https://doi.org/10.31449/inf.v47i5.4361 Informatica **47** (2023) 21–40 **21**

AI for Improving Justice Delivery: International Scenario, Potential Applications & Way Forward for India

Sunil Kumar Srivastava
Ex-Senior Scientist, Government of India, Ministry of Electronics and IT, New Delhi, India
E-mail: sks@meity.gov.in

Keywords: AI and law, AI applications, justice delivery, Indian judicial system

Received: 28 August, 2022

Judiciary in India has been under tremendous pressure due to large number of cases pending at various levels. From time to time, several initiatives have been taken to reduce the backlog of pending cases in the courts. One of these is leveraging information and communication technology (ICT). Under this initiative (called e-Court), ICT solutions have been developed and deployed. This has led to visible improvement in the productivity. Even during the Covid-19 pandemic, the courts in India have been functioning. However, the number of pending cases has still been growing due to various reasons including increase in economic activities, awareness in the public and ease of access to the courts. The present work explores the possibility of using artificial intelligence (AI) in the processes to improve the justice delivery in India. A comprehensive literature survey was conducted to review the applications developed and deployed in this domain in other countries viz. Australia, Brazil, Canada, China, UK, and USA. Based on this, it identifies the gaps and suggests a spectrum of potential applications possible in Indian context. The article suggests a way forward for facilitating development and deployment of AI applications in this domain in India.

Povzetek: Članek raziskuje možnost uporabe umetne inteligence (AI) v procesih za izboljšanje zagotavljanja pravice v Indiji.

1 Introduction

The recent advances in technology are transforming the way humans have been practicing their professions and the domain of law & justice is no exception. IT solutions have been developed and used by law professionals since the seventies for accessing the legal databases provided by the publishing firms like LexisNexis, Westlaw (now acquired by Thomson Reuters), Wolters Kluwer and Bloomberg Law. In the beginning, the searches were mostly based on keywords connected by Boolean operators and the market was dominated by the Big Four companies mentioned above. The limitations of keyword-based retrieval were realized with passage of time, and this led to new techniques based on artificial intelligence (AI) / machine learning. AI, essentially, is concerned with the theory and practice of designing and building artefacts which can perform the tasks, which are said to require intelligence, when done by humans.

The technology developments have created a fertile ground for building AI-based applications in various domains including law and justice. Several factors have played roles in this. Firstly, the technology of natural language processing (NLP) has advanced, particularly, due to emergence of deep machine learning techniques. NLP techniques are widely used in the analysis of legal texts and therefore, it has led to several new applications [1]. Secondly, due to the proliferation of Internet and computing devices, it has become feasible to collect large amount of data in several fields. Data works as a fuel for AI applications. Thirdly, applications requiring high computing power and large computer storage can be supported by clouds available at affordable cost. Fourthly, delivery of services has become easier due to the proliferation of mobile devices. Further, an echo system of technology-based start-ups has emerged. More and more techno-entrepreneurs are setting up start-ups to develop innovative solutions.

AI has not yet reached to a stage where it can be entrusted with the independent responsibility of decision making in critical domains like medicine or law, but it can be used to enhance the productivity of the decision makers. It is quite unlikely that computer-based systems would ever be able to replace human decision-makers in near future. However, such systems can assist the judges, courts staff and litigants in several ways to increase the productivity [2]. Though research in this area has been continuing during the last five decades [3], the practical applications have started emerging during the recent past only. The applications have been developed for practicing lawyers as well as for the judges, court officers and litigants. While large number of applications have been developed for the lawyers/advocates practicing in the courts or corporate sector, relatively smaller number of applications have been developed for the judges, court officers and litigants.

AI applications is especially useful in improving justice delivery in the developing countries with large population like Brazil, China, India, etc. Judiciary in India is under tremendous pressure due to large number of cases

pending at various levels. If the situation continues in the same way, it might become difficult to decide the cases filed by a citizen during his/her lifetime. According to the data available on National Judicial Data Grid [4], the current number of cases pending at district and taluka (sub-district) level courts is around 40 million. The number of pending cases in various High Courts is around 6 million. There are cases which are pending in the courts for more than 30 years. Recently, Calcutta High Court released a person who had spent 40 years in judicial custody (an undertrial prisoner). In another case, a person has been in jail for 20 years before he was acquitted by the Allahabad High Court [5].

Though backlog of pending cases in the law courts can be found in many countries especially those with high population, this has taken a serious turn in India where sometimes, often people do not get justice even within their lifetime. Large number of cases are pending at every level of judiciary starting from trial courts to the High Courts to the Supreme Court. When cases take several years to conclude, people start taking laws in their own hands defeating the very purpose of judiciary.

Delays have many other consequences too. According to a report by Administrative Staff College of India (ASCI) [6], in India, 67.2% prisoners are under trial i.e., whose cases have not yet been decided by the courts (she/he has not been declared guilty). In contrast to this, the global figure of number of under trials is 27%. Similarly, the pending civil cases lead to economic loss due to the suspension of activities. This is one of the reasons why India ranks so poorly on the Ease of Doing Business Index.

From time to time, several steps have been taken to reduce the pendency of cases in India. In 2011, National Mission on Delivery of Justice and Legal Reforms [7] was initiated to reduce pendency of cases. This had several components such as alternate dispute resolution system, fast-track courts, prison court. One major component was leveraging information and communication technology (ICT) for fast and effective justice delivery. Many activities have been completed and the number of cases being disposed of every day also has increased. Under e-Court initiative, several steps have been taken which have started showing improvement in the productivity. Even during the Covid-19 pandemic, the courts in India have been functioning due to ICT-enablement. However, the number of pending cases has still been growing due to increased economic activities, awareness among people and increased accessibility to justice [8]. This has made it necessary to explore the possibility of using emerging technologies such as artificial intelligence (AI) to speed up the processes in justice delivery.

The article reviews the AI applications in some countries (Australia, Brazil, Canada, China, UK, USA) where a good number of applications have been developed and deployed for improving justice delivery. Though courts are the primary institutions in the justice delivery, the cases are settled outside the courts through negotiations also. Therefore, the article also surveys the AI systems which support the litigants in out of court settlement through negotiation. Similarly, the citizen empowerment is also important in the overall justice delivery process. The citizens must have access to legal advice to make effective use of the process of law. In view of this, the article also reviews the AI applications which provide legal advice to the citizens.

Based on the success of AI applications in other countries and analysis of the situation in India, several applications have been identified which would be especially beneficial in Indian context. The article makes an attempt to answer the question whether we can create an ecosystem wherein cases are disposed off in months (if not days); the cost of getting justice is reduced substantially so that the high cost does not deter a citizen from approaching courts; a citizen can get legal advice at an affordable rate without any apprehension of breach of privacy; a citizen desirous of self-representing in the court can do so comfortably with access to relevant information; etc. To answer these questions, several documents on the pendency of court cases were examined to figure out the types of applications which need to be developed in India.

The article would be useful for the Information Technology (IT) practitioners and decision makers in the judiciary / governments who are interested in applying technology to make the justice delivery more efficient, effective, and affordable. While discussing the possibility of identifying the applications for India, references have been given to the publications on the applications developed and used in countries. This will also be beneficial to the researchers who are interested in finding out the areas for applied research in this domain i.e., law and justice.

Section 2 reviews the international scenario wherein it investigates the applications of AI for improving justice delivery in the countries where significant applications have been developed and deployed. Section 3 discusses the issues which have arisen while using AI applications and gives an overview of recommendations / guidelines evolved by some organizations. Section 4 provides the status of AI adoption in justice delivery in India. Section 5 identifies different types of AI applications which need to be developed in India for improving the overall justice delivery system. Section 6 provides the way forward for adoption of AI in the judicial system in India. Section 7 contains the conclusions.

2 International scenario

The focus of AI applications in the domain of law and justice has been on the development of tools for law practitioners. Several start-ups are working on the development of tools to help in legal research (finding case laws and statutory provisions related to the case at hand), due diligence (required while entering into agreements, especially in the corporate world), drafting of legal documents (contracts, affidavits, petitions, etc), legal analytics (assessing the probability of the outcome of any case). Many of these are being used by the practitioners. In contrast to this, relatively lesser number of AI-based solutions have been developed and deployed

to assist the judges and court administration in their works i.e., judicial decision-making. In the following sections, a brief description of the AI applications in this domain in the select countries viz. Australia, Brazil, Canada, China, UK, and USA are given below. As these countries are leading countries in AI technology, these applications illustrate the scenario. Of course, several applications have been developed in other countries as well but covering all these is not possible due to the limitation of space.

The applications in the domain of law and justice can be categorized based on the function. Another categorization possible is based on the type of users i.e., practicing lawyers, judges, court officers and litigants, etc. While commercial applications have primarily targeted practicing lawyers, several applications have been developed with the aim to support the judges and court officers. Also, there are several applications which support the litigants by providing legal advice on their cases. Even the applications, which are developed for lawyers, are often useful to the judges. For instance, the judges too need legal research tools to find the relevant legislative provisions and case laws so that they can see how the case was decided in the past. A list of some of the commercial AI applications developed for practicing lawyers is given in **Table 1**. AI applications which have been developed primarily to support the judges, court officers and the litigants are given in **Table 2**. Most of the applications in this category are developed by governments or courts either directly or by engaging industry.

S. No.	Application	Function	Company
1	CaseText	Legal Research	CaseText
2	Ross Intelligence	Legal Research	Ross Intelligence
3	CaseMine	Legal Research	CaseMine
4	Kira	Contract Review	Kira Systems
5	Seal	Contract Review	Seal Software
6	LawGeex	Contract Review	LawGeex
7	Luminance	Contract Review	Luminance
8	LISA	Drafting Assistant	RobotLayer Lisa
9	Rowan Patents	Drafting Assistant	Rowan Patents
10	Ravel Law	Legal Analytics	Ravel Law

Table 1: AI Applications for Practicing Lawyers

S. No.	Application	Function
1.	**Australia**	
	Split-up	Out of court settlement
	FCA Consent Order Application	Out of court settlement
	Amica, Adieu, Penda	Chatbots for legal advice – divorce laws
	Judicial Information Research System	Judicial assistant – provides similar cases and the range of sentences
2.	**Brazil**	
	Victor	Scheduling / prioritization of cases
	Socrates	Scheduling / prioritization of cases
	Sigma	Assistance in judgment drafting -provides key elements
	LEIA	Judicial Assistant – provides similar precedents
3.	**Canada**	
	MyOpenCourt	Support for self-representation
	Smartsettle ONE	Out of court settlement
	IVA	Chatbot for legal advice – immigration laws
4.	**China**	
	STCR System	Judicial assistant and judgement drafting
	System 206	Judicial assistant and transcriber
	AI-assisted sentencing	Judgement drafting
5.	**UK**	
	HART	Risk assessment – possibility of re-offending or failure to appear
	DoNotPay	Chatbot for legal advice – traffic rules
6.	**USA**	
	PSA	Risk assessment
	LSI-Revised	Risk assessment
	COMPAS	Risk Assessment
	VisaBot	Chatbot for advice – immigration laws

Table 2: AI Applications for judges, court officers, and litigants

2.1 Australia

Australia is a country where AI has been used to develop decision support systems since the nineties when the state of the art in AI was rule-based systems. In a rule-based system, the knowledge of the domain is encoded as a set of rules. In the eighties and nineties, several rule-based AI systems were developed in various domains such medical diagnosis, manufacturing, mineral exploration, etc. These systems have been improved with time and are now using a combination of rule-based and neural-based techniques.

2.1.1 Split-up system

Split-up is one of the first such systems developed in the nineties using AI techniques available during that period [9]. It has been designed to deal with the matters related to the distribution of marital property among the separating couple. Such a decision depends on several factors including age, income, contributions, and future needs. The matter is decided under various sections of Family Law Act 1975 of Australia. Though there are certain guiding rules for deciding the distribution, there are several areas where the judges weigh different factors to decide the matter. The system uses a combination of rules and neural networks. To develop the system, an analysis of the past cases was done to identify the factors present in the domain. In total 35 factors were identified. While some factors are decided by the rules, other factors are decided by neural networks. The system generates limited explanation also for its conclusions in terms of the references to statute or precedents.

2.1.2 FCA consent order AI application

In the recent past, some new systems have been developed in the same area of law i.e. family laws. In conventional mode, the parties reach to a deal through their representative lawyers. Once an agreement has been reached, the parties approach the court to formalize the agreement through an order of the court. However, this process is costly as the parties must hire lawyers and is slow. Therefore, Federal Court of Australia (FCA) and Carrington Associates, an IT company, collaborated to develop a proof-of-concept level system FCA Consent Order AI Application [10] to advise in the matters of distribution of property in case of splitting-up. The precedent cases were used to build the system on IBM Watson platform. Anonymised data set of 1600 cases were used to train the system to advise on new cases. A good amount of time was spent by the developers in understanding the basic concepts from legal experts. The system returned an accuracy of 94%.

2.1.3 Legal advice to litigants

Several chatbots have been developed in Australia with financial support from national and provincial governments [11,12,13]. National Legal Aid and Legal Aid Queensland collaborated to develop *Amica*, a chatbot which advises the separating couple on how to split up the property and liabilities jointly owned by them. The chatbot was developed at a cost of $ 3 million. It uses AI to compare the present case with the precedent cases in its database and suggests distribution of the assets of the splitting couple based on how the property distribution was done in the similarly situated previous cases. At present, the service is available free of cost, but the agencies are planning to charge a fee in future. To provide complete information to the users, some chatbots also have information on lawyers, counsellors and mediators who can be approached by the user if needed. *Adieu* is a chatbot which works in the area family laws but can also refer to lawyers. *Penda* is a chatbot which deals with the cases involving family violence. It advises the victims online without any face-to-face meeting.

2.1.4 Judicial information research system

In one of the early projects, the Judicial Commission of New South Wales created a sentencing database, called Judicial Information Research System (JIRS) [14], to support in making sentencing decisions by retrieving and presenting similar cases from the database of cases. This gave the judges a range of sentences in the precedent cases for similar convictions. The system was made available to the judges as well as lawyers with an objective to bring uniformity in decision making.

2.2 Brazil

Brazil too suffers from a huge backlog of lawsuits. According to a report, about 80 million lawsuits were awaiting their judgements in 2017, which means almost one lawsuit for every three Brazilians [15]. Such a huge backlog has several adverse implications as in any country. The country has to spend a huge budget on maintaining the judiciary. In view of this, the judiciary in Brazil has taken several initiatives. Some of these are discussed below.

2.2.1 Victor

VICTOR [15] has been developed under an initiative of Brazilian Supreme Court (STF) in collaboration with the University of Brasilia and is operational at STF since 2019. The system reads all the extraordinary appeals which go up to STF and identifies which are related to any theme out of 27 most recurring themes of general repercussions. Before the use of the system, this has been done by the human servers, but it is time expensive task for them. The purpose of VICTOR is to assist the servers in the analysis. It is expected to increase speed as well as consistency in identifying the topics. The system has been trained with about 45,000 past decisions of STF regarding the application of themes of general repercussions. The system assists in resolving about 10,000 extraordinary appeals every year. The name of the system is a tribute to

Victor Nunes Leal, former justice of Brazilian STF, who brought many reforms in the Brazilian judiciary.

2.2.2 Socrates

SOCRATES [16] system reads new cases and groups all the cases with similar issues together so that all the similar cases could be judged in blocks. It also finds if the case relates to an issue which is unrelated to the duties of the court. The system has a dataset of 2 million cases which cover all the cases under progress at Superior Court of Justice (STJ). Further, the system also finds whether the case involves a legal issue which is in the category of repetitive demand. Such an issue involves millions of people. When it is found that an appeal belongs to the category of repetitive demand, it is returned to the court of origin. The system is being extended to provide all necessary elements to the judge for preparing judgment, such as the points submitted by the parties and the major prior decisions of the court on the issues involved in the case.

2.2.3 Sigma

SIGMA system [17] has been developed through a collaboration of several bodies including Federal Appeals Court for the 3rd Region (TRF3) and Laboratory for Applied Artificial Intelligence for the 3rd region. The system assists in the preparation of draft decisions and judgments. Given a new case, it compares the matter of the case with the matter of the already stored cases and based on this, it retrieves the models used in the earlier cases. Based on these models, it suggests inputs for preparing the draft decisions. The tool is being used on experimental basis. The system is available to all the chambers in TRF3 and is being planned to be extended nationally.

2.2.4 Legal intelligent advisor (LEIA)

The system has been developed by Softplan Company and staff of the courts [17]. Given a new case, it finds the precedents involving the same legal issue. The system is operational at several courts including Justice Court of Acre, Alagoas, Amazonas, Ceara. At present, it has about 50 themes for which the precedents are available. The main purpose of deploying this system is bringing uniformity in the judgments. The system has been trained with different set of lawsuits in different jurisdictions. For instance, at the Court of Alagoas, it has been trained with 1.9 million lawsuits and it was found that about 168 thousand lawsuits have similarities.

2.3 Canada

Legal service is quite expensive in any country and Canada is no exception. According to a recent study, 86% of Canadians who were looking for legal assistance, chose not to hire a lawyer as the cost of hiring a lawyer was quite expensive in comparison to the claim involved [18]. Even the cost of hiring a lawyer to get the litigants educated about the legal aspects is also quite high. Therefore, people are forced to forego some of their claims despite knowing well that they are entitled for the benefits. This indicates the need to use the technology in overall justice delivery system to reduce the expenses and thus improving the access to justice. Several efforts have been made to make use of AI in judicial system in Canada. Some of these are discussed below.

2.3.1 MyOpenCourt

MyOpenCourt [19] was launched in Australia in May 2020 with an objective to help the employees who lost their jobs due the Covid-19 pandemic as well as the employers who have to lay off the employees due to the unforeseen circumstances. This is an open-access platform and focusses on the employment related matters only at this stage. The system has been developed by a research-based consortium, Conflict Analytics Lab which comprises of experts from industry as well as academia including Queen's University, McGill University, Cornell University, Stern School of Business (New York University), Google AI and Scotiabank Centre for Customer Analytics.

For employees, MyOpenCourt has two tools – *Am I an employee or contractor?* and *Termination compensation Calculator*. In both the tools, the system asks the user questions seeking information on specific circumstances of the employee/employer and give its advice (in terms of prediction of the outcome) along with the supporting case laws. The platform is especially helpful to the employees who want to self-represent themselves in the court. The tool provides all necessary similar precedent cases to argue in the court. The platform is also useful for the employers as a case research tool to understand the merit of a case. The platform facilitates out of court settlement also by providing a middle ground.

2.3.2 Smartsettle ONE

A company based in British Columbia has developed an AI-based mediator called Smartsettle ONE [20] which is an online dispute resolution (ODR) system. The system is being used to settle the disputes where the amount involved is small. Sometimes, even mediators suggest that the parties make use of such systems to save time and money. In Smartsettle ONE, each party has to submit a hoped-for amount as well as a blind bid for the best-alternative-to-non-agreement (BATNA). Based on these inputs, the system makes proposal to the parties at each step and the parties respond. The system tries to reach a settlement agreeable to both the parties. Such systems are especially useful in the cases involving quantifiable value to resolve such as personal injury cases where the question is how much you are willing to settle for. Recently, the tool was used in a London court to settle a dispute between two parties over the payment of counselling fee of 2000 pounds. When the case was

lingering on in the court for three months, the court advised the litigants to use a mediator and they used Smartsettle ONE in place of a human mediator to reduce the expenses.

2.3.3 AI justice challenge

Canada has a strong ecosystem of start-ups developing solutions using advanced technologies such as AI. Canadian government and industry have been supporting the start-ups by conducting technological challenges to develop innovative solutions using state of the art technologies. Innovate BC, an agency of the provincial government of British Columbia brings industry and academia together to develop new solutions through grand challenges. In 2019, Innovate BC collaborated with Justice Canada and other stakeholders to conduct a challenge for development of solutions in five areas which are centred on improving the user-experience in the justice delivery system [21, 22]. Several start-ups participated in the challenge. The best solution in each category was selected for further development. The systems are still under development. Similarly, other provinces of Canada have started pilot project.

2.3.4 Legal advice to litigants

Several chatbots have been developed to provide legal advice to the citizens or immigrants. After initial success in UK and USA, DoNotPay [23] was launched in Canada to help the people seeking immigration advice. Immigration Virtual Assistant (IVA) works in the area of immigration laws. It answers the queries of tourists, workers and students seeking visa for visiting Canada.

2.4 China

China has a civil law system in contrast to India which has a common law system. However, during the last four decades, there have been a series of judicial reforms in China which have changed the judicial system in several ways and the present system has some similarity to common law system. In 1985, Supreme People's Court of China (SPCC) started publications of typical cases. Till that time, the cases were not being published for public viewing. In 2010, SPCC issued the Provisions on Case Guidance to establish a guiding case law system in China. Guiding cases are selected cases decided by various courts. Once a case has been included as a guiding case, it is to be followed by all the courts. Before the introduction of this system, the courts were not bound to follow precedent cases decided by the same court or other higher courts [24].

Though guiding case system has similarity to common law system as both use precedent cases in deciding the present case, there are several differences. Firstly, all the precedent cases do not have binding effect and the judgment need not give detailed reasoning which is the practice in the common law system. Secondly, the cases are published by SPCC after some editing and not individual courts as prevalent in the common law system. Later, China moved to Same Type Case Reference (STCR) System [24] which insists on binding effect also. In STCR system, the judges are supposed to follow the judgments in similar cases delivered by their own courts as well as superior courts. If a judge does not follow the decision given in a similar precedent case, the judge has to take approval from the superior judges for the deviation. Thus, some aspects are similar to those in common law system, but the motivation of this reform is primarily to strengthen the supervision over the judges and thus bringing uniformity in the judgments.

As China is the most populous country of the world, the number of cases to be decided by the Chinese courts is high and thus computerization was necessary to implement STCR system effectively. Since 2014, most of the cases are being made available online. At present, there are 66 million cases in the database which were decided during 2014-2019. As there is no national case law reporter which can segregate the cases under various issues/sub-issues as in the case of common law jurisdictions, it has become the responsibility of the system developers to provide intelligent search engines. For a typical district level judge, there would be about 30,000 cases of his/her own court, 40,000 cases of his/her appellate court, 100,000 cases of his/her province high court and 110,000 cases of the SPCC. Without a proper system, it would be quite difficult for any judge to find the same type of cases.

2.4.1 AI-based STCR system

To implement STCR system, China is developing systems which can suggest decisions, range of sentences / average sentences for different scenarios, range of compensation, etc. The database has about 40 million judgements. There are primarily three types of systems: same-type program to find similar cases; prior-case analysis program to provide statistical analysis of the retrieved cases and judgment-generating program to generate draft judgment for the given case. The judge loads the record of the present case and the system generates preliminary judgment. To accomplish this, the cases are analysed to determine the factors present in the case, which are responsible for the outcome of the case. This approach is similar to factor-based approach used in the research prototype systems developed during the eighties and nineties. Similar systems have been developed to prepare prosecution documents and make prosecutorial decisions.

2.4.2 System 206

In Shanghai, the judicial and prosecutorial authorities collaborated with iFLYTEK, an AI company and East China University of Political Science and Law to develop a system called System 206 [25] which works as a 24X7 judicial assistant for the judges in handling criminal cases. The system can process the information made

available to it and store the information in structured forms in terms of time, place, people, etc and stores the same for reference. It can also identify any discrepancy in the statements of the suspects made during multiple confessions. It is being used in Shanghai's No. 2 Intermediate People's Court since January 2019.

2.4.3 AI-assisted sentencing system

In Hainan province, High People's Court collaborated with Smart Security, a local IT company to develop an AI-based system to support in sentencing [26]. The system uses natural language processing, knowledge graphs and other techniques to identify key facts in a case and prepare a draft of the judgment based on the judgments given in the precedent cases. This is leading to some level of standardization in sentencing. Hainan High Court has advised the lower courts to use the system to increase the productivity and to bring uniformity. Supreme People's Court has also appreciated this initiative of the provincial court. This work has been granted more than 10 patents. According to a report, the overall judgment time has reduced to half in the courts in Hainan province. The time taken in the preparation of judgment and all legal procedural documents have been reduced by 70% and 90%, respectively.

2.5 United Kingdom

In the United Kingdom, though there are several AI system development projects in progress in judicial domain, at present there is no system being used to support judicial decision-making in the courts. However, there are risk assessment tools which are being used by police officers while deciding custodial matters. According to Data Justice Lab, almost half of local authorities and quarter of police authorities are using such systems [27]. The most popular among these systems is discussed below.

2.5.1 Harm assessment risk tool

Harm Assessment Risk Tool (HART) was developed by Durham Constabulary in collaboration with the researchers at Cambridge University [28, 29]. It supports the police officers in making custody related decisions. HART uses random forest-based machine learning method, which consists of a large number of decision trees corresponding to a series of if-then rules. It has been trained using 104,000 custody decisions which were taken during 2008-2012. Given a new case, it predicts the likelihood of committing a crime again in terms of high risk (committing a serious offence), moderate risk (committing a non-serious offence) or low-risk (committing no offence) over a two-years follow up period.

As part of the development process, an analysis of the custody events was done with the help of police officers who had long experience in taking such decisions, to identify the characteristic features which play an important role in deciding the case. There are 34 such features, primarily, corresponding to criminal history. The system was validated using the data of about 15000 custody events which occurred during the year 2013. The results were compared with the actual outcomes over the following two years. The overall accuracy of the system was found to be 62.8%. The use of such systems has triggered a debate among the stakeholders, particularly, over racial bias in the system. Due to this, police officers are supposed to use the system only as an aid and not depend on it completely.

Similar tools have been developed in the UK for supporting the decision-making in specific types of crimes such as sex offences, youth delinquencies, and domestic violence. Apart from police organisations, other offices in the UK are developing systems for deciding entitlements where decision-making is based on a set of rules. Department of Work and Pensions is spending 8 million pounds per year on *intelligent automation garage* where computer professionals are developing more than 100 such systems using advanced AI techniques [27].

2.5.2 Legal advice to litigants

One of the most popular chatbots in the domain of law, DoNotPay was developed in London. It advises on the matters related to traffic rules violations. The chatbot was developed by Joshua Browder using the platform IBM Watson. When a person is issued a traffic chalan (ticket) and the person feels that it has been issued wrongly, the person can use the system to find out the legal position. The system asks a series of questions in an interactive manner and then analyses to recommend on the further course of action. It may suggest that the person should pay the penalty or may suggest for an appeal against the decision of the traffic cop. After initial success in London, it was launched in several cities in the US. The chatbot has been extended to other areas such as immigration rules. It can advise the people seeking asylum in the countries like USA, Canada. The system can also generate the filled-up application forms based on the answers provided by the user. DoNotPay can be downloaded and used free of cost. The company intends to keep it free in future as well.

2.6 United States

In the United States, risk assessment tools are used at various stages in criminal justice system. These generally aim at assessing the possibility of recidivism i.e. re-offending. These tools also assess the possibility of failure to appear before the court or any competent authority which is an important factor in deciding pre-trial release or granting parole to the offenders. In the beginning, the tools normally involved conventional statistical methods but now employ advanced methods including the machine learning techniques based on neural processing [30].

The objectives of developing such tools include use of imprisonment as a punishment only when necessary; enhancement in public safety; protection of constitutional rights of the defendant; and reduction in the cost of incarceration on family and community. In several analysis of the cases, it has been noticed that in the conventional methods, in many cases, high-risk defendants are released while many low-risk defendants are detained i.e., the decisions taken were not correct. It was also realized that in conventional methods, in most of the cases, the judges did not have vital information on the defendant such as prior criminal history. To make decision-making more objective, such tools have been developed and deployed.

Most of these tools are based on Risk-Needs-Responsivity (RNR) model of risk and needs assessment and offender treatment. In short, the model has three principles – risk principle, needs principle and responsivity principle. According to the risk principle, the risk involved with any criminal can be predicted and high-risk offenders should be given more intensive treatment. Needs principle states that the treatment should address the criminogenic needs of the offender i.e., dynamic factors correlated with criminal conduct. Responsivity principle states that the rehabilitation program should be delivered according to the learning style of the offender [31].

Several states in the USA are using risk assessment tools [32]. In some states, use of algorithmic tools has been mandated by legislations. A federal legislation has also made the use of algorithmic tools necessary in federal cases. Some of these tools are discussed below briefly.

2.6.1 Public safety assessment tool

Public Safety Assessment (PSA) was developed by Arnold Ventures during 2011 – 2014 using a data set of 1500,000 cases from about 300 jurisdictions in the US [33]. Analysis of these cases was done to find the factors which are most predictive of new criminal activity or failure to appear in the courts. Ultimately, nine factors were zeroed on. These can be determined on the basis of data on the criminal history of the defendant. Arnold Ventures has made public the weighing of the factors and the precise algorithm for computation of risk. However, it has not made public the data used in the training process as it is under obligation to keep it confidential. The tool is available free of cost for jurisdictions in the US and has been deployed state-wide in Arizona, Kentucky, New Jersey, and Utah. It is also being used in many cities including Chicago, Houston, San Francisco, Pittsburgh, New Orleans.

2.6.2 Level of service inventory – revised

Another commercial tool for risk assessment is Level of Service Inventory – Revised (LSI-R). The tool was initially developed by Don Andrews and James Bonta using data on a group of Canadian criminals [34]. Presently, the tool is marketed by a Canada-based company, Multi-Health Systems. It uses a set of static (which don't change over time such as the age when the first crime was committed by the offender) and dynamic risk factors (which can change over time such as drug addiction) to assess the risk associated with the defendant. Initially, it was developed to make decision on the level of supervision needed by the correctional facilities. Now, it is being used by some jurisdictions in making decisions in other contexts also. It can be used as a stand-alone system or as a software development kit provided by the vendor. The charges are based on the number of times, the tool is used. The tool and its adapted versions are being used in the correctional facilities in almost 25 states in the US.

2.6.3 Decision-support at sentencing stage – COMPAS

Some States in the US have started using tools to assist in decision-making at the sentencing stage. Some are using commercially available tools while others have developed their own tools. Virginia and Pennsylvania have developed their own tools. In Virginia, the tool (developed by Virginia Criminal Sentencing Commission) identifies the low-risk felons to assign more appropriate punishments such as community service in place of jail term. Correctional Offender Management Profiling for Alternative Sentencing (COMPAS) [35], the most widely used tool, developed by Northpointe, assesses the risk posed by the offender by examining five areas: criminal involvement, relationships/lifestyles, personality/attitude, family, and social exclusion. It uses a variety of static and dynamic factors to assess the risk. This is being used to assist in sentencing in several states including Wisconsin, Florida, and Michigan. This is a proprietary software. The company has not disclosed the inner working of the tool i.e. how does it compute the weights. The courts are using as they find that the advice given by the system is appropriate in most of the cases.

2.6.4 Legal advice to litigants

Several chatbots have been developed and are being. For instance, VisaBot works in the domain of immigration laws. It interacts with the applicant to collect the relevant information and advises on the eligibility for visa and how to improve the probability of success. It has been used by more than 50,000 applicants seeking residence permit in the US. DoNotPay system has been used in several cities. The developer of this chatbot has made available chatbots for several other domains such as to assist people to apply for social benefits under various schemes.

2.7 Research directions

The applications described above are operational (sometimes, demonstrable only) and are being used by the judges, court officers and litigants. Apart from these, there are several R&D projects being executed at various institutions in these countries. Some of these are described below. It is clarified that these are some important ones, but this is not the exhaustive list of all R&D projects in this area.

In Australia, several research projects are in progress at various institutions. For instance, a group of researchers at Macquarie University, is developing a system which can analyse any new case to predict its outcome based on the outcomes of similar prior cases. This is being developed with the data from the Federal Circuit Court. A group at University of New South Wales is working on summarization of legal documents which is an active area of research in this domain. Other universities where work is being done in this domain include University of New South Wales, Victoria University, University of Ballarat, Melbourne University, University of Sydney, University of New Castle.

In Canada, some universities have come together to form consortium. For instance, ConflictAnalytics is a consortium consisting of Queen's Law, McGill University, Brandeis University, Columbia School of Business and some industrial entities like Google AI, Scotiabank Centre for Customer Analytics. MyOpenCourt is one of their achievements. There are many other projects in progress. One of the areas they are working is negotiation wherein they are investigating how to train models using negotiation data without violating confidentiality of the agreements. Under Autonomy through Cyberjustice Technology (ACT) initiative, a group of researchers is working on several projects to improve access to justice [36]. At University of Alberta, a team led by Prof Randy Goebel of Computer Science Department has collaborated with Japanese researchers to develop a system which took Japanese Bar Exam. The system was able to pass the exam where at least one of the colleagues of the investigating faculty failed [37].

In the United Kingdom, the work done on HART at Cambridge University has been mentioned above. At University of Liverpool, the team of researchers led by Prof Trevor Bench-Capon and Prof Katie Atkinson, has been working on the development of models to develop tools to support more consistent and faster decision making [38]. The tools can display possible arguments and the justification process. ANGELIC framework developed by them is used to capture the knowledge of case laws. The group is also working on explainable AI systems i.e., the systems can explain how it reached the decision and why other options were rejected. With financial support from Innovate UK, the university is working with some law firms and AI companies to develop solutions for specific areas.

In the United States, the Stanford Centre for Legal Informatics has several ongoing research projects on applications of AI to law [39]. The work at this centre has led to formation of several start-ups in legal tech. One of the important projects at the centre is on judgment drafting. This work is being pursued on the observation that writing of judgments can be divided into two parts. One part involves creativity and problem solving where the human involvement is must. The second part is mechanical in nature but differs from case to case. To automate this task, a survey of judgments is being carried out to find out the parts where drafting can be automated.

Several groups are working on natural language processing of legal documents to develop systems for case summarization, question answering, prediction of outcomes, etc. The institutions where such work is being done include New York University, University of Texas at Austin [40]. In view of the controversies being raised, some groups are working on fairness, bias, and accountability aspects of AI applications. One such group has formed Algorithmic Justice League at MIT to study the impact of algorithmic decision making on humans [41].

3 Issues in adoption of AI

Adoption of AI has been a difficult task in any domain and so in the justice delivery. This section looks into various controversies which have been faced from time to time in various countries. The issues have been debated by various organizations and they have brought out recommendations / guidelines in this regard as described below.

3.1 Controversies over use of AI

Controversies have erupted on the use of AI to support decision making in judiciary. The area where it has led to maximum controversy is risk assessment in criminal justice. There have been several studies on the accuracy and validity of risk assessment tools. In some studies, it has been observed that such tools are often biased against the blacks. They are often labelled as high-risk criminals, though in reality they do not commit as many new offenses. Similarly, white persons are more often labelled as low-risk offenders.

One of the popular cases is that of State of Wisconsin versus Loomis. In this case, Eric Loomis, the defendant (a black person) was awarded 6 years prison sentence by the lower court. The information used in deciding the case included risk score calculated by COMPAS. The sentence was challenged in *Wisconsin Supreme Court* on the ground that it violated his right to fair trial as guaranteed by the constitution of the US. The court rejected the points raised. In deciding the case, the Court agreed that the proprietary nature of the software makes it difficult to understand how the score was computed but it observed that all the information used by the system was either given by Loomis or taken from the public record. While giving the information, the defendant had a chance to ensure its accuracy. The court also observed that while deciding the case, the judge had other information also

apart from risk score. The risk score was neither determinative nor the sole factor in deciding the case. As the judge decided the case on the complete information (not just risk score), the judgement was individualized. However, while rejecting the claims of Loomis, the Supreme Court of Wisconsin observed that such tools have limitations and therefore, the courts should use risk score along with other factors. Risk score alone can't be used while deciding any case.

In Canada, Supreme Court dealt with a similar case in Ewert v. Canada (2018 SCC 30 CanLII), where an indigenous litigant brough Charter against the risk assessment done by Correctional Services Canada, which used a tool developed and tested predominantly with data of non-indigenous people. Supreme Court held that the tool which has been developed and tested with data from a different population can't be used for risk assessment of an indigenous person. This will not give individualized assessment of the offender. The example shows the need of collecting and testing with data from different sections of the society to build an AI-based system [42].

Similarly, in the United Kingdom, while AI systems are being developed and used in various areas, a debate has started over the suitability of such systems where its decision can make adverse impact on life of someone [43]. Several committees are looking into this aspect and making recommendations to bring transparency, fairness, and accountability, etc. Science and Technology Select Committee report on "Algorithms in Decision-making" has advocated for legally enforceable "right to explanation" so that any citizen can seek explanation behind any decision taken by machine. Law Society of UK has also recommended steps for oversight, registration and mitigation of risks in justice system.

Despite these controversies, several jurisdictions in the USA, Canada and UK are still using the systems as one of the sources of information. Several studies have been done on the accuracy of these systems. In one of the latest studies, published in February 2020, it has been concluded that such tools perform better than humans for assessment of risks, if used in proper settings [44].

3.2 Responsible adoption of AI

As discussed above, the application of AI in judicial system has led to a debate among the stakeholders. To address the problems arising out of the use of AI in judicial systems, some agencies have worked on creating guidelines to be followed while developing AI-based systems in judicial domain.

3.2.1 Recommendations of partnership on AI

Partnership on AI (PAI), an inter-governmental organization, has prescribed the following as the minimum requirements for the responsible development and deployment of criminal risk assessment tools [45]:

(a) Training datasets must measure the intended variables.
(b) Bias in statistical models must be measured and mitigated.
(c) Tools must not conflate multiple distinct predictions.
(d) Predictions and how they are made must be easily interpretable.
(e) Tools should produce confidence estimates for their predictions.
(f) Users of risk assessment tools must attend trainings on the nature and limitations of the tools.
(g) Policymakers must ensure that public policy goals are appropriately reflected in these tools.
(h) Tool designs, architectures, and training data must be open to research, review and criticism.
(i) Tools must support data retention and reproducibility to enable meaningful contestation and challenges.
(j) Jurisdictions must take responsibility for the post-deployment evaluation, monitoring and auditing of these tools.

3.2.2 European ethical charter on use of AI

Commission for Efficiency of Justice of the Council of Europe has formulated key ethical principles to be adopted in AI-based solutions in judicial system. The details of these have been published in *European Ethical Charter on the Use of artificial Intelligence in Judicial systems and their environment* [46]. The principles are as follows:

(a) Principle of respect for fundamental rights
(b) Principle of non-discrimination
(c) Principle of Quality and Security
(d) Principle of transparency, impartiality and fairness
(e) Principle "under user control"

3.2.3 IEEE global initiative on ethics of autonomous and intelligent systems

Institute of Electrical and Electronics Engineers (IEEE) has a global initiative on ethics of autonomous and intelligent systems (AIS) with the objective to equip the people involved in the design and development of autonomous and intelligent systems (AIS) with the necessary information to prioritize ethical considerations so that the technologies are advanced for the benefit of the humanity. In 2016, IEEE published a document *Ethically Aligned Design (EAD): A Vision for Prioritizing Human Wellbeing with Autonomous and Intelligent Systems* [47]. The following issues have been recommended as Norms for the Trustworthy Adoption of AIS in Legal Systems:

(a) Issue 1: Well-being, Legal Systems, and AIS
(b) Issue 2: Impediments to Informed Trust
(c) Issue 3: Effectiveness

(d) Issue 4: Competence
(e) Issue 5: Accountability
(f) Issue 6: Transparency

From the above, it may be seen that most of the principles / guidelines suggested by different agencies have several things in common. The qualities like fairness, transparency, accountability, equality, etc. have been emphasized in all the recommendations. The guidelines prescribed by PAI is more concrete and limited to the criminal justice whereas the European ethical charter and norms recommended by IEEE are more general for the domain. Though many of these may be adopted by any country, the final test is whether the system conforms to the principles adopted in the constitution of the country.

4 Current status in India

Supreme Court of India has been exploring the possibility of applying AI technology for quite some time. In 2019, It constituted AI Committee consisting of justices of Supreme Court and High Court and technical experts. The Committee looked into various applications and decided to focus on the development of the following two applications:

(a) Supreme Court Vidhik Anuvaad Software (SUVAS)
(b) Supreme Court Portal for Assistance in Courts Efficiency (SUPACE)

SUVAS [48] is a neural-based machine-aided translation system to translate legal documents from English to Indian languages and vice-versa. This has been made available for several major Indian languages including Hindi, Bengali, Marathi, Gujarati, Tamil, Telugu, Kannada, Malayalam. It has been trained using large corpora for these languages running in several millions of sentences and therefore, has achieved good accuracy. This has been made available to the translators along with a translation workbench which has several useful features including interactive translation, user preferred phrases, etc. It produces translated documents while maintaining the formatting of the document. This has been deployed on experimental basis in several High Courts across India.
SUPACE [49] assists a judge in finding answers to the relevant questions on the case under consideration. A judge can pose the questions to the system and get answers without going through all the case documents. While answering the question, the system also displays the relevant text highlighting the precise answer. Needless to say, it can save the time of the judge and thus speeds up the process. At present, it has been trained with cases filed under certain sections of Indian Penal Code. It can answer questions like when the crime was committed, whether there was any witness, whether the weapon used has been recovered, etc. It is being trained further to improve the accuracy.
Though the number of AI applications in justice delivery is limited, India has created a very strong ICT infrastructure for judiciary. Starting from the district and sub-district level courts to the Supreme Court, each court has necessary IT infrastructure as well as connectivity. Case documents can be filed online from the comfort of home/office. Daily cause list is published online. Large number of courts have the facility of videoconference which is being used for hearing these days. Case judgments are available online. Necessary institutional mechanism has been put in place for computerization. There are monitoring committees at the Supreme Court as well High Courts which monitor the progress of computerization and provide guidance for further implementation. That is why the courts have remained operational even during the Covid-19 pandemic. This has created necessary base which can be used to develop and deploy AI-based applications. The infrastructure is being upgraded from time to time in a systematic manner.
Apart from the existing ICT infrastructure in the courts, India has a vibrant IT industry which has been growing consistently during the last three decades. Several companies have developed and deployed large scale IT applications in other sectors in India as well as abroad. Many applications have AI components as well. Further, India is home to thousands of IT start-ups which have developed a range of products and services. Several start-ups are already working in legal sector. Some of these are using AI in their products and services. Thus, the country has an eco-system which can support developing AI applications for justice delivery.
The most important enabling factor is the leadership role being played by the Supreme Court. Two years back, the Supreme Court took initiative and constituted Artificial Intelligence Committee to examine the developments happening across the world and advise on the applications which could be taken up on priority basis. The Committee is already monitoring the two applications mentioned above and many more may be taken in future.

5 Potential Applications

As it is evident from the previous section, the number of AI applications in justice delivery in India is quite limited. There are several avenues where AI applications can be developed to improve the access to justice. To identify the potential applications, a comprehensive literature survey has been done. The applications developed in several countries were studied including Australia, Brazil, Canada, China, UK, USA. References to the systems have been given while discussing the potential applications for India.
The applications can be clubbed into the following broad categories:

(a) **Providing services to the judges** in expediting the cases through legal research, case analysis and assistance in judgement drafting;
(b) **Empowering the litigants/citizens** in different ways such as providing information on legal issues for taking informed decisions, assisting the litigants in self-representation, assisting in making use of alternative dispute resolution systems; and

(c) **Assisting the court staff** in clubbing of cases, scheduling of cases, transcription of proceedings and machine-aided translation of documents.

Apart from improving the productivity of the courts, AI-based systems can help in bringing uniformity in decision-making in the courts, especially, lower courts. AI systems can help the judges in deciding the routine cases where the decisions depend on well-defined rules or on certain factors which have different weights. For instance, compensation in motor accident cases depends on factors such as age of the victim, his income, his liabilities, etc. Based on circumstances and weights assigned in the precedent cases, the system can decide the weights and can suggest some quantitative value. When decisions are standardized, it brings transparency as well. Though a judge can differ with the value suggested by the machine as the judge may find presence of a factor which makes the case unique in some sense requiring a different treatment. In that situation, the judge can give the judgment different from the one suggested by the system, but he/she is supposed to explain the reasons in the judgment. Such deviations can be used to improve the system further. It can also be used as a tool to monitor the functioning of the lower courts by a superior court. If there are too many cases where a particular judge differs, the system can flag it so that the superior courts can look into the matter.

Figure 1 shows how the proposed applications would provide services to various stakeholders. The applications are being made available through a platform, which is called Justice India Platform. This platform can be used by the developers to provide the solutions at one place. Various courts in the country can provide the judgments through this platform. Data collected in various projects can be shared through this platform.

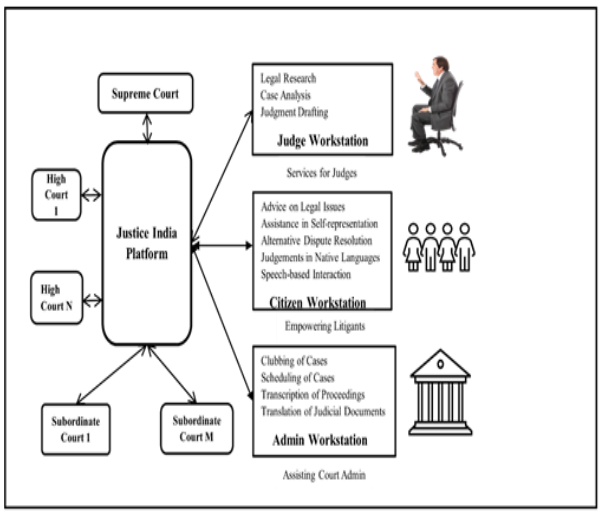

Figure 1: Services provided through proposed justice India platform

5.1 Providing services to the judges

Judges are the key actors in the judiciary. They are always under pressure to dispose of more and more cases. They must be supported by ICT applications in this process. Though it is quite unlikely that the judges can ever be replaced by computers, their productivity can be improved by aiding at various stages of the case disposal as given below.

5.1.1 Assistance in case analysis

The recent developments in natural language processing have made it possible to develop sophisticated text analysis tools. These tools can be applied in analysis of the legal documents. Once a document has been comprehended by the system, it can answer questions posed in natural language. A well-known example of this type of system is Watson from IBM. This can comprehend vast amount of text and can answer any question in that area. Another example is a system developed by Microsoft using Stanford Question Answering Dataset (SQuAD), which has reached the level of human comprehension in limited domain [50]. Similarly, a system developed by Alibaba has reached the level of human comprehension in limited domain. Such systems can assist the judges by providing the key information on the dispute. For confirmation, the system can also provide the parts of the document so that the judge herself can see verify the answer.

Another application of artificial intelligence in law is case summarizing [51, 52]. Case summarizers have been developed in several domains. Case summarizer collects the key points of the case from the documents. There are many stages where the judge would like to go through a summary of the case rather than full case to save time and effort. For instance, full case may not be important in making the decisions such as for passing an order for temporary injunction. Of course, while delivering the final orders, the full case details need to be examined. While referring to the precedent cases also, a case summarizer would be quite helpful as only limited amount of text is to be referred.

5.1.2 Assistance in legal research

While deciding the cases, judges do legal research to find the relevant precedents (past cases on the same legal issues) where a similar case has been decided by the same court or by a higher court. Precedent cases are needed to see how the law has been interpreted in these cases in the past. Often the terms in the legislation are not well-defined in terms of clear rules (i.e., open-textured). In such matters, there is no ‘the’ answer in the case. Advocates argue for their clients for a favourable decision citing the precedents. Though they agree on the existence of certain factors in deciding the dispute, but they don’t agree on what weightage should be assigned in any specific case. Both the parties compare and contrast the

precedent cases with the present case while seeking a favourable outcome. The judge takes a decision based on the similarities and dissimilarities between the current case and the precedents decided earlier.

The experience gained in the development of Same Type Case Reference (STCR) system in China can be useful. Though China does not have common-law system as in India, several recent reforms in judiciary in China have made Chinese judicial system quite like common-law system. Few years back, China has adopted STCR system where the judges are supposed to follow the decisions taken by the same court or higher courts in similar cases. If a judge wants to deviate from the earlier cases, he needs to take permission from the higher authorities. This is, essentially, how the cases are decided in common law system where precedents are binding in deciding a new case. Therefore, the experience gained in designing and using a system like STCR would be quite useful for Indian judicial system.

Though the full details of the STCR system developed in China, have not been made available, the limited information available indicate that STCR system uses a factor-based approach. In this approach, cases dealing with one type of issue in the given domain are collected and analysed to identify the factors. Each case of the domain is represented in terms of factors and can be compared with other similar cases in terms of these factors. When a new case is to be decided, the new case is compared with the precedent cases and this comparison leads to the insights useful for deciding the case. This type of comparison of legal disputes in terms of factors was, initially, proposed in the work done at University of Massachusetts in the eighties [53]. The useability of this approach has been studied in Indian laws as well [54]. As natural language processing (NLP) was in very preliminary stage in the eighties and nineties, it was not possible to identify factors from the case text but the had to be identified manually. Now, it is possible to use NLP to identify the factors in legal disputes. Such systems can be improved further using new techniques in NLP.

5.1.3 Assistance in drafting of judgements

AI-based system can assist in drafting parts of the judgments which could prove to be beneficial in increasing the productivity of the courts. China has claimed that they have developed such types of tools, and these are improving the productivity of the judges substantively. They have not made full details available so that these could be examined. However, it is known that natural language processing techniques can be helpful in preparing at least parts of the judgments.

An area where AI systems can assist in making preliminary judgement is risk assessment based on a vast number of cases decided in the past. In some countries like USA and UK, the risk of re-committing a crime is assessed by using a model which predicts the risk score based on the data embodied in several thousands of earlier cases. One of the most popular tools is COMPAS, which is being in several states in the US. Though the rules/regulations in India are quite different, such types of systems can be developed and used as one of the sources of information while deciding some matters. This will also bring uniformity in decision making. It becomes quite important as large number of undertrials are lodged in the prisons waiting for judgement. Such systems can also be used by parole boards while deciding the cases for parole.

Such systems need not be limited to criminal cases. There are several types of cases where subjective decisions are made based on the factors relevant to that domain. For instance, the compensation to be paid to a person due to personal injuries depends on the factors such as age of the victim, income of the victim, liabilities of the victim and potential of earning in future, etc. In some cases, the compensation amount can be computed using a set of rules as formulated by legislature or stipulated by the courts while deciding similar cases. In other cases, the situation may not be that simple and the judge needs to weigh several factors. In such situations, a model which makes suggestions based on large number of similar precedents, can assist the judge in reaching a conclusion.

5.2 Empowering litigants / citizens

Another area where AI can be quite helpful is in helping citizens with information on simple legal matters. The issue of lack of legal literacy among the citizens has been discussed at various forums from time to time. Though steps have been taken from time to time, the benefits have not yet reached to a large population. Often people are not aware of even basic rules/regulations and when they face a situation where they need to approach courts, they find it quite difficult due to the cost and time involved. Many times, they prefer to accept the situation as the desire of the God. On the other hand, some people in the society who know the rules/regulations take advantage of the situation by exploiting those who are not aware of these. There are several ways the citizens/litigants can be supported in accessing the justice. Some of these are discussed below.

5.2.1 Chatbots for legal advice

Acts and Rules are written in complex sentences using legal terminologies. Even educated people find it difficult to understand the laws which are of direct relevance to them such as consumer rights protection laws, domestic violence laws, contract laws, etc. What people need is the information in plain language and answers to the direct questions such as whether the law would be applicable in the given situation or what are the options available to a victim or what is the possibility of winning a case in the given circumstances. AI-based chatbots such as Amica, Adieu, etc have been developed in several areas of laws in many countries and are being used widely. We need a series of chatbots in English and Indian languages to advise the citizens in simple matters. Some of the areas where it would be quite useful are Right to Information,

Consumer rights protection, various sections of Indian Penal Code.

Such chatbots can be quite useful in the situations where the victims want to maintain privacy such as in the cases of domestic violence, sexual harassment, etc. In such matters, the victims don't come forward on their own but once they know the laws and possibility of winning the case, they would be in a better position to decide the action to be taken. It is also possible to provide such information without requiring the victim to disclose his/her identity. Of course, for that to happen, we need to evolve necessary guidelines. Delivery of such services on mobile phones has made it accessible to a large population due to the high penetration of mobile phones in the country.

5.2.2 Support in self-representation

AI-based systems can be helpful to the people who want to represent themselves in the courts. There are many people who would like to represent themselves in the courts in at least simple matters such as those related to consumer rights protection, etc., provided they have information on the relevant laws and precedents for articulating their points. An AI-based system can help a person in this aspect by providing information on the relevant legislations and case laws. A person himself can assess the winning possibility of his/her case by going through the precedents. AI-based system can also assist in drafting legal documents such as affidavits for this purpose, etc. It can also provide procedural information such as which court should be approached, and which documents need to be submitted, etc.

5.2.3 Alternative dispute resolution

Out of the court settlements can reduce the workload on the judges. Recently, Chief Justice of India (CJI) has spoken on this point. He said that mediation should be the first option to be tried [55]. People often don't try this route as they are not guided properly. They can be supported by AI-based systems which can retrieve similar past cases decided by various courts. If such a system has large number of past cases in its database, it can make good quality predictions about the outcome of the case. The litigants themselves can see which are the cases where a particular party has won or lost the case. The system can also tell how much time and hearings have been involved in each case. Even when litigants are not convinced on the outcome, they may accept the suggestion after calculating the average time and money to be spent if they approach the courts.

5.2.4 Access to judgements in native language

Advances in AI have led to improved systems for machine-aided translation. Language technology, especially, machine translation can make a visible difference in taking justice to the public. India is a diverse society with people speaking different languages, following different religions, practicing different culture. The diversity is one of our strengths. However, difference in language becomes a barrier in accessing justice when the court uses a language different than the one used by the litigant. In the absence of the knowledge of language, a person needs to depend on his / her lawyers for the information related to his/her case. His information is limited to what is told by the lawyer. This obviously has its drawbacks. The situation can be improved by providing judgments in Indian languages.

Though a beginning has already been made by Hon'ble Supreme Court with the launch of SUVAS, we need to go a long distance. The good news is that several teams are already working to create large corpora of Indian languages which can support development of more accurate machine-aided translation systems [56]. The activity already initiated needs to be continued and strengthened.

5.2.5 Speech-based interaction

Automatic speech recognition (ASR) and text-to-speech (TTS) synthesis techniques can be utilized to develop useful applications for citizens. A significant percentage of Indian population is illiterate or semi-literate. Further, there are large number of people who know how to read and write but are more comfortable with speech-based interaction. They can interact with speech-based applications comfortably to find out information such as the status of their matter, the date of hearing, the assigned court number, etc. Both ASR and TTS technology are available to develop such applications in English and most of the major Indian languages [57, 58].

5.3 Assisting court administration

Apart from the judges, the courts are staffed by administrative personnel who receive the petitions/ documents, process these before bringing to the judges. They support the judges in handling the cases and are also responsible for issuing the judgments and other legal documents. As case processing takes good amount of time, it is a place where activities can be automated to improve the disposal speed of the cases. The following are some AI applications which can be developed to support the court staff in performing their duties.

5.3.1 Clubbing of similar cases

In its 230th report, Law Commission of India has recommended clubbing of cases as one of the measures to reduce the case pendency [59]. With the advances in NLP, it has become possible to the cases which have similarity to a large extent. Equipped with this capability, a system can be developed to club/bunch the similar cases together. This can be used to bunch the pending cases which are quite similar in legal sense but spread over time. A judge can decide the bunch of cases together when the cases are similar from the point of view of law. Of course, while considering all the cases together, the

judge has to consider certain issues which are not common to all the cases, but the view taken on the common issue will reduce the overall time taken in deciding the cases. At present, the cases are taken separately. A case may be scheduled after 3 months, another case after 7 months and so on. Each case will be taken up by the court when the time comes. Of course, the decision taken in one case will be applicable to the subsequent cases, but the judge must spend some time to consider a new case and hear the arguments of the parties before deciding the case. This will not only reduce the workload of the courts, but the litigants will also be happy with their cases being decided much earlier than when scheduled initially. Of course, there is a need of empirical study of this methodology to find out the savings of time and convenience or inconvenience caused to the litigants.

5.3.2 Scheduling of cases

There are several avenues to use AI in the routine tasks performed by the court officials. This will not only relieve the court officers to some extent but will also bring uniformity and transparency in decision-making. Use of AI in such processes will lead to speeding up the process of case disposal. An example is the use of AI in scheduling of cases based on the criteria/policies of the court. Such systems are already being used in other countries. Similarly, AI has been used to identify the relevant case to file the documents received.

5.3.3 Transcription of proceedings

ASR technology for Indian languages have reached to the level that it can be used for transcription of court proceedings, dictation of judgements, etc. Dictation systems can assist in saving of substantial time of judicial officers. Transcription of the statements of the witnesses can not only save time of the court staff but can also be used in finding the discrepancies among the statements of the witnesses quickly. There is a need to do in-depth study of such systems which have already been deployed in the courts in other countries like China, Singapore [60], etc. and adopt in the courts in the country.

5.3.4 Machine-aided translation of judicial documents

Translation is also needed when the cases move from district/sessions court to High Court which sometimes may not be using the same language in the functioning. Similarly, translation may be needed when the case moves from a High Court to the supreme court. Some High Courts use Indian languages whereas the Supreme Court uses English. Several times, translation itself becomes a reason of delay. A fully automated machine translation is still not feasible at this point of time, but machine-aided translation systems (with human in-the-loop) can reduce the effort/time spent by the human translators and thus make the whole process faster.

6 Way forward

Adoption of AI in any domain requires efforts in four dimensions viz. Infrastructure (data as well as computing and communication) Development, Policy and Regulations, Human Resource Development and Technology Development as described in [61] and illustrated in the **Figure 2**. These are briefly discussed below in the context of law and justice.

6.1 Infrastructure development

Data works as fuel for AI. The AI algorithms, particularly those based on neural networks, use past data to learn how to perform the given tasks. Incidentally, this is like decision-making in common-law where the past cases are often used to decide new cases which involve similar facts/issues. As the court cases are published, creating case datasets is relatively less difficult in this domain but there are several tasks to be done. Though the new cases are filed online, and judgments are also available online, the past judgements are often not in electronic form. Apart from this, there is also need of datasets for speech and machine translation. Though speech dataset is available in various languages, speech dataset for law domain needs to be created. Similarly, parallel text corpus is needed for training of machine-aided translation systems. Often the texts are available in printed or electronic form, but these have to be brought together.

Under e-Court initiative, courts across the country have been equipped with necessary hardware and connectivity. These are being upgraded further as the technology is changing fast. Thus, the basic computing and communication infrastructure is already being taken care of. However, high-end computing infrastructure needs to be created for training of AI systems.

6.2 Policy and regulations

For Responsible Adoption of AI, there is a need to have a comprehensive policy for AI systems development. This is true in any domain but much important in the domain of law. The policy must address the relevant issues including bias, transparency, ability to explain. Several organizations have evolved ethical guidelines / principles for development of AI systems. The important among these are Recommendations of Partnership on AI, European Ethical Charter on Use of AI and IEEE Norms for the Trustworthy Adoption of AIS in Legal Systems, as mentioned earlier.

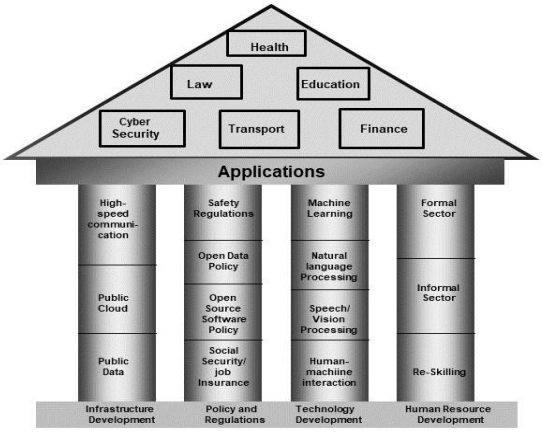

Figure 2: Pillars for adoption of AI (Source: [61])

The above recommendations / ethical charter are good starting points but need extensive deliberations to formulate similar guidelines for adoption in India. Though the judiciary has a final say in such matters, articulation of such guidelines requires technical experts as well, particularly when we prepare detailed guidelines for the design and development of AI systems as recommended by Partnership on AI (PAI). Drafting an ethical charter is not within the scope of this article but some observations on this issue are made below to move forward.

(a) *(a) Must fit in constitutional and legal framework:* Apart from those discussed above, such guidelines/charters will be developed and published by other jurisdictions from time to time, but we need to examine whether these fit in our constitutional and legal framework and adopt accordingly.

(b) *(b) Human-in-the-loop:* The objective of applying AI to judicial system is to assist the judges in the tasks which are performed under the supervision of the judge. AI is not intended to replace humans in this or any other critical domain like medicine, governance, defence, etc. The final decision needs to be taken by humans. AI-based applications in such domains must have human-in-the-loop.

(c) Periodical Review: As we start using AI solutions in judicial system, many new issues will emerge over time. For instance, the issue of bias due to the historical datasets and need of transparency became a point of debate when such systems were used to predict the probability of repeating the offense (by the same offender), as discussed in the previous section. Therefore, whatever charter, we decide, needs to be reviewed and updated periodically.

(d) Multiple Levels: Guidelines need to be developed and made available at various levels as seen in the above two sets of guidelines (recommendations of PAI and European Ethical Charter). The recommendations of PAI are at technical level and more detailed in comparison to the ethical charter formulated by Commission for Efficiency of Justice.

A good attempt has been made in a report prepared by Vidhi Centre for Legal Policy and TCG-Crest to develop an ethical charter for India, but it requires further deliberations to make necessary modifications and adaptations as suggested by the authors of the report [62].

Regulations are also needed for adoption of AI as has been seen in other countries. For instance, in the United States, Federal as well as several State governments have enacted laws which require the courts to use IT systems while deciding the cases of parole, etc.

6.3 Human resource development

Development of AI applications for improving justice delivery require people with expertise in both technology (AI & computer science) and law. For the long-term projects, we need to prepare professionals with knowledge in both the domains. This can be achieved by initiating new educational programmes where a mix of courses are offered in technology & law and the students are enrolled from both the disciplines. Some elective courses can be offered to the interested undergraduate students of law and technology who want to explore this area. Similarly, some introductory courses in the areas of AI & law may be introduced in the judicial academies where judicial officers receive in-service training. Workshops may be held to provide exposure to the area.

6.4 Further research & development

Though the above-mentioned AI applications developed have demonstrated the feasibility in the domain, these require further improvement/development to reach the level of performance to make substantial impact. Thus R&D is needed in broadly two directions. Firstly, the algorithms / techniques need to be improved. Secondly, the techniques which have been tried in other countries need to be customized for the Indian context which may require further research.

Some of the AI applications described above can be developed using the technology currently available. For instance, chatbots can be developed to advise people on legal issues in several areas in India. However, there are several applications which require further R&D before these could be used in real-life environment. For instance, applications for judgment drafting. Several groups are working on the systems which can assist in judgment drafting by providing preliminary judgement drafts. A major project on judgement drafting is underway at Stanford University. Though some institutions in China have claimed that they have achieved substantial success, it has not published the details. There is a need to collaborate with the institutions for further research to develop such systems.

6.5 Institutional framework

As mentioned above, there are some areas where AI technology can be used right now and useful systems can be developed for use within limited time frame. To develop such systems, both types of expertise are required – technical and legal/judicial. There is a need to bring both academia and industry together as other countries have done in developing AI systems for their courts. In this direction, it is suggested that a National Centre for AI and Law and several (4-5) Centres of AI and Law (discussed below) be established as described below and illustrated in **Figure 3**.

Under the guidance of a National Steering Committee (to be established), National Centre for AI and Law will be responsible for overall development and deployment of systems. It will have a core team for coordination of activities (preparing specifications, monitoring development and testing/validation of the system), but will primarily engage both private and public sector institutions through various approaches such as innovation challenge, etc. Innovation challenge rounds can be conducted to identify the competent teams from both public and private sectors. Such challenge rounds have been used to get innovative solutions in several domains withing the country as well as outside. As such challenges are held in a transparent way, government agencies find it useful in comparison to the normal tendering process which requires that the specifications of the final solutions be specified in the beginning which is quite difficult in the areas where entirely new solutions are to be developed. This centre will ensure that inputs are taken from all the stakeholders including judicial officers at various levels, citizens, industry. To accomplish this, it may arrange consultation meets, workshops, etc from time to time. It may institute studies on various related topics.

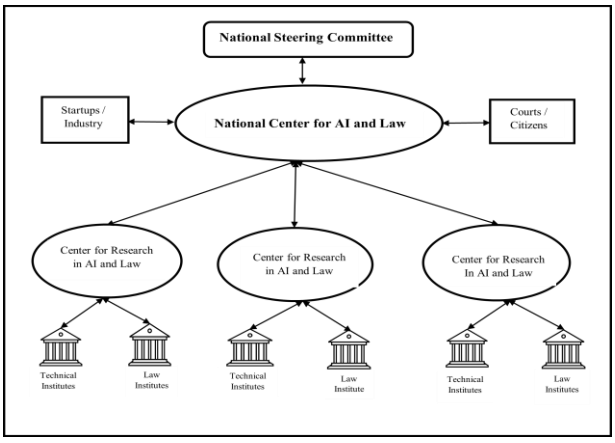

Figure 3: Institutional framework for adoption of AI in justice delivery

In order to take up substantial research in this area within the country, some Centres for Research in AI and Law need to be established. These centres are needed to develop systems which still requires a good amount of research and development. The centres should be setup in the top law schools/universities and technical institutions (such as IITs, IIITs, etc) as a collaborative initiative. These centres should also be used in studies of performance of AI systems so that the system can be improved further.

7 Conclusions

The article has reviewed AI applications for improving justice delivery in some of the developing as well as developed countries. It is observed that a fully autonomous system in justice delivery is not achievable with the currently available technology, but it can surely increase productivity of the court officers and judges. AI-based systems are helping in out of court settlements in the areas like employee compensation, property distribution in divorce cases, etc. It is also being used in criminal justice system in several ways. For instance, it is being used in assessing the possibility of recidivism i.e., re-offending. AI-based solutions are also empowering the citizens in taking informed decisions by providing the relevant legal information/advice in simple legal matters. Further, AI & law continues to be a prominent area for research. The article has discussed broad research directions being pursued in various countries.

The article has discussed the problems being faced in deploying AI applications in judiciary. Deployment of AI solutions has triggered a debate among the stakeholders over several issues such as fairness, transparency, accountability, etc. Such matters have also been examined by the courts in some countries. While upholding the use of such solutions for the larger benefits of the society, the courts have emphasized on incorporating features like transparency and transparency in these systems. In view of this, some organizations have prescribed ethical charter / principles / guidelines for development of AI solutions for judicial domain. Some of these principles / guidelines have been discussed in this article.

Though some AI applications are being developed in India for improving justice delivery, there is a long way to go. The article has identified the gaps and has suggested the potential applications which may be taken up for development for improving the quality and speed of justice delivery in India. The applications have been suggested for three types of users viz. judges, court officers/administration and litigants. Several applications for each of these users have been discussed.

The article has also given a way forward for India wherein it has discussed the necessary components viz. infrastructure, policy and regulations, human resource development. Fortunately, necessary ICT infrastructure has already been created in the country under the e-Court initiative. Large number of cases and legislations have already been made available on Internet in textual form. A database of current cases along with the judgements/orders has been created and updated on routine basis. A suitable policy needs to be formulated on the lines of the policies in other countries. Several applications can be developed by engaging industry and other stakeholders.

Further research is needed to improve the techniques and adapt the developed solutions to the Indian context. As the domain requires knowledge of technology as well as law, technical and law institutes need to work together. At present, researchers in both the domains are working in isolation. The article also discusses an institutional mechanism for this purpose which may be established to coordinate the activities.

References

[1] B.S. Haney, "Applied Natural Language Processing for Law Practice", Intellectual Prop. & Tech. F, 2020. Available: http://bciptf.org/wp-content/uploads/2020/06/Haney_Manuscript_Publish_5-30-2.pdf

[2] A.D. Reiling, "Court and Artificial Intelligence", International Journal for Court Administration, 11(2), 2020. https://doi.org/10.36745/ijca.343

[3] B. Verheij. Artificial Intelligence as law. Artificial Intelligence and Law, 28(2), 2020. https://doi.org/10.1007/s10506-020-09266-0

[4] National Judicial Data Grid. Available: https://njdg.ecourts.gov.in

[5] M.B. Lokur, "What Is Stopping Our Justice System From Tackling the Cases Pending Before Courts?" The Wire, May 12, 2021. Available: https://thewire.in/law/india-judiciary-pending-cases-supreme-court

[6] D. Mahadik, "Analysis of Causes for Pendency in High Courts and Subordinate Courts in Maharashtra", Report prepared by Administrative Staff College of India, 2018.

[7] National Mission on Delivery of Justice and Legal Reforms. Available: https://doj.gov.in/national-mission-justice-delivery-and-legal-reforms

[8] P. Jain, "Artificial Intelligence for sustainable and effective justice delivery in India", OIDA International Journal of Sustainable Development, 11(6), 2018.

[9] A. Stranieri and J. Zeleznikow, "Split Up: An intelligent Decision support System which provides Advice Upon Property Division Following divorce", International Journal of Law and Information Technology, 6(2), 1998.

[10] A. Chanthadavong, "Federal government thinks AI for separating couples is a good idea", ZDNet, 2021. Available: https://www.zdnet.com/article/federal-government-thinks-ai-for-separating-couples-is-a-good-idea/

[11] R. Crozier, "Fed Court turns to AI to predict asset split after relationship breakdown", iTnews, 2019. Available: https://www.itnews.com.au/news/fed-court-turns-to-ai-to-predict-asset-split-after-relationship-breakdown-525587

[12] D. Cronshaw, "How artificial intelligence is being used for divorce and separations with apps like Amica, Adieu and Penda", Newcastle Herald, 2019. Available: https://www.newcastleherald.com.au/story/6849822/divorce-through-robot-lawyer-apps-saves-cash-and-stre ss/

[13] J. Talevski, "Carrington Associates engages Federal Court of Australia with AI concept", ARN, May 23, 2019. Available: https://www.arnnet.com.au/article/661983/carrington-associates-engages-federal-court-australia-ai-concept/

[14] JIRS. Available: https://www.judcom.nsw.gov.au/judicial-information-research-system-jirs/

[15] Luz de Araujo, et.al. VICTOR: A dataset for Brazilian legal documents classification. Proceedings of 12th Conference on Languages Resources and Evaluation (LREC 2020), Marseille, May 2020. https://aclanthology.org/2020.lrec-1.181.pdf

[16] F.M. De Sanctis. Artificial Intelligence and Innovation in Brazilian Justice. International Annals of Criminology, 2021. Available: https://doi.org/10.1017/cri.2021.4

[17] Artificial Intelligence: Technology Applied to Conflict Resolution in Brazilian Judiciary. Research Report, Centre of Innovation, Administration, and Legal Research, Getulio Vargas Foundation, 2021. Available: https://ciapj.fgv.br/sites/ciapj.fgv.br/files/report_ai_ciapj.pdf

[18] J. Macfarlane, "The National Self-Represented Litigants Project: Identifying and Meeting the Needs of Self-Represented Litigants", 2013. Available: https://representingyourselfcanada.com/wp-content/uploads/2015/07/nsrlp-srl-research-study-final-report.pdf

[19] D. Liang, "Conflict Analytics Lab opens its AI legal aid system to small businesses", 2020. Available: https://myopencourt.org/conflict-analytics-lab-opens-its-ai-legal-aid-system-to-small-businesses/

[20] T. Vasdani, "From Estonian AI judges to robot mediators in Canada, UK", The Lawyer's Daily, 2019. Available at https://www.thelawyersdaily.ca/articles/12997

[21] S. Azam, "Artificial Intelligence, "AI Justice Challenge" and the Future of Law", BarTalk, 2019. Available: https://www.cbabc.org/BarTalk/Articles/2019/August/Features/Artificial-Intelligence,-the-AI-Justice-Challenge

[22] R. Fyfe, "AI and the Future of Law", BarTalk, 2019. Available: https://www.cbabc.org/BarTalk/Articles/2019/August/Features/AI-and-the-Future-of-Law

[23] DoNotPay System. https://DoNotPay.com

[24] J. Deng, "Should the Common Law System Welcome Artificial Intelligence: A Case study of China's Same-Type Case Reference System", Georgetown Law and Technology Review, 3(2), Pages: 223-280, 2019. https://doi.org/10.2139/ssrn.3267045

[25] B.M. Chen and Z. Li, "How will technology change the face of Chinese justice", Columbian Journal of Asian Law, 34(1), 2020. https://doi.org/10.7916/cjal.v34i1.7484

[26] Y. Shenggao, "AI-assisted sentencing speeds up cases in judicial system", China Daily, 2019. Available: http://www.chinadaily.com.cn/cndy/2019-04/18/content_37459601.htm

[27] C. Jones, "The government's approach to algorithmic decision-making is broken: here's how to fix it", NS-Tech, 2020. Available: https://tech.newstatesman.com/guest-opinion/algorithmic-decision-making

[28] T. Scantamburlo et al, "Machine Decisions and Human Consequences", In Algorithmic Regulation by K. Yeung and M. Lodge, Oxford University Press, 2019. https://doi.org/10.1093/oso/9780198838494.003.0003

[29] M. Oswald M et al, "Algorithmic risk assessment policing models: Lessons from the Durham Constabulary HART model", Information and Communications Technology Law, 27(2): 223-250, 2018. https://doi.org/10.1080/13600834.2018.1458455

[30] C. Coglianese and L.B. Dor, "Artificial Intelligence in Adjudication and Administration: A Status Report on Governmental Use of Technology in the United States", Project Report, University of Pennsylvania Law School, 2019.

[31] N. James, "Risk and Needs Assessment in the Criminal Justice System", Report by Congressional Research Service, 2015. https://crsreports.congress.gov/product/pdf/R/R44087

[32] AI and Human Rights: Criminal Justice Systems. Electronic Privacy Information Centre. Available: https://epic.org/ai/criminal-justice/index.html

[33] Arnold Ventures. Available: https://www.arnoldventures.org/

[34] T. Howell, "LSI-R, LS/RNR and LS/CMI Documentation", Public Safety Division, Multi-Health Systems, Inc, 2021.

[35] E. Jackson and C. Mendoza, "Setting the Record Straight: What the COMPAS Core Risk and Need Assessment Is and Is Not", Harvard Data Science Review, 2(1), 2020.

[36] L. Millan, "Université de Montréal AI Initiative seeks to improve access to justice", The Lawyer's Daily, 2020. Available: https://www.thelawyersdaily.ca/articles/17336

[37] L. Kugler, "AI Judges and Juries", Communications of the ACM, 61(12), 2018.

[38] K. Atkinson, "AI can spur real change in the legal sector", NewStatesman, September 03, 2020. Available: https://www.newstatesman.com/spotlight/emerging-technologies/2020/09/ai-can-spur-real-change-legal-sector

[39] The Stanford Centre for Legal Informatics. Available: https://law.stanford.edu/codex-the-stanford-center-for-legal-informatics/

[40] S. Polsley S et al, "CaseSummarizer: A System for Automated Summarization of Legal Texts", Proceedings of 26th International Conference on Computational Linguistics, Osaka, Japan, 2016.

[41] Algorithmic Justice League Project. Available: https://www.media.mit.edu/projects/algorithmic-justice-league/overview/

[42] G. Christian, "Artificial Intelligence, Algorithmic Racism and the Canadian Criminal Justice System", law – Canada's Online Legal Magazine, 2020. Available: http://www.slaw.ca/2020/10/26/artificial-intelligence-algorithmic-racism-and-the-canadian-criminal-justice-system/

[43] B. Cilevics, "Justice by algorithm – the role of artificial intelligence in policing and criminal justice systems", Report of Committee on Legal Affairs and Human Rights, Council of Europe, 2020.

[44] Z. Lin et al, "The limits of human predictions of recidivism", Science Advances, 6(7). American Association for the Advancement of Sciences, 2020. https://doi.org/10.1126/sciadv.aaz0652

[45] Partnership on AI, "Algorithmic Risk Assessment Tools in the U.S. Criminal Justice System", Report, 2020. Available: https://www.partnershiponai.org/report-on-machine-learning-in-risk-assessment-tools-in-the-u-s-criminal-justice-system/

[46] European Commission for the Efficiency of Justice, "European Ethical Charter on the Use of artificial Intelligence in Judicial systems and their environment", 2018. Available: https://rm.coe.int/ethical-charter-en-for-publication-4-december-2018/16808f699c

[47] IEEE, Ethically Aligned Design (EAD): A Vision for Prioritizing Human Wellbeing with Autonomous and Intelligent Systems, 2019. Available: https://standards.ieee.org/content/dam/ieee-standards/standards/web/documents/other/ead1e.pdf?utm_medium=undefined&utm_source=undefined&utm_campaign=undefined&utm_content=undefined&utm_term=undefined

[48] Supreme Court of India, "Supreme Court Vidhik Anuvaad Software", Press Release, September 25, 2019. Available: https://main.sci.gov.in/pdf/Press/press%20release%20for%20law%20day%20celebratoin.pdf

[49] S. Shekhar, "Supreme Court embraces Artificial Intelligence, CJI Bobde says won't let AI spill over to decision-making", India Today, April 7, 2021. Available: https://www.indiatoday.in/india/story/supreme-court-india-sc-ai-artificial-intellegence-portal-supace-launch-1788098-2021-04-07

[50] Stanford Question Answering Dataset. Available: https://rajpurkar.github.io/SQuAD-explorer/

[51] A. Kanapala et al, "Text Summarization from Legal Documents: A Survey", Artificial Intelligence Review, 51(1), 2019. https://doi.org/10.1007/s10462-017-9566-2

[52] P. Bhattacharya et al, "A Comparative Study of Summarization Algorithms Applied to Legal Case Judgments", Lecture Notes in Computer Science, Vol. 11437, Springer, 2019. http://dx.doi.org/10.1007/978-3-030-15712-8_27

[53] K.D. Ashley, "Modeling Legal Argument – Reasoning with Cases and Hypothetical", PhD Thesis, University of Massachusetts, Amherst, MA, 1988.

[54] S.K. Srivastava, "Some Investigations in Knowledge Representation and Reasoning in Legal Domain", PhD Thesis, IIT Delhi, New Delhi, 1997.

[55] CJI Calls For Law To Prescribe Mediation As Mandatory First Step For Dispute Resolution https://www.livelaw.in/top-stories/mediation-cji-ramana-speech-india-singapore-mediation-summit-177662

[56] G. Ramesh et al, "Samanantar: The Largest Publicly Available Parallel Corpora Collection for 11 Indic Languages", 2021. arXiv preprint arXiv:2104.05596.

[57] A. Singh et al, "ASRoIL: a comprehensive survey for automatic speech recognition of Indian languages", Artificial Intelligence Review, Vol. 53, pp. 3673–3704, 2020. https://doi.org/10.1007/s10462-019-09775-8

[58] S.P. Panda et al, "A survey on speech synthesis techniques in Indian languages", Multimedia Systems, Vol 26, pp. 453–478, 2020. https://doi.org/10.1007/s00530-020-00659-4

[59] Report of Law Commission of India. Available: https://lawcommissionofindia.nic.in/reports/report230.pdf

[60] Supreme Court Audio Recording and Transcription Services. Available: https://www.supremecourt.gov.sg/services/court-services/audioandtranscriptionservices

[61] S.K. Srivastava, "Artificial Intelligence: Way Forward for India", IAES International Journal of Artificial Intelligence, Vol. 7, No. 1, pp. 19-32, March 2018. https://doi.org/10.11591/ijai.v7.i1.pp19-32

[62] A. Jauhar et al, "Responsible Artificial Intelligence for the Indian Justice System: A Strategy Paper", Vidhi Centre for Legal Policy, New Delhi, April 2021.