

Harnessing the Power of Artificial Intelligence in Indian Justice System: An Empirical Study

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Abstract

The Indian justice system, known for its complexity and backlog of cases, stands at a crossroads where technological advancements offer promising solutions. This research article explores the growing role of artificial intelligence in transforming and revolutionizing various aspects of the Indian Justice System. By analyzing the current challenges and opportunities, the researcher delves into the potential applications of artificial intelligence in case management, legal research, decision-making, and overall efficiency improvement. Ethical considerations and potential hurdles are also examined by the researcher to provide a comprehensive overview of artificial intelligence's impact on the Indian legal landscape using empirical as well as doctrinal methods of study.

Keywords: Artificial intelligence, legal, ethical, justice system, technological advancement

INTRODUCTION

The integration of artificial intelligence (AI) into the legal system has brought about a profound and transformative impact on legal communities worldwide. Pioneering this movement was the IBM Watson-powered [1] robot known as “ROSS,” marking the initial global endeavor to leverage AI for legal purposes. ROSS introduced a unique approach, utilizing data mining and trend analysis to unravel intricate legal questions. Remarkably, the most substantial influence of this advancement is anticipated not within the litigation or arbitration processes themselves, but rather in the realm of ancillary tasks supporting these processes, including research, data management, and utilization.

Given the extensive volume of cases and the evolving nature of Indian laws and their interpretations, the legal landscape remains in constant flux. The availability of AI-driven technologies for research has the potential to substantially diminish the labor-intensive nature of such tasks. Consequently, the associated costs of research efforts could be significantly reduced, leading to heightened profitability and a substantial acceleration in task completion rates. While this could potentially result in a downsizing of staff, particularly paralegals and some associates, it is poised to enhance the overall productivity of legal professionals and expedite the process of legal research and drafting.

An example in this regard is the adoption of AI-based software, such as Kira, by Cyril Amarchand Mangaldas [2]. Kira is adept at scrutinizing and identifying specific data, providing a refined and precise search experience. This implementation has empowered the firm to redirect its focus towards more critical aspects of the litigation process, effectively reducing the burden of repetitive and monotonous tasks that were previously assigned to paralegals, interns, and entry-level employees.

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Prominent jurists and judges have expressed their endorsement for AI-driven software, particularly in the context of docket management and

straightforward decision-making. Justice SA Bobde emphasized the need for harnessing IT and IT-enabled services to enhance the efficiency and cost-effectiveness of justice delivery. He underscored the potential of AI to aid judicial decision-making, enabling courts to manage caseloads more effectively and allocate judicial resources to matters that necessitate complex human attention [3].

Justice DY Chandrachud further articulated that AI's purpose is not to replace human judgment but to act as a facilitating tool for judges. This tool would assist judges in reevaluating their processes, enhancing predictability and consistency in outcomes, and ultimately broadening access to justice for ordinary citizens [4].

In sum, the introduction of AI into the legal landscape has ushered in a paradigm shift, poised to revolutionize the legal profession's operational dynamics and enhance the quality and accessibility of justice delivery. This convergence of technology and jurisprudence holds the promise of expediting routine tasks while elevating human expertise to address intricate legal matters, ultimately shaping a more efficient and equitable legal system.

ARTIFICIAL INTELLIGENCE MEANING

Numerous official definitions of artificial intelligence systems exist, originating from independent organizations and national legislators. To provide a foundational reference, I will draw upon the definition put forth by the expert group designated by the European Commission in 2019 (AI HLEG): *Artificial intelligence (AI) systems are software (and possibly also hardware) systems designed by humans that, given a complex goal, act in the physical or digital dimension by perceiving their environment through data acquisition, interpreting the collected structured or unstructured data, reasoning on the knowledge, or processing the information, derived from this data and deciding the best action(s) to take to achieve the given goal* [5].

This comprehensive definition captures AI's essence as both a field of study and the resulting products of its implementation, and it serves as a foundational framework for regulatory considerations. It encompasses various methodologies and techniques under the AI umbrella, such as machine learning (including deep learning and reinforcement learning), machine reasoning (encompassing planning, scheduling, knowledge representation, reasoning, search, and optimization), and robotics (including control, perception, sensors, actuators, and their integration into cyber-physical systems).

In practical terms, AI systems encompass a wide spectrum, ranging from software algorithms running on simple computers or computer networks to more intricate physical architectures featuring hardware components such as sensors and computer vision devices. The former could be termed "AI algorithms" or "software agents," while the latter could be referred to as "robot agents." Regardless of the specific manifestation, both iterations share a foundational reliance on data, serving as the bedrock upon which modern AI systems are constructed and trained.

HISTORICAL EVOLUTION OF ARTIFICIAL INTELLIGENCE

To comprehensively understand the utilization of AI within the judicial system and grasp its emergence, it becomes imperative to navigate through its historical evolution, marked by both forward strides and occasional setbacks in innovation. The origins of AI can be traced back to the nascent stages of technological advancement, with the impetus provided by the exigencies of the Second World War that kindled the aspiration to align machine functionality with human cognitive processes.

The 1950s witnessed the development of the foundational technology underpinning AI, although the term "AI" itself had not yet been coined by the pioneers of this technological revolution. The crux of this era lay in the fact that computers were beginning to execute programmed inputs, thereby laying the conceptual groundwork that machines could potentially be engineered to simulate human-like thinking patterns. A pivotal milestone during this period was the creation of *the logic theorist*, a program

designed to simulate problem-solving akin to human cognition. Presented at a 1956 conference intended to foster collaboration and innovation, this endeavor did not yield immediate transformative results, but it did ignite the spark that would eventually blaze into a significant topic of debate.

Progress in the aftermath of this conference was gradual, yet the seeds of AI had begun to scatter, leading to enhanced understanding of algorithms and the increasing affordability of technology. This era saw the emergence of expert systems, designed to mirror human thought processes and make decisions analogous to human experts. Experts would input information on how to respond to specific situations, and the machine would assimilate these responses, making them accessible for various applications. This system's capability to impart expert knowledge to novices, akin to a mentor, illustrated the profound potential AI held for the legal sector. The idea that an automated assistant could aid legal professionals and even instruct junior lawyers underscored the benefits of AI integration.

Following a period of intermittent progress, groundbreaking advancements resurged in 1997 with the historic triumph of "*Deep Blue*," an AI-powered chess-playing system, defeating the reigning world chess champion by employing algorithmic strategies grounded in chess principles. Nearly two decades later, Google's AI, specializing in the intricate "Go" game, not only outclassed human European and world champions but also bested upgraded versions of itself. This achievement was particularly remarkable due to the game's complexity compared to chess. Unlike chess, Go's immense complexity meant that it was impossible to encode every conceivable move. Consequently, the AI had to derive strategies through the cross-referencing of available data.

Furthermore, a subsequent iteration of the AI system managed to self-learn three distinct games autonomously, albeit with a set of predefined rules as a foundation. It is worth noting that the aforementioned AI software was trained on data input by a human, revealing a crucial limitation: the system lacks the capacity for independent interpretation and explanation of its "thought process." This limitation poses a significant challenge to the foundational principles of the rule of law.

Moreover, due to the AI's restricted autonomy, it remains susceptible to manipulation and arbitrary usage, thereby introducing contentious aspects for its application in legal contexts. The paradigm has shifted from human experts encoding knowledge into automated systems to the question of whether AI can contribute its own cognitive insights to novel and unprecedented scenarios. In essence, while AI has evolved over the decades, acquiring the ability to amass knowledge, it still falls short of genuine independent thought. This shortfall renders it a potential threat to the intricate intricacies and impartiality that characterize the judicial system.

In summation, the evolution of AI within the judicial landscape has unfolded over time, revealing its potential to accumulate knowledge but falling short of true autonomous cognition. This journey through history underscores the need to cautiously navigate the complexities posed by AI's presence in the legal domain, while keeping a vigilant eye on the potential challenges and ethical considerations it brings to the fore.

UTILISATION OF AI IN JUDICIAL SYSTEMS IN OTHER COUNTRIES

Although AI's implementation in the Indian judiciary is currently in its early developmental stages, it has already made significant advancements within legal systems worldwide notably with the UK, the USA, and EU. As an illustration, the Estonian Ministry of Justice has embarked on an innovative utilization of AI, introducing a "robot judge" to handle minor claims of less than €7,000 (approximately \$8,000) [6]. This pilot initiative focuses on contract dispute resolution and has the potential to extend to broader categories of claims in the future.

Within the United States, AI has gained greater prominence in the creation of risk assessment instruments. For instance, the implementation of the Strategic Subject List (S.S.L.) in Chicago aims to predict individuals prone to engagement in gun violence [7]. Another tool of note is COMPAS

(Correctional Offender Management Profiling for Alternative Sanctions), which has sparked controversy due to its utilization in evaluating the likelihood of reoffending, thereby influencing parole and sentencing determinations [8].

A comparable system named HART (Harm Assessment Risk Tool) has been employed in the United Kingdom to predict the likelihood of reoffending among criminals and recommend appropriate levels of supervision during imprisonment [9]. Utilizing the random forest forecasting technique within machine learning, this tool has been developed to assist custody officers in determining whether suspects possess low, moderate, or high risk of engaging in subsequent criminal activities within a two-year timeframe. It is important to note that while HART aids custody officers in decision-making, it does not make the ultimate determination regarding detention; rather, its purpose is to guide law enforcement in considering referrals to a rehabilitation program known as Checkpoint [10].

In Brazil, the implementation of an AI tool named VICTOR aims to conduct initial case analysis, thereby alleviating the judicial burden [11]. This tool assists the Brazilian Supreme Court in evaluating cases through document analysis and natural language processing tools. Its primary objective is to efficiently identify and categorize resources pertaining to matters of “general repercussions,” streamlining the court's focus on addressing questions that hold genuine significance for society at large, while excluding appeals driven solely by the unwillingness of the unsuccessful party to acknowledge defeat.

In Argentina [14] and Colombia [15], the Prometea tool has found application in the Public Prosecutor’s Office of Buenos Aires and the Constitutional Court of Colombia. It predicts case outcomes, achieving a significant milestone of under 20 seconds per prediction with a 96% success rate. This tool also rapidly identifies urgent cases from voluminous files within 2 minutes, a task that would typically consume a human 96 days [16].

In the Middle East, the Abu Dhabi Judicial Department (AJDJ) collaborates with the private sector on the “Justice Intelligence” Project, utilizing technology to foresee case settlements, achieving up to 94% accuracy [17].

Singapore’s courts employ a speech translation system powered by neural networks to provide real-time transcriptions of court hearings, enabling immediate review of oral testimonies by judges and involved parties [18].

Across nations such as Russia [19], China [20], and Mexico [21], robots extend legal advice to citizens and assist judges in pension grant evaluations. Austria employs AI for intricate document management, including court document anonymization and digitization of analog records, while Malaysia leverages AI to support sentencing decisions [22].

These diverse AI applications underscore the need for cautious integration, warranting robust oversight, and safeguards. The subsequent section delves into critical considerations essential prior to the integration of AI into justice systems.

LITERATURE REVIEW

• Analysis of the Use of Artificial Intelligence in the Judicial System in the Context of Rule of Law Author(S): Philippa Anna Attrill

The author’s primary objective is to assess how the preservation of the rule of law and fundamental human rights imposes constraints on the advancement and growth of artificial intelligence in the judicial system. The author in this paper has employed a thematic analysis of existing literature and relevant case law and sets out to examine the hypothesis that the recognition of human rights and the foundational concept of the rule of law act as significant barriers to the seamless integration of AI within

the judicial framework. More specifically, the author delves into the extent to which aspects inherent to the rule of law, such as transparency and equality, and essential rights, including freedom from discrimination and the right to a fair trial, pose challenges to the progression of AI adoption in the judicial context. By engaging with these intricacies, the author contributes to the ongoing dialogue surrounding the responsible deployment of AI in the judicial sphere and underscores the nuanced considerations that underpin this technological transformation.

- **Artificial Intelligence and Law: Stepping Stones to A Model of Legal Reasoning**

Author(S): Edwina L. Rissland

The author in this article elucidates that by leveraging AI's precision, the intricacies of legal reasoning, including the crafting of case-based arguments can be easily dealt with. The collaborative efforts of AI and legal researchers are directed towards the dual objectives of analytical and practical progress. Past and ongoing research can be viewed as an endeavor aimed at modeling legal reasoning, with a particular emphasis on argumentation. The author acknowledges the complexity of legal reasoning, and presents how current AI models serve as foundational stepping stones towards more refined and intricate models. The author time and again reminds the readers that the goal of incorporation of AI in Legal field is to “assist” and not to “replace.”

- **Responsible Artificial Intelligence for the Indian Justice System: A Strategy Paper**

Author(S): Ameen Jauhar, Dr. Partha P. Chakrabarti, Vaidehi Misra, Dr. Saptarishi Ghosh, Dr. Arghya Sengupta, Dr. Kripabandhu Ghosh

The authors shed a light on benefits of the integration of AI within a justice system which holds the potential to streamline administrative processes within courts while facilitating informed decision-making for lawyers, judges, and litigants. To bring this theoretical promise to fruition, a comprehensive engagement strategy is essential, involving not only the Indian legal community but also other stakeholders. This collective involvement ensures robust support for the transformative process driven by technology. Achieving successful integration necessitates a thorough grasp of AI's actual contributions within various judicial contexts, along with adeptly handling the legal and ethical intricacies that surface. With its insights and thought-provoking perspectives, the authors through their research paper aspire to ignite a meaningful dialogue around the integration of AI in the Indian justice system. Positioned as a primer, it aims to equip stakeholders including judges, judicial officers, and litigants with the foundational knowledge necessary to navigate this transformative journey. Ultimately, the article's aspiration is to catalyze positive change, enhancing efficiency, transparency, and accessibility in the realm of justice through the integration of AI.

- **Artificial Intelligence for Sustainable and Effective Justice Delivery in India**

Author(S): Parth Jain

The author in his article has highlighted the concern revolving around the escalating number of pending cases in Indian courts that has sparked concern among the legislative, executive, and judicial branches of the country. To address this issue, various measures have been taken, such as promoting Alternative Dispute Resolution methods and eliminating obsolete laws. However, the untapped potential of integrating AI to tackle this challenge remains largely unexplored. India, as the world's largest democracy with a population exceeding 1.25 billion, grapples with resource shortages across sectors, including the judiciary. The scarcity of judges coupled with a rising influx of cases has led to prolonged civil and criminal trials, in stark contrast to the swift proceedings in developed nations. Consequently, delayed and inefficient justice delivery prevails, impeding societal progress. In this context, the author suggests that innovative solutions beyond traditional approaches are imperative to restore and sustain an efficient justice delivery system. One promising solution involves harnessing the power of AI in expediting legal matters. As Indian courts progressively shift towards digitalization, the burgeoning realm of AI holds potential to revolutionize justice delivery and reduce the backlog of pending cases. The author refers to some advanced countries like the USA and Canada that have already deployed AI systems to aid judges in decisions related to bail, parole, and more and suggests that India

can identify tasks within the legal domain that can be accelerated through intelligent automation. The author lays emphasis on the fact that AI cannot supplant human judges; its deployment can significantly augment the decision-making process. Trained AI systems, though intelligent, can provide calculated and impartial insights, mitigating the influence of personal biases on judicial outcomes. This approach not only optimizes judicial efficiency but also ensures judicious utilization of public funds. The author suggests that by implementing AI within the legal framework, courts can streamline processes, reduce delays, and enhance the overall justice delivery system. This move aligns with AI's success in other domains and presents a viable solution for not only India but also jurisdictions worldwide.

STATEMENT OF RESEARCH PROBLEM

The increasing volume of pending cases in Indian courts has raised alarm within the legislative, executive, and judicial segments of the nation. To confront this predicament, multiple strategies have been enacted, including the advancement of Alternative Dispute Resolution mechanisms and the removal of outdated laws. Yet, the considerable untapped potential of incorporating AI to address this predicament remains largely undiscovered. It is imperative to align Indian courts with technological advancements to mitigate delays and expedite overall judicial proceedings.

OBJECTIVES OF THE STUDY

The present research involves a descriptive and prescriptive approach. Hence, the following are the objectives of the study:

- To investigate the extent of the backlog of pending cases in Indian courts and its impact on the legislative, executive, and judicial branches.
- To explore the potential benefits and challenges associated with integrating AI solutions to address the problem of pending cases in Indian courts.
- To analyze the existing technological infrastructure within Indian courts and assess its readiness for incorporating AI-based solutions.
- To examine the experiences of other jurisdictions that have successfully implemented AI technologies in their court systems to reduce case backlog and expedite judicial processes.
- To assess the perceptions and attitudes of stakeholders, including judges, lawyers, and litigants, towards the integration of AI solutions in the Indian judicial system.
- To identify potential ethical and legal concerns associated with the use of AI in court proceedings and propose ways to address them.
- To develop recommendations and guidelines for policymakers and judicial authorities to strategically implement AI solutions that can help alleviate the backlog of pending cases and enhance the justice delivery system in India.

RESEARCH QUESTIONS

The questions which were asked within the present paper are as follows:

- What is the extent of the pending cases in Indian courts and how it impacts the legislative, executive, and judicial branches?
- What are the potential benefits and challenges associated with integrating AI solutions to address the problem of pending cases in Indian courts?
- What is the existing technological infrastructure within Indian courts and how can it incorporate the AI-based solutions in Indian Judicial System?
- Which other jurisdictions/nations have successfully implemented AI technologies in their court systems to reduce case backlog and expedite judicial processes and how successful has it been?
- What are the perceptions and attitudes of stakeholders, including judges, lawyers, and litigants, towards the integration of AI solutions in the Indian judicial system?
- What are the potential ethical and legal concerns associated with the use of AI in court proceedings and how to address them?
- What could be the possible recommendations and guidelines for policymakers and judicial authorities to strategically implement AI solutions that can help alleviate the backlog of pending cases and enhance the justice delivery system in India?

RESEARCH METHODOLOGY

Empirical and doctrinal research methodologies were used to examine the topic and give a deeper understanding of the use of AI in the Indian Legal System. This study relies on both primary and secondary data. Interview (structured as well as unstructured) method was used to understand the viewpoints of legal professionals about the incorporation of AI in the field of legal profession.

The research also included qualitative data analysis from judgments, websites, books, law journals, as well as articles. These were gathered from various e-databases as well as e-sources, including SCC Online, JSTOR, and Hein Online. Doctrinal research encompasses the evaluation and interpretation of prior or already existing data.

RESEARCH GAP

A gap exists in understanding the potential benefits of integrating AI within the Indian court system to effectively address its inherent challenges. Further investigation is required to explore how AI can optimize judicial processes, reduce delays, and enhance overall efficiency.

HYPOTHESIS

Utilizing AI offers a comprehensive solution to alleviate the issue of court congestion effectively.

ISSUE OF THE PENDENCY OF CASES—THE JOURNEY SO FAR

India stands as the world's largest democracy and is projected to surpass China in population by 2028, according to reports. The United Nations estimates that India's population has already exceeded 1,354,334,793, with a consistent upward trend. This continuous population growth, combined with improved economic conditions, decreasing tolerance, and a materialistic way of life, has led to a surge in both civil and criminal litigations. Consequently, the backlog of cases in the legal system has soared, currently reaching 27,571,757 pending cases. This substantial backlog, alongside various other factors, lies at the core of the challenge of delayed and hence ineffective justice delivery in India.

In this scenario, civil and criminal cases in India commonly take years to be resolved, in stark contrast to the relatively swift processes seen in developed nations like the USA and Canada, where resolutions often take only a matter of days. If this pattern of rising cases persists, there is a risk that the judicial framework of the nation might buckle under the weight of its own caseloads, causing the crucial mission of justice delivery to grind to a halt. Such a development would not only undermine the foundational principles of a civilized society based on the rule of law but could also pave the way for a state of anarchy. Therefore, it becomes imperative to safeguard the integrity of the judiciary institution, established to uphold the responsibility of preserving the rule of law, and prevent its paralysis.

To address the issue of court congestion, both the judiciary and the legislative body of India have taken measures within their respective domains. Notably, the judiciary has been actively advocating for Alternate Dispute Resolution methods such as Mediation and Arbitration, Lok Adalats (or People's Court), Fast Track Courts, Nyaya Panchayats, and Gram Nyayalayas (or Village Courts) [23–25]. Court Management Systems have been introduced, enabling presiding officers to effectively monitor case progress from filing to resolution and take expedient actions when necessary [26]. Additionally, judicial officers are assigned quarterly and annual targets along with action plans to achieve them [27]. In parallel, the legislature has eliminated 1,200 obsolete laws to reduce case backlog and is contemplating the establishment of new courts [28]. Although these measures have yielded some relief in alleviating the caseload, complete eradication of the backlog issue remains a challenge. Hence, considering innovative approaches becomes imperative.

An unconventional solution involves integrating technology into the legal sphere to expedite processes at various stages. As an illustration, Indian courts have begun recording witness testimonies and marking the presence of under-trial prisoners via video conferencing [29]. This not only saves time

and public resources but also provides convenience for individuals who would otherwise need to travel extensive distances to testify in court. The digitization of court records and real-time updates of court orders on official websites represent another utilization of technology, offering litigants immediate access to their case progress without the need for physical court order copies [30]. Taking technology implementation a step further, there's a proposition to harness the emerging field of AI to support judges and lawyers in facilitating expedited justice delivery.

AI AS ONE STOP SOLUTION

AI has swiftly become a prominent term, not only within the realm of science but across nearly every discipline it has impacted. In this age of automated machinery, the inclination to increasingly depend on these devices, even for the most minor tasks, is an inherent consequence. This led to the emergence of the concept of “Artificial Intelligence” or “Machine Intelligence.” To elucidate the essence of AI, the following definitions can be contemplated:

- AI denotes the capacity of a digital computer or computer-controlled robot to execute tasks typically attributed to intelligent beings. This phrase is frequently linked to the endeavor of constructing systems that possess the cognitive processes inherent in humans, encompassing capabilities like reasoning, meaning discovery, generalization, and learning from prior experiences [31].
- A domain within computer science focused on bestowing machines with the semblance of human-like intelligence [32].
- AI pertains to a genre of computer technology that aims to enable machines to perform tasks intelligently, akin to human behavior [33].

In essence, AI embodies the capability of a machine to emulate human cognition and behaviors, encompassing functions like “learning” and “problem-solving” [34]. An AI-powered machine typically perceives its surroundings, identifies the issue it's designed to address, formulates diverse strategies to solve it, evaluates the costs and benefits of each approach, along with the likelihood of success, and then carries out the task with the utmost precision. What's more, an AI-powered machine is equipped for autonomous learning, signifying it can enhance its performance through self-guided experience, resembling on-the-job training for humans.

These unique traits of AI-driven machines have facilitated their integration across various sectors such as health care, automotive, defense, marketing, and education. In the health care sector, AI contributes to medical diagnostics, health record management, treatment design, medication management, and drug development [35]. It is even aiding doctors in conducting precise surgeries [36]. The concept of driverless cars epitomizes AI's impact on the automotive industry. In the domain of warfare, AI serves roles in battlefield analysis, tactical decision-making, and the creation of intelligent, self-governing unmanned weapon systems [37].

In marketing, AI is pivotal, evident in the deployment of chatbots for customer queries, image and voice recognition for rapid search outcomes, and recommendation engines tailoring product suggestions based on customer needs [38]. The educational landscape is also experiencing a paradigm shift due to AI, with machine-assisted assessment of multiple-choice answers and even subjective content by students [39]. The notion of a lifelong AI companion guiding students from school to graduation, aiding them in identifying strengths and addressing weaknesses, is being contemplated [40].

Given its success in these fields, the potential of AI in legal contexts, particularly courts, is noteworthy. AI can assist judges in expediting various legal processes, offering solutions to the issue of mounting caseloads. In law firms, AI is already proving advantageous by saving time and resources. Speech recognition software like Dragon aids lawyers in rapid drafting and note-taking [41]. AI-driven tools streamline document review, particularly contract analysis, rendering the task quicker compared to human efforts [42]. Software like Contract Intelligence (COIN) is instrumental in this regard [43].

Additionally, an AI-powered computer recently outperformed lawyers in predicting case outcomes, showcasing AI's potential in legal advice [44]. Legal research is yet another arena where AI is becoming indispensable for lawyers [45].

AI IN JUSTICE DELIVERY SYSTEM

Similar to legal professionals, judges can also harness the potential of AI-driven machines to expedite diverse phases of a case, ultimately resulting in reduced overall time for case resolution. It is essential to delineate the distinct stages of both civil and criminal cases before delving into how AI can be leveraged to accelerate these processes.

Table 1. In a typical civil case, the following stages are encountered [46].

Institution phase	Trial phase	Judgment
Institution of suit	Framing of issues	Judgment/decreed
Issue and service of summons	Plaintiff evidence	Review of decreed
Appearance of defendant	Defendant evidence	Appeal
Written statement by defendant	Final arguments	Execution of decreed

Table 2. Initiation of a criminal case commonly involves filing a First Information Report (F.I.R.) or submitting a complaint, and subsequently progresses through the subsequent stages [47].

Police case	Complaint case
First Information Report (F.I.R.)	Complaint to the Judicial Magistrate
Investigation	Inquiry
Charge sheet	Complainant's preliminary evidence
Framing of charge	Framing of charge
Prosecution evidence	Complainant's evidence
Statement of accused	Statement of accused
Defense evidence	Defense evidence
Final arguments	Final arguments
Judgment and order	Judgment and order
Jail or probation	Jail or probation
Appeal	Appeal

In these phases, courts undertake various miscellaneous duties, encompassing multiple interim judgments. Amidst these responsibilities, a subset of essential tasks can be streamlined through the utilization of AI-powered systems, enhancing the efficiency of the overall decision-making process. These tasks encompass:

- Enhanced document understanding:* AI-driven machines developed by companies like Microsoft are capable of comprehending documents on par with, if not superior to, human capabilities. This includes answering questions based on document content. An exemplary milestone in this domain is the achievement of human parity by a Microsoft Research Asia team using the Stanford Question Answering Dataset (SQuAD) test. The AI system scored 82.650, outperforming its human counterpart by a marginal margin (82.304). Alibaba's researchers are also making strides with an AI system reaching a score of 82.440. The continued investment in Machine Reading Comprehension technology is likely to enhance these scores and augment the machine's capacity to assist in understanding voluminous data in court scenarios. This can aid in analyzing parties' pleadings, evidence, and agreements, aiding the court in swiftly identifying points of agreement and contention.
- Efficient document summarization:* Courts frequently navigate through a multitude of documents including pleadings, evidence, legal precedents, and statutes. These documents consume considerable time. While comprehensive examination is essential for final verdicts, a machine capable of summarizing document contents could provide summaries or abstracts to judges for interim decisions such as temporary injunctions or prima facie assessments. This tool could enhance judicial efficiency, particularly in cases with extensive documentation. Advanced AI software like Summarizer is already utilized for document summarization, with potential for tailored solutions to court needs.

- c. *Streamlined case law and code research*: Judges invest substantial time in researching legal precedents and case laws, contributing to case resolution delays. Introducing AI to legal research can expedite the decision-making process. Online research assistants like ROSS facilitate comprehensive case law exploration, identifying the most relevant and applicable precedents. Machine Learning (ML) and Natural Language Processing (NLP) can be employed to standardize, categorize, summarize, and manage vast legal data, enhancing the quality and speed of legal research.
- d. *Data-driven visualization and predictive analytics*: Law firms employ big data analytics to visualize case data and identify patterns among cited cases, predicting favorable or unfavorable outcomes. Courts can utilize Predictive Analytics to present probable results to litigants, motivating them to seek out-of-court settlements. This approach optimizes client return on investment and accelerates case resolution while mitigating court congestion.
- e. *Efficient administrative tasks*: Given the expanding responsibilities of judges, encompassing administrative duties alongside judicial roles, AI-powered machines can manage repetitive administrative tasks. Delegating these tasks to machines allows judges to focus more on core judicial activities.
- f. *Informed bail/parole/probation decisions*: In criminal cases, courts frequently face critical decisions related to bail, parole, and probation. These decisions significantly affect individual rights and societal safety. AI-powered systems, such as the Public Safety Assessment software, can aid judges by assessing the risk of recidivism and flight, considering factors like the nature of the offense, prior convictions, age, appearance history, and more. While AI insights are advisory, they can enhance the speed and objectivity of these determinations, ensuring a more efficient and fair legal process.

SHORT-TERM CHALLENGES

Utilizing AI within a public institution, such as the judiciary, demands a conscientious awareness of the pre-existing and inseparable societal contexts and dynamics that impact them. Moreover, it is crucial to ensure that this integration aligns harmoniously with constitutional and legal rights, as well as the essential values inherent in a democratic republic like India [48]. In certain legal jurisdictions, the endeavor to uphold these public interests and foster the responsible advancement of AI has been pursued through the adoption of ethical charters [49].

This section highlights a range of ongoing and foreseeable challenges encountered globally, particularly in instances where AI use cases have already been put into practice. These challenges often intertwine and necessitate comprehensive frameworks for resolution, as opposed to isolated or fragmented interventions.

Ultimately, it remains pivotal to uphold the alignment of this progress with the foundational principles of constitutional legality and democratic values, while also ensuring that AI is harnessed responsibly and ethically. The adoption of cohesive and holistic strategies is imperative for addressing these interconnected challenges across the spectrum of AI deployment.

Securing Clarity and Comprehensibility

In the realm of AI-driven technologies, situations arise where the inputs and outputs are discernible, but the underlying mechanisms transforming them remain enigmatic. This opacity often referred to as the “black box” dilemma [50], can be confounding. Consequently, the rationale and mathematical codes underpinning these algorithms are usually safeguarded, complicating the ability to question their foundations. This opacity is compounded when the private sector is involved, as these entities, responsible for pioneering such technologies, frequently shelter their innovations under the umbrella of trade secrets, thereby creating a legal “black box” scenario [51].

An additional issue stemming from this lack of transparency is the challenge of explainability. Even if the algorithms were made accessible, a large portion of users lack the expertise to comprehend their intricacies and operations. This results in an information disparity between those creating AI solutions and those utilizing them, inhibiting users from effectively scrutinizing or questioning their functionality [52]. These dual challenges of transparency and explainability are particularly problematic within the realm of the justice system.

In terms of transparency, it becomes vital to uncover potential biases introduced by AI that influence case outcomes. Regarding explainability, the existence of these 'black boxes' contradicts the judicial norm of issuing well-reasoned orders. Consequently, this obstructs individuals' ability to comprehend and challenge decisions to which they are subject [53]. Therefore, a prudent approach involves embracing the twin imperatives of ensuring disclosure and permitting external audits to enhance both transparency and comprehensibility.

Nonetheless, contrasting this perspective, heightened disclosure and transparency also entail inherent risks. For example, increased openness can potentially render explanations vulnerable to hacking, make AI systems susceptible to attacks, and expose companies to legal actions and regulatory repercussions [54]. This introduces a notable 'transparency paradox' within the realm of AI technology deployment. Interestingly, even tools like LIME and SHAP, designed to elucidate black box systems, are not immune to hacking vulnerabilities [55]. Furthermore, research underscores that complete algorithms can be stolen based solely on their explanations [56].

In the specific context of the justice system, which often houses databases containing sensitive personal information, extensive disclosure could significantly jeopardize individuals' informational privacy. Consequently, the delicate equilibrium between disclosure and security must be delicately struck, especially as AI's utilization in justice systems continues to expand.

Mitigating Data and Design Biases to Counteract Social Inequities

AI/ML systems bear the potential to inadvertently or deliberately perpetuate biases, thus undermining fairness within the justice system. These systems, often trained on extensive datasets, can inadvertently replicate existing biases entrenched within those data sets [57]. Furthermore, personal biases of algorithm developers can compound this predicament [58].

Left unattended, the prolonged utilization of such technology may eventually amplify large-scale discrimination against specific communities. A poignant illustration is the utilization of postal codes to identify defaulters and repeat offenders, inadvertently resulting in not only the propagation of biases but also perpetuating extensive discrimination against entire community clusters, often congregating in neighborhoods due to urban gentrification.

As elaborated in the accompanying text box, this challenge has been acutely confronted in instances like HART (Harm Assessment Risk Tool)—an AI-based system designed to aid the UK police in custody decisions based on recidivism risk assessment. Analogous issues have surfaced with the application of risk assessment tools in the United States, wherein algorithms unintentionally perpetuate racial profiling due to their replication of dataset biases [59].

Data biases have also reverberated within other AI technologies, such as facial recognition tools. For instance, Amazon's facial recognition tool "Rekognition" erroneously categorized darker-skinned women as men in 31% of cases [60]. It gained notoriety for even misidentifying Michelle Obama as a man. Comparable technologies have encountered analogous failures, particularly concerning individuals with darker skin tones. This has led to instances of mistaking members of Congress for convicted criminals [61]. Therefore, a central hurdle in integrating AI technology within the justice system lies in averting the perpetuation of these systemic biases [62].

Developing Decision Support Systems to Complement, Not Replace, Human Judgment

In theory, the role of AI within the justice system can be categorized into two avenues: as decision support systems or as substitutes for human judgment. Acknowledging the challenges and limitations of the latter approach, the Indian judiciary has consistently affirmed that AI cannot supplant the vital role of human judgment essential for just decision-making [63]. Consequently, AI's integration into the justice system primarily takes the form of supportive systems and augmentation tools.

Nevertheless, empirical studies reveal that individuals often use computer systems to simplify the decision-making process rather than enhance the quality of their decisions [64]. This implies that the introduction of decision support systems in the judiciary may not necessarily enhance adjudication, and in some cases, it might even lead to deteriorated outcomes [65]. Given the strain of caseloads and resource constraints, there exists a risk that AI-based support systems could be utilized by judges without thorough consideration, potentially leading to a de facto delegation of judicial decision-making authority to algorithms [66]. Recognizing this potential risk, the Wisconsin Supreme Court emphasized the need for judges to elucidate how they incorporate algorithmic assessments like COMPAS into their decisions [67].

These concerns gain greater prominence in the current context, as AI technology innovation in the Indian justice system is still in its nascent stages. Consequently, the prospect of technology replacing human judgment is far from realization, making the risk of suboptimal technology replacing human discretion more pronounced in India. Therefore, it is imperative that users, such as judges, maintain meaningful autonomy to deviate from algorithmic outcomes when necessary [68].

Relying excessively on such systems could potentially result in legal matters being adjudicated by computer programs, giving the illusion of adherence to human adjudicatory principles. Consequently, AI-powered technology might fundamentally reshape the essence of judicial processes. These tools have the potential to become prescriptive, potentially overshadowing case-specific reasoning and instead reducing judicial decisions to purely statistical and algorithmic results.

LONG TERM CHALLENGES

Beyond the immediate hurdles discussed earlier, there are two notable concerns associated with the widespread incorporation of AI into the justice system, particularly within the judiciary. These issues encompass value lock-ins, which can impede the advancement of legal and jurisprudential developments, and the potential transformation of the judiciary's constitutional role within the framework of the separation of powers doctrine.

Addressing Value Lock-ins and Legal Stagnation

The first concern pertains to averting value lock-ins, which can lead to a standstill in the progress of legal and jurisprudential evolution [69]. Value lock-in refers to a situation in which consistent adherence to precedents solidifies the existing legal framework, making it resistant to necessary adaptations that align with the evolving values and societal beliefs [70]. Currently, there is limited literature exploring the concept of value lock-ins in the context of an AI-driven judicial system. The idea of lock-ins is particularly significant in long-term discussions, where a state of affairs becomes entrenched and unchanging, effectively "locking in" society to that state [71].

While not all lock-ins have negative implications, in the context of the judiciary and its interpretation of the law, being locked into the status quo can conflict with principles of justice. For instance, the Indian Constitution is regarded as a "living document" that evolves in response to shifting societal values, beliefs, and dynamics [72]. In an AI-centric judicial system, while the doctrine of stare decisis aims to maintain consistency, there is a potential consequence of precedents becoming static. This is illustrated by the example of the right to privacy, which was eventually recognized under Article 21 of the Indian Constitution after several decades of conflicting legal interpretations [73].

In an AI-driven judiciary, if decision-making were solely based on an AI adjudicatory tool influenced by prior conflicting jurisprudence, it might reinforce the same legal principles without accommodating evolving perspectives. Consequently, as AI technology becomes more integrated into the justice system and assists in decision-making, it is imperative to retain human involvement. Human oversight and discretion are necessary to complement the efficiency of intelligent decision-making tools and prevent the emergence of unfavorable value lock-ins. This approach ensures that the legal system remains adaptable and in harmony with evolving societal values.

Reshaping the Constitutional Role of Judges and Separation of Powers

A second significant concern involves exploring how the integration of algorithmic or AI-driven elements within the judiciary could potentially reshape its constitutional role, particularly as a crucial check and balance against potential overreach by the executive and legislative branches [74]. This matter has attracted scholarly attention, raising pertinent questions about whether algorithmic decision-making tools can effectively execute the multifaceted functions expected of human judges in constitutional courts [75].

While an AI tool might be capable of generating judgments, the duties of a constitutional judge encompass complexities that extend beyond simple decision-making. These responsibilities involve weighing legal principles against factual contexts and employing reasoned discretion to harmonize competing interests. Particularly in cases involving legislative ultra vires or executive overreach, the judiciary might need to employ innovative reasoning to maintain equilibrium [76]. This capacity is nurtured through a judge's years of experience on the bench, fostering a continuous interaction with the law. This engagement shapes a judge's ability to monitor the evolution of the law and to anticipate potential broader consequences in seemingly innocuous legislation or executive actions [77].

For AI to replicate such intricate abilities, it would necessitate a substantially advanced level of deep learning and intelligence comparable to or surpassing human cognitive capabilities. This concept is commonly known as General AI [78], which, as of now, has not materialized in any concrete form of existing AI technology. A complete transfer of judicial functions to AI would undoubtedly encounter the challenge of whether this technology can perform the full spectrum of roles and obligations currently fulfilled by human judges. The inherent complexities of constitutional decision-making and the dynamic nature of legal interpretation make it a formidable task for AI systems to comprehensively emulate human judicial expertise.

THE WAY FORWARD

Considering that the groundwork for this ecosystem is presently being established, it is essential for the Supreme Court to take the lead in shaping discussions regarding a comprehensive roadmap. Without such guidance, the development of this framework could lack coherence and coordination. Acknowledging this imperative goal and to assist the judiciary in its endeavors, this section outlines a comprehensive agenda organized into three overarching categories: conceptualizing the incorporation of AI within the justice system, establishing operational mechanisms to facilitate this integration, and implementing AI within the justice system.

Formulating the Integration of AI Within the Justice System

The initial step to be taken by the AI committee of the Supreme Court is to strategize the short, medium, and long-term implementation of AI. This process should outline ethical guidelines that underscore the responsible design and deployment of AI technologies. Concurrently, it should assess the logistical capacity of the judiciary to integrate these technologies, encompassing aspects such as archiving judicial data and enhancing its accessibility. The conceptualization phase should encompass the following aspects:

- a. *Establishment of a guiding charter* that defines essential principles safeguarding due process, constitutional and legal rights, and addressing concerns such as transparency, bias, and

accountability in AI-driven technologies. Notably, the Institute of Electrical and Electronic Engineers (IEEE) has introduced Four Principles for the Trustworthy Adoption of AI in Legal Systems [79]. The European Commission for the Efficiency of Justice (CEPEJ) has also developed an ethical Charter for the use of Artificial Intelligence in judicial systems [80]. An adapted version of such a charter, tailored to the Indian context, is included as Annexure-A to this article.

- b. *Extensive engagement of stakeholders* through consultation processes to ensure transparency and instill confidence within the legal community throughout this endeavor. Lessons drawn from the digitization efforts during the COVID-19 pandemic should steer the judiciary's future digitalization endeavors and broader justice system improvements. Importantly, securing support from diverse stakeholders is essential, and their input should be sought on the scope, potential applications, and challenges that may arise in the process of integrating AI. The AI Committee, expanded as detailed below, can be entrusted with establishing effective channels for engagement. The initial document for consultation could be the AI Charter.

Promoting Governance of AI in the Justice System

To address the pivotal challenges posed by AI, the AI Committee should endorse research initiatives dedicated to AI governance within the justice system. High-quality interdisciplinary research is essential to guide informed policy decisions regarding the integration and utilization of emerging technologies. The AI Committee can incentivize and commission independent research studies, with a focus on the unique Indian context and grassroots realities. While international literature exists on related topics, India's distinct social and cultural landscape necessitates indigenous research contributions.

Planning for Skill Development and Capacity Building

Effective capacity building through comprehensive training and skill development is a critical factor in the successful implementation of AI. Given that AI is sophisticated technology, deficiencies in training can hinder its scalability and breed skepticism towards its intervention. In a diverse country like India, training should not be limited to technology users alone, but also extend to recipients and stakeholders. This complex educational endeavor requires meticulous planning and execution before the deployment of such technologies.

Establishing Operational Support for Integration

The development of AI-driven technologies for the justice system requires meticulous planning and execution. Key actions to be initiated by the judiciary include the following:

- a. *Expansion of the Supreme Court's AI Committee* to oversee the integration of AI within the justice system. This enlarged committee should ideally comprise core members who are sitting or retired judges of the Supreme Court or High Courts. It should be chaired, as it currently is, by a sitting Supreme Court Judge. Additionally, expert members including technologists specialized in AI design and innovation, ethicists, policy researchers, and academics should be formally included. The engagement terms, eligibility criteria, remuneration, tenure, and the number of expert members should be determined by the core group of judges. The objective is to establish a permanent entity solely dedicated to the task of AI integration, in contrast to a sporadic committee convened for this purpose.
- b. *Public dissemination of openly accessible datasets*, as these are indispensable for meaningful AI innovation. Presently, both the judiciary and other justice system entities amass and store substantial data. However, comprehensive protocols governing data sharing and usage are lacking. The AI committee could explore the establishment of a data trust under the aegis of the Supreme Court. This trust would manage the collection, storage, and sharing of non-sensitive judicial data, fostering the innovation of machine learning algorithms while preserving public interest [81]. The data trust should operate within the framework of data protection laws applicable in India. The core group of the AI committee would determine the trust's institutional

structure, including the composition of its board of trustees and the terms of data usage licenses. This trust could adopt various institutional formats, such as a non-profit company, with the decision on its incorporation based on its suitability to fulfill core functions while upholding fiduciary responsibility towards public interest. Moreover, the judiciary should contemplate a policy to open up access to its data, while safeguarding individual privacy and enabling technologists to leverage existing datasets. To create viable open datasets, the judiciary should collaborate with trustworthy partners, a task to be coordinated by the Supreme Court's e-Courts Committee in consultation with the AI Committee.

- c. *Leveraging public-private partnerships (PPPs)* to design and implement AI technological interventions. A PPP model involving socially conscious private corporations can ensure governmental oversight while capitalizing on the resources and expertise of the private sector. Historically, the National Informatics Centre (NIC) has been instrumental in the digitization of public sector entities in India over the past two decades. However, developing AI solutions tailored for the justice system—aimed at public welfare—will entail significant costs and logistical complexity. It is widely recognized that ecosystems of this nature are not created proprietorially; instead, they require coordinated public-private partnerships to establish a foundation upon which innovators can build various products. Therefore, expressions of interest from suitable private entities to develop the AI use cases outlined in Section I of this paper should be invited.

Phased Implementation of AI in the Indian Justice System

To achieve the dual goals of enhancing administrative efficiency and refining decision-making processes, the integration of AI should be executed in a systematic, phased manner [82–85]. This approach involves piloting AI interventions, assessing their progress, and iteratively advancing these initial technologies. Rather than ad hoc and fragmented adoption, a deliberate and incremental expansion of AI deployment is essential. The following key measures must be implemented to facilitate this phased design and implementation:

- a. *Initiating the first generation of AI Pilots:* The first generation of AI pilots, such as SUVAAS and SUPACE (an AI tool aiding judges in legal research), is already underway in various courts under the AI committee's guidance. This foundation can serve as a launchpad for further AI innovation, encompassing a broader range of machine learning (ML) and deep learning algorithms to enhance process automation. Initially, the emphasis can be on optimizing administrative efficiency, as outlined in Section I. This entails identifying distinct administrative processes across the case lifecycle, determining tasks suitable for complete automation (like hearing scheduling), and recognizing bottlenecks (like summons issuance). Such processes can benefit from narrow ML algorithms, streamlining and automating basic court operations.
- b. *Establishing feedback loops and impact evaluation frameworks:* To improve subsequent generations of AI for the justice system, the assessment of pilots and first-generation AI interventions is critical. Impact evaluation, conducted under the AI committee's supervision, should be carried out by expert technology auditors. This assessment should be ongoing and periodic rather than a one-time event, ensuring that the quality of deployed technology adheres to the highest standards and aligns with emerging ethical best practices within the broader discourse on AI governance.
- c. *Developing the second generation of AI tools:* The second generation of AI tools can target decision-making processes by integrating more sophisticated technologies like case query tools, intelligent analytics, research augmentation, computational tools directly aiding judicial decisions, and legal robotics. Enhancing decision making is a central objective, as discussed earlier. For judges, intelligent case query tools or algorithms that consolidate and analyze case law and theoretical legal research can be invaluable. These tools not only expedite judicial decisions but also facilitate comprehensive reviews of existing jurisprudence, a process that is inherently time-consuming when done manually. This phase of AI development will also directly benefit litigants by providing easier access to fundamental legal services and an interactive

repository of rudimentary legal information. The second generation will likely capitalize on advanced AI techniques beyond ML. This phase entails two parallel programs: one for judges and lawyers and another for the general public and potential litigants. These “narrower” computational tools will also contribute to the development of more intricate and precise tools for predictive justice, thereby ushering in a transformative shift within the Indian justice system. Within the judiciary, simpler use cases could be pursued via task-specific ML algorithms in pilot programs, evaluating their efficacy, user-friendliness, and potential limitations before expanding to other use cases.

While embarking on the journey of AI integration can initiate transformative changes in the Indian justice system, it is essential to recognize that AI's potential for transformation is profound. In the medium to long term (approximately 3 years), the AI committee should revisit this roadmap to identify renewed steps that cater to the evolving requirements of India's justice system [86–91]. Fundamentally, the development of the AI ecosystem in India should remain accessible to all innovators within the Indian startup landscape, grounded in the establishment of customized standards tailored to the Indian justice system.

CONCLUSION

Having explored both the current applications of Artificial Intelligence across various sectors and its potential utility within the legal domain to support judges and lawyers, it can be conclusively affirmed that AI-powered machines possess the capacity to streamline tasks performed by lawyers and expedite various stages of trial proceedings. Similarly, these machines can aid judges in the decision-making process, thereby potentially reducing the overall duration of trials. The time saved through such interventions undoubtedly translates to enhanced operational efficiencies in case disposition, thereby contributing to the significant objective of curtailing backlog in the judiciary. By achieving this, the noble aspiration of delivering effective and sustainable justice to the general populace can be realized.

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