meaning. *S. Russel & P. Norvig*, supra note 1. Similarly when driving a car, a person engages a variety of brain functions which includes spatial recognition, situational awareness, vision, movement and judgement. . D. Shunichi, ‘Technological Development of Driving Support Systems Based on Human Behavioural Characteristics’ (2006) 30 IATSS Research 19, 20–21. [↑](#footnote-ref-12)
13. *H. Surden,* supra note 11 [↑](#footnote-ref-13)
14. This becomes a pertinent field of enquiry because AI systems have generated a lot of hope for resolving real-world issues and making human lives better. J. Anderson & L. Rainie, ‘Artificial Intelligence and the future of humans ’ (Pew Research Centre 10 Dec. 2018) <<https://www.pewresearch.org/internet/2018/12/10/artificial-intelligence-and-the-future-of-humans/>> accessed 23 September 2020 [↑](#footnote-ref-14)
15. The word ‘intelligence’ in artificial intelligence is a misnomer, which creates an ‘illusion of similitude’ with the cognitive process of human intelligence. Computers are deduction engines that are also capable of induction, as is the case when they succeeded at mastering chess or Go. They are not capable of abductive reasoning or creating a story, and hence there are limits to their creativity. For more discussion on the topic *see* R. Logan M. Tandoc, ‘Thinking in Patterns and the Pattern of Human Thought as Contrasted with AI Data Processing’ *<*<https://www.mdpi.com/2078-2489/9/4/83/htm>> accessed 23 September 2020 [↑](#footnote-ref-15)
16. H. Surden, ‘Machine Learning and Law’ (2014) 89 Washington Law Review 87, 89 [↑](#footnote-ref-16)
17. Id at 89-90 [↑](#footnote-ref-17)
18. Id at 87 [↑](#footnote-ref-18)
19. T. Mills, ‘AI vs AGI: What’s the Difference?’ (FORBES 17 Sept. 2018) <[https://www.forbes.com/sites/forbestechcouncil/2018/09/17/ai-vs-agi-whats-the-difference/#8b957b638ee1](https://www.forbes.com/sites/forbestechcouncil/2018/09/17/ai-vs-agi-whats-the-difference/%238b957b638ee1)> accessed 23 September 2020 [↑](#footnote-ref-19)
20. J. Krupansky, ‘Untangling the Definitions of Artificial Intelligence, Machine Intelligence, and Machine Learning’ (Medium 13 Jun. 2017) <[https://medium.com/@jackkrupansky/untangling-thedefinitions-of-artificial-intelligence-machine-intelligence-and-machine-learning-7244882f04c7](https://medium.com/%40jackkrupansky/untangling-thedefinitions-of-artificial-intelligence-machine-intelligence-and-machine-learning-7244882f04c7)> 24 September 2020 [↑](#footnote-ref-20)
21. The ability of today’s AI to excel in specific, constrained, well-defined areas is sometimes referred to as “narrow” intelligence. *See* R.Desai, ‘Artificial Intelligence (AI)’ (Dr. Rajiv Desai: An Educational Blog 23 Mar. 2017) <http://drrajivdesaimd.com/2017/03/23/artificial-intelligence-ai/> accessed on 34 September 2020 [↑](#footnote-ref-21)
22. *H. Surden,* supra note 11 at 6 [↑](#footnote-ref-22)
23. B. Marr, ‘The Key Definitions of Artificial Intelligence (AI) That Explain Its Importance’ (Forbes 14 Feb. 2018) <[https://www.forbes.com/sites/bernardmarr/2018/02/14/the-key-definitions-of-artificial-intelligence-ai-that-explain-its-importance/#139a6a954f5d](https://www.forbes.com/sites/bernardmarr/2018/02/14/the-key-definitions-of-artificial-intelligence-ai-that-explain-its-importance/%23139a6a954f5d)> accessed 24 September 2020 [↑](#footnote-ref-23)
24. *R. Desai*, supra note 21 [↑](#footnote-ref-24)
25. This topic will be dealt in more details in the upcoming section- ‘Use of AI in the Administration of Law and Good Governance’. [↑](#footnote-ref-25)
26. R. Buest, ‘Artificial Intelligence Is About Machine Reasoning—or When Machine Learning Is Just a Fancy Plugin’ (CIO 3 Nov. 2017) <<https://www.cio.com/article/3236030/artificial-intelligence-is-about-machine-reasoning-or-whenmachine-learning-is-just-a-fancy-plugin.html>> accessed 24 September 2020 [↑](#footnote-ref-26)
27. H. Surden, ‘The Variable Determinacy Thesis’ (2011) 12 Columbia Science & Technology Law Review 1, 20 [↑](#footnote-ref-27)
28. Id at 20 [↑](#footnote-ref-28)
29. Id at 21-22 [↑](#footnote-ref-29)
30. R. E. Susskind, ‘Expert Systems in Law: A Jurisprudential Approach to Artificial Intelligence and Legal Reasoning’ (1986) 49 Modern Law Review 168 [↑](#footnote-ref-30)
31. *H. Surden*, supra note 27 at 78 [↑](#footnote-ref-31)
32. Suppose the tax code says that a person whose income is more than Rs. 15,00,000, he or she will be taxed at a rate of 30%. A programmer with the help of a legal expert ‘translate’ it into if-then computer rule which directly represents the underlying knowledge of the tax provision. IF income > 15,00,000 THEN tax rate =30%. Id at 78 [↑](#footnote-ref-32)
33. W. Farnsworth, *The legal analyst: A toolkit for thinking about the law* (University of Chicago Press 2007) [↑](#footnote-ref-33)
34. P. S. Sajja & R. Akerkar, ‘Knowledge-Based Systems for Development’, in Priti Srinivas Sajja & Rajendra Akerkar eds. *Advanced knowledge-based systems: Models, applications and research (e-book* 2010) [↑](#footnote-ref-34)
35. *H. Surden,* supra note 27 [↑](#footnote-ref-35)
36. Id at 72 [↑](#footnote-ref-36)
37. Id at 21-22 [↑](#footnote-ref-37)
38. M. Hutson, ‘Computers Are Starting to Reason Like Humans’ (Science 14 Jun. 2017) <http://www.sciencemag.org/news/2017/06/computers-are-starting-reason-humans> accessed 26 September 2020 [↑](#footnote-ref-38)
39. *See* MC de Marneffe et. al., *Finding Contradictions in Text*, (2008) 46th Annual meeting of the association for computation linguistics: Human language technologies 1039 [↑](#footnote-ref-39)
40. D. Fumo, ‘Types of Machine Learning Algorithms You Should Know’ (Towards Data Science 15 Jun. 2017) <<https://towardsdatascience.com/types-of-machine-learning-algorithms-youshould-know-953a08248861>> accessed 26 September 2020 [↑](#footnote-ref-40)
41. ‘What Is Machine Learning? 3 Things You Need to Know’ (Mathworks: Machine Learning) <<https://www.mathworks.com/discovery/machine-learning.html>> accessed 26 September 2020 [↑](#footnote-ref-41)
42. B. Marr, ‘The Top 10 AI and Machine Learning Use Cases Everyone Should Know About’ (Forbes 30 Sept. 2016) < [https://www.forbes.com/sites/bernardmarr/2016/09/30/what-are-the-top-10-use-cases-for-machine-learning-and-ai/#6e7f4c3094c9](https://www.forbes.com/sites/bernardmarr/2016/09/30/what-are-the-top-10-use-cases-for-machine-learning-and-ai/%236e7f4c3094c9)> accessed 26 September 2020 [↑](#footnote-ref-42)
43. M. Sidana, ‘Types of Classification Algorithms in Machine Learning’ (Medium 28 Feb. 2017) <[https://medium.com/@Mandysidana/machine-learning-types-of-classification-9497bd4f2e14](https://medium.com/%40Mandysidana/machine-learning-types-of-classification-9497bd4f2e14)> accessed 26 September 2020 [↑](#footnote-ref-43)
44. The word ‘learning’ is used in ML in a functional sense- when humans learn, they get better at a particular task through experience. In the same way, machine learn by examining more data and improve their performance over time by looking for additional patterns in it. *See* *H. Surden*, supra note 11 at 1312 [↑](#footnote-ref-44)
45. *H. Surden*, supra note 11 at 1311 [↑](#footnote-ref-45)
46. ‘Customize Spam Filter Settings’ (Google) <<https://support.google.com/a/answer/2368132?hl=en>> accessed 6 October 2020; ‘Overview of the Junk Email Filter’, (Microsoft) <<https://support.office.com/enus/article/overview-of-the-junk-email-filter-5ae3ea8e-cf41-4fa0-b02a-3b96e21de089>> accessed 27 September 2020 [↑](#footnote-ref-46)
47. ‘Introduction to Bayesian Filtering’ (Process Software) <<http://www.process.com/products/pmas/whitepapers/intro_bayesian_filtering.html>> accessed 27 September 2020 [↑](#footnote-ref-47)
48. N. Moline, ‘Combatting Spam Emails and Contact Forms’ (Justia Legal Marketing & Technology Blog 4 Dec. 2018) <https://onward.justia.com/2018/12/04/combatting-spam-emails-and-contact-forms/> accessed 27 September 2020 [↑](#footnote-ref-48)
49. *An instance:* Suppose that the user has initially marked 100 mails as spam. The ML software then analyses the pattern in it and finds that in almost 85% of the mails the word used is ‘CashlessClaims’ whereas the same word appears in the average mail only 15% of the time. The ML uses this pattern to create a proxy model in which ‘CashlessClaims’ becomes a statistical indicator, of the mail to be likely a spam mail. The software then implements this model to segregate all future mails. If the words ‘CashlessClaims’ appears in the mail, the ML software automatically diverts that mail into the spam folder. The machine gets better over time by examining more data and identifying additional useful patterns.

Now suppose that the ML software finds another correlating factor, in the 100 mails that were initially identified as spam, that emails originating from Angola is likely to be a spam than emails emerging from anywhere else. The ML software trains itself to draw a correlation between the existing parameter ‘CashlessClaims’ and new parameter of mails ‘emerging from Angola’. Now when a mail comes from Angola containing word ‘CashlessClaims’, the ML software will in all likelihood mark it as a spam with ‘high degree of likeness’. See generally, *N. Moline,* supra note 48 [↑](#footnote-ref-49)
50. *H. Surden*, supra note 11 at 1314 [↑](#footnote-ref-50)
51. Id at 92 [↑](#footnote-ref-51)
52. Id at 89 [↑](#footnote-ref-52)
53. *R. Desai,* supra note 21 [↑](#footnote-ref-53)
54. Move to complete digitization of courts (The Economic Times 4 Aug. 2020)< <https://economictimes.indiatimes.com/blogs/et-editorials/move-to-complete-digitisation-of-courts/>> accessed 28 September 2020 [↑](#footnote-ref-54)
55. National Judicial Data Grid < <https://njdg.ecourts.gov.in/njdgnew/index.php>> accessed 28 September 2020 [↑](#footnote-ref-55)
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59. *H. Surden,* supra note 11 at 1313 [↑](#footnote-ref-59)
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63. M. Kumar, ‘Self-Driving cars to be operated from Call Centres?’ (Geo 11 Jan. 2017) < <https://www.geoawesomeness.com/self-driving-cars-operated-call-centres/>> accessed 29 September 2020 [↑](#footnote-ref-63)
64. Id [↑](#footnote-ref-64)
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