

Applications of Generative Artificial Intelligence in the Judiciary: The Case of ChatGPT

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Abstract

With the advancement of technology, generative AI systems, especially models like ChatGPT, show significant potential for development in future smart court systems. Traditional adjudication models are dominated by judges, but with the intervention of AI, algorithms and data will jointly influence the entire adjudication process. The quality of data governance will directly impact the outcomes of judicial cases. By exploring the application of ChatGPT in judicial decision support and analyzing its data processing advantages, usability, feedback capability, and trainability, we can see how these factors facilitate the judicial decision-making process. The efficient and precise algorithms, combined with vast amounts of data, demonstrate ChatGPT's superiority in processing and analyzing legal information. Undoubtedly, the application of AI technology can greatly improve judicial efficiency and promote the progress of smart adjudication. However, judicial decision-making is not merely a mechanical, data-driven process. The application scenarios of generative AI systems also face numerous challenges, including data deficiencies and the issue of generating hallucinations.

Keywords: ChatGPT, generative artificial intelligence, smart courts, data processing, judicial decision-making.

1. Introduction

Since its launch by OpenAI, ChatGPT has rapidly become a focal point in academia, influencing a wide array of disciplines and fields. A year later, the journal *Nature* listed ChatGPT as one of the top ten scientific breakthroughs globally, marking a significant impact in the academic community. Not only has ChatGPT co-authored several international academic papers [1], it has also sparked extensive discussion and attention in the field of law. In January 2023, Colombian judge Juan Manuel Padilla García acknowledged that he used ChatGPT to draft a judgment involving the payment of medical insurance expenses for an autistic child. In this case, the insurance company argued that not all expenses related to autism treatment should be considered medical expenses and therefore should not be fully covered by the insurance company. After initially forming his judgment, the judge discussed the matter with ChatGPT. Referencing ChatGPT's opinion, the judge ruled that the insurance company should cover all expenses related to autism treatment and included the conversation with ChatGPT in the judgment [2].

In the interdisciplinary research of artificial intelligence and law, ChatGPT has not only brought surprises but also raised concerns among scholars.

Looking back at academic history, the interdisciplinary research between artificial intelligence and law can generally be divided into three stages:

The First Stage: Enlightenment Period - This stage marks the early intersection of artificial intelligence with legal issues. In 1970, Bruce and Thomas published "Some Speculation About Artificial Intelligence and Legal Reasoning," which is considered foundational work in the field. The article argued that the basic logic of

applying artificial intelligence in the legal domain lies in mimicking legal reasoning for decision-making, with the primary technical challenge being the training of AI's semantic understanding abilities and bridging the gap between computer and natural languages [3]. Chinese scholar Qian, from the perspective of a natural scientist, spoke at the "First National Symposium on Science and Law Systems," where he discussed several ideas for using computer science as a tool in legal system development, such as digitizing case information and lawyers' experience data [4].

Since then, many scholars have addressed the unique characteristics of law from various angles and dimensions, discussing legal and technological issues and publishing viewpoints on the intersection of law and computers. This ongoing dialogue has significantly enriched the field, bridging gaps and fostering deeper understanding between the disciplines of artificial intelligence and law.

The second stage, The Peak Research Period, identified as the peak period of research, began with the 2017 event where AlphaGo defeated Ke Jie, the world champion of Go. This victory brought artificial intelligence into broader academic focus. Since then, there has been a significant increase in academic papers featuring artificial intelligence as a keyword, indicating a sharp rise in interest within the legal field regarding this technology. Judicial practice has also begun to use artificial intelligence technology to assist in handling legal issues. One of the most striking innovations in the United States criminal justice system in the last three decades has been the introduction of risk-assessment software, powered by sophisticated algorithms, to predict whether individual offenders are likely to re-offend [5].

Applications of AI in Law: Research has particularly concentrated on question answering, information extraction, and text argumentation mining [6]. These studies explore how AI can handle and analyze evidence and assist in determining sentences.

AI as a Judicial Tool: From the perspective of defining the role of AI in law, there is a consensus in the academic community that AI should be positioned as an auxiliary tool. Operational Mechanism of AI in Judicial Decision-Making: The academic view generally sees the intervention of AI in judicial decision-making as an algorithmic adjudication model that predicts future outcomes based on historical data.

The third stage represents a new peak in research, beginning in 2022 with the release of ChatGPT by OpenAI. In 2023, a significant milestone was reached when the Cartagena Circuit Court in Colombia utilized ChatGPT to assist in making a historical judicial decision, marking a new height in the intersection of artificial intelligence and legal studies.

This event underscores the growing integration of AI technologies in practical legal processes, not just as theoretical or secondary tools but as integral components that actively contribute to judicial decision-making. This advancement raises important questions and opportunities for further research on the impact of AI on legal ethics, the accuracy of AI-assisted decisions, and the potential for AI to augment or even transform traditional legal frameworks.

The advancement of technology, particularly the development of artificial intelligence, can significantly enhance the efficiency of judicial adjudication. By freeing judges from repetitive and transactional tasks, AI allows them to focus on the substantive disputes of cases, thereby enhancing judicial capabilities. However, the application of this technology also raises a series of concerns among researchers. Particularly in defining the boundaries for the use of intelligent machines in judicial assistance, the direction of academic research has shifted from simply promoting the application of AI to rational limitations on its boundaries, reflect this cautious approach. This body of research emphasizes a prudent approach to integrating AI into judicial systems, carefully considering both its potential benefits and associated risks.

The rapid iteration of technology may lead to several issues, including the backlash of technology against justice. Additionally, technology might undermine the justice of individual cases, data risks can lead to judicial risks.

Artificial intelligence can also influence judicial decision-making by judges. These issues blur the boundaries of AI's auxiliary utility in the judiciary.

The quicker technological updates in AI pose more daunting challenges for judicial adjudication. This context demands a balanced approach to integrating AI into the judiciary, ensuring that while the technology aids in improving efficiency and decision-making, it does not compromise the principles of justice or the integrity of judicial processes. Tania advocates that although the extent to which judges are engaged in each activity varies across different regions and countries, the development of artificial intelligence could still change the interactive nature of the role, alter the adjudicative function, and even potentially eliminate the judicial function altogether [7].

This paper analyzes the operational mechanism of ChatGPT through case studies and literature reviews, thereby deducing that its use in judicial decision support may lead to operational defects due to data deficiencies. Consequently, generative artificial intelligence cannot completely eliminate the decision-making function of judges. However, given the rapid advancements in generative artificial intelligence technology, this paper has not fully explored its potential application in the judicial adjudication field. It does not rule out the possibility that Dworkin's ideal of the perfect Hercules judge could become a reality in the future.

2. Analysis of ChatGPT's Operating Mechanism

ChatGPT is a generative dialogue artificial intelligence model developed by OpenAI, built on a generative pre-trained architecture specifically for handling dialogue tasks. No matter how technology advances and is applied, the fundamental operating mechanism of artificial intelligence lies in imitating humans. Its basic logic still relies on judicial syllogistic reasoning and analogical reasoning, fundamental to its operation. AI has consistently endeavored to mimic the human mental process of handling information, a purpose that remains unchanged. However, with the advent of generative artificial intelligence like ChatGPT, many problems that were once considered challenging seem to have found straightforward solutions. In the context of the new era, researching the application of ChatGPT in judicial decision-making has become a meaningful topic. The stage-by-stage success of ChatGPT demonstrates that as a representative of cutting-edge AI technology, the breakthroughs in its inherent technology have brought about significant advantages that have enabled it to achieve great success and extensive exposure over the past year, effectively addressing or filling technological gaps.

The main advantages of ChatGPT are based on four major strengths:

Firstly, the large database and powerful computing capabilities are crucial. According to feedback from Sam Altman, CEO of OpenAI, they have spent considerable time and effort in various ways, through multiple channels, to acquire and build a vast database. Their database encompasses information databases in different languages, and ChatGPT selects data from the appropriate language database based on the language characteristics of the user to generate responses. ChatGPT can generate answers within milliseconds, which essentially represents an extrapolation and enhancement of human cognitive capabilities. The emergence of technologies like ChatGPT has transformed the "human-centered" knowledge creation paradigm to some extent and has promoted the transformation towards a "computing power-supported" knowledge creation paradigm [8].

Secondly, the ease of use. ChatGPT features a vast natural language system, which, in simple terms, means it has a substantial technological foundation combined with user-friendly, "foolproof" operation. The first contact with the chatbot reveals its ability to provide detailed and precise answers in various areas [9]. People can obtain information or generate task-specific texts from ChatGPT as easily as chatting with friends online. Without any operational difficulty, users can quickly obtain the information they desire from their first use, and the accuracy of the responses is very high. This is one of the key reasons for ChatGPT's popularity. Moreover, ChatGPT is also "obedient," "polite," and efficient. For legal professionals, using ChatGPT is as routine as using a search engine to look up information. However, unlike typical search engines, ChatGPT acts like a 24-hour standby assistant, offering numerous conveniences to judicial workers and addressing issues with specificity, such as making information retrieval, document preparation, and case comparison more convenient.

Thirdly, the feedback mechanism. Unlike past experiences with search engines where there was little to no feedback or it was not very targeted, ChatGPT can tailor a set of written responses specifically for users. Moreover, if users are unsatisfied with the responses, they can request modifications until they are content. Specifically, ChatGPT actively "gathers" human evaluations and continuously optimizes its algorithms based on

human feedback. Acquiring feedback and continually refining its algorithms can be seen as ChatGPT's process of self-training and self-learning. Sometimes, it might offer two sets of answers to a question, allowing the user to choose. By continuously optimizing its responses based on various types of feedback, this training process is similar to how humans interact and get to know each other better; the more in-depth the understanding, the more likely it is to produce a satisfactory answer.

Fourthly, trainability. OpenAI conducts training on ChatGPT by leveraging a vast database and continuously gathering user feedback from real-world use. This training primarily involves integrating feedback received during operation to specifically optimize ChatGPT. The entire training process is characterized by OpenAI continuously collecting data from ChatGPT users, which is then used to strengthen training and fine-tune the model. During the text generation process, users can cast votes of approval or disapproval based on their satisfaction with the content and can also provide specific textual responses. The advantage of trainability is evident in the upgrade iterations from GPT-3.5 to GPT-4.0, which optimized and resolved many issues. This process is akin to using human coaching to enhance model performance, where human intervention enhances machine learning outcomes to achieve more realistic results. Sam Altman has noted that feedback-based training is highly effective and can make the GPT models more useful. This mode is similar to human training, which helps to continuously improve practices through repetitive training. As a result, GPT can continually receive better evaluations, forming a basis for an algorithm that OpenAI can continuously improve upon.

However, every coin has two sides, and the advantages of ChatGPT also bring corresponding challenges, mainly in three aspects:

Disparity in Database Content and Quality Across Languages: It is evident that OpenAI's English language database is more comprehensive than its Chinese counterpart. Consequently, there are significant differences in performance across different linguistic regions. Particularly in Chinese-speaking areas, the effectiveness of ChatGPT is notably inferior to that in English-speaking countries due to discrepancies in the database. Many Chinese scholars have also raised concerns about data discrimination and ideological issues.

Hallucination Issues During Operation: According to recent research from the Hong Kong University of Science and Technology, the training objectives in NLG models (Natural Language Generation models) might lead to training flaws, resulting in outputs that are dull, incoherent, or stuck in loops [10]. Users of ChatGPT have also noticed that it often produces meaningless text or output that does not stay true to the provided input. This problematic generation process is known as hallucination. Researchers believe that hallucinations originate from two main factors: the training data, where discrepancies might arise during data collection, and inherent divergences in source-reference within some NLG tasks [9]. Essentially, two major elements lead to hallucinations: data and training. The primary cause of data-induced hallucinations is source-reference divergence. Additionally, training and inference processes can also lead to hallucinations. Thus, addressing hallucination issues relies on fact-checking and human evaluation.

Consciousness Issues: ChatGPT can be trained and can learn deeply, and like humans, it can produce hallucinations, appearing to have "consciousness." However, whether ChatGPT actually possesses consciousness is still difficult to determine. Sam Altman stated in an interview following the release of ChatGPT-4 in 2023 that, at least for now, ChatGPT-4 does not have consciousness; it may know how to mimic it. Rodney advocates that artificial intelligence does not need to possess consciousness and a soul in the traditional sense. He proposed a "behaviorist" perspective, asserting that intelligent behavior can emerge from simple perception and reaction [11].

Currently, in judicial practice, the operation of courts using artificial intelligence to assist in judicial decision-making is often carried out through local collaborations with technology companies. Due to regional economic differences and the distribution of tech companies, there is considerable variability in practices across different areas. In some economically advanced regions, cutting-edge practices have been implemented, such as the Suzhou Intermediate People's Court in Jiangsu, China, announcing its pilot artificial intelligence system that can generate judicial documents in just two minutes with a completion rate of 70%. The system is primarily used for cases involving financial loan contract disputes, labor disputes, sales contract disputes, and housing lease

contract disputes. Additionally, the Suzhou Intermediate Court is continuously expanding the application range of this system and plans to extend its use to other complex case types and various other court work scenarios. On March 8, 2024, China's Supreme People's Court released a work report, where Chief Justice Zhang Jun highlighted the role of digital courts in enhancing quality and efficiency.

In the context of modernizing the rule of law, whether at the policy level or in practice, the development and application of AI technologies like ChatGPT are an inevitable trend. However, based on the current state of practice and the operational mechanisms of ChatGPT, there are still some issues and potential risks in its application that require in-depth analysis at the theoretical level.

3. Data and Operational Flaws of ChatGPT in Judicial Applications

From a theoretical perspective, ChatGPT has a broad prospect in judicial practice, but it also triggers corresponding risks and challenges. From the attitude of scholars in recent years towards the application of artificial intelligence in judicial adjudication, one can infer the academic community's stance on "the use of ChatGPT in judicial decisions." Concerns are mainly about the uneven quality of data and the "black box" nature of algorithms, as well as inherent flaws in the algorithmic logic that lead to deficiencies in ChatGPT's judicial applications. Additionally, there are inherent flaws related to artificial intelligence itself and its impact on human judges.

From the perspective of future applications, given the principles of generative artificial intelligence, there is broad scope for its use in the judicial field, such as generating "demonstrative evidence" and drafting litigation documents, thereby transforming the modes of litigation and adjudication [12]. Researchers have pointed out that fundamentally, there is little difference between humans and machines serving as judges; as long as the judgment is impartial, the nature of justice remains unchanged. In terms of values like judicial independence and fairness, artificial intelligence has advantages over human judges: it can ignore media or public expectations and exclude public pressure from decision-making considerations; it does not face incentives or pressures from career progression or financial rewards, allowing it to operate unbiasedly and without emotion [13]. Furthermore, the work quality and effectiveness of human judges are constrained by their energy and experience, making them prone to errors, while AI simply operates based on pre-set algorithms and efficient data processing [14]. By offering efficiency and at least an appearance of impartiality, AI adjudication will foster a turn toward "codified justice," that is, a paradigm of adjudication that favors standardization above discretion [15].

In summary, the strong data processing and computational capabilities of artificial intelligence can gradually expand its application scenarios, improve judicial efficiency, and overcome human limitations such as emotions, memory, and knowledge, eventually shifting from a supportive role to an independent adjudicative role.

Behind the optimistic view of technological development, many scholars express concerns about the accompanying risks, primarily focused on the inherent characteristics and flaws of the technology itself. The inability to guarantee data quality can taint the generation process of ChatGPT; moreover, the opacity of algorithms during the computation process can lead to invisible and hidden defects.

3.1 Preliminary defects: data issues

Judging disputes is not simply about the application of law to uncontroversial facts [16]. A highly skilled judge in the judiciary needs to possess professional legal literacy and a wealth of judicial experience. For ChatGPT, both "experience" and "legal literacy" derive from the provision of data. The logical foundation of judicial adjudication in the civil law system is based on syllogistic reasoning, which forms a judgment conclusion from a major premise and a minor premise (as shown in Figure 1). First, the minor premise (case facts) and the major premise (legal norms) should be determined, so that the result of the case can be derived on this basis. Besides, the organization of the minor premise (case facts) depends on the integration of historical data and the input of existing data (as shown in Figure 2). In contrast, the common law system forms judgment conclusions through analogical reasoning by comparing the current case with precedents (as shown in Figure 3). Regardless of whether it is the syllogistic reasoning-based adjudication model of the civil law system or the analogical reasoning-based adjudication model, the supply of data (which determines the precedents selected by judges)

directly affects the outcome of judicial decisions. The quality of the data is a prerequisite for generating high-quality content, but there may be the following issues at the data level.



Figure 1 Judicial syllogism reasoning mode part1



Figure 2 Judicial syllogism reasoning mode part2

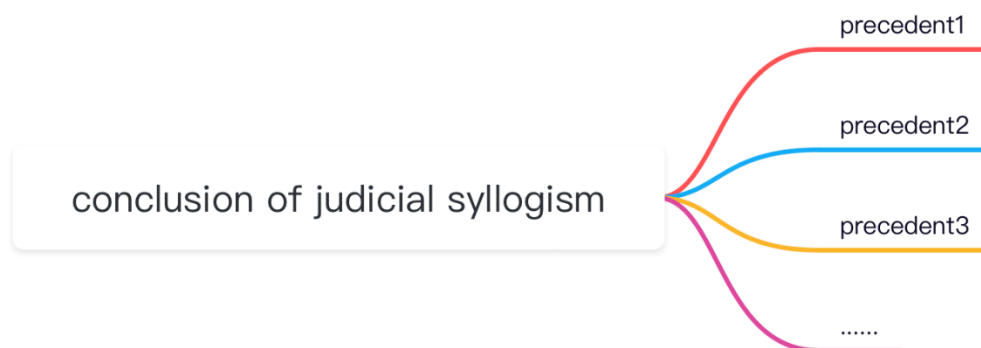


Figure 3 Analogical reasoning model

However, as shown in Figure 3 (It is necessary to compare the current case with several similar precedents in order to reach a conclusion that is similar to the precedents), there may be the following issues at the data level:

Firstly, there are data security issues, which include two aspects: the integration of past data and the input of current data. Regarding the integration of past data, artificial intelligence systems collect personal information from users, which may lead to risks associated with data security and personal information privacy [17]. Additionally, judicial practice differs from ordinary practice settings, as case materials may involve protected data such as the privacy of individuals, trade secrets of businesses, and even national data security concerns. Even if these contents are not involved, there exists another potential risk in judicial practice: if judges use generative artificial intelligence, the system will collect information about the judges, which could lead to the “judicial profiling” issue mentioned by many scholars.

If the aim is to maximize the benefits of artificial intelligence in judicial adjudication, it necessitates effective training for judges and assistance in efficiently crafting prompts. However, training judges to use AI systems can be a double-edged sword. On one hand, it encourages judges to utilize AI, enhancing efficiency and potentially leading to more consistent judicial outcomes. On the other hand, it risks exposing judges' personal information. This situation could create a cyclical paradox where the push for AI integration in the judiciary comes at the cost of potential privacy concerns and ethical dilemmas related to data usage and individual profiling.

Secondly, there is a lack of a data updating mechanism. The subjects of ChatGPT's learning, or the issues it needs to address, are constantly changing. Some cases have outcomes that carry specific temporal and cultural significances. For instance, the types of case disputes and focal points of contention vary between countries with different cultural backgrounds. The core legal issues and the points of interest to the public also differ. Countries with continental characteristics and those with maritime characteristics have different types of case disputes and data. Therefore, the core of judicial processing is dynamically evolving and growing. If data from different regions and eras are mixed, how to properly manage the scale and data updating mechanisms is a critical issue.

ChatGPT's database should have a collection and updating mechanism capable of handling massive amounts of old and new data. It's essential to determine whether outdated data is still in use and by what mechanism it should be updated. For example, in common-law countries, beyond adhering to the principle of *stare decisis* (following precedents), there are instances where precedents are distinguished or overturned. Judicial adjudication requires legal professionals to engage with facts, norms, and values in various ways, [18] and this experiential involvement is currently irreplaceable by artificial intelligence. People's value consensus varies across different eras and cultural backgrounds.

Whether these precedents should be entirely discarded or overturned to a limited extent depends on the analysis and examination of individual cases and precedents. Handling the relationship between limitedly overturned precedents and current cases is complex. Once these issues are digitized, they all focus on updating the judicial database, illustrating that the collection of judicial data relies on sophisticated legal skills. Furthermore, people's value concepts undergo a cyclical and intricate research process. A typical example is the discussion in the United States regarding abortion, which after prolonged debates, seems to have reverted to the stance from fifty years ago. For these issues, where there is no correct answer and humanity is still exploring and debating, the reference value of big data and its updating mechanisms cannot provide a standard solution.

3.2 Hidden defects: algorithmic issues

The logic of algorithms depends on big data, and without a resolution to the data updating mechanism, related issues will be embedded within the algorithms. Due to the inherent opaqueness of algorithms, we can only infer potential problems through several observable perspectives. A deeper analysis of algorithms reveals that their basic approach is based on statistical models, including applications using machine learning algorithms.

Firstly, the opaqueness of algorithms leads to what is known as the "black box" phenomenon. Considering the development of computer science and its technical implementation, faced with massive computational demands, it is impossible for humans to review the entire computational process. As such, the traditional epistemological sense of transparency is unattainable, resulting in cognitive blind spots or opaqueness. This lack of transparency clearly diverges from the principles of procedural justice and openness in the judicial process.

Secondly, the "black box" nature of algorithms can lead to algorithmic bias. On one hand, relying on large databases and powerful computational abilities, artificial intelligence can process information faster and more accurately than the human brain. On the other hand, the continuous strengthening of data accumulation and associations may lead to supervised algorithms developing stereotypical biases during their learning processes. As a result, what should be neutral artificial intelligence may become biased due to the "black box" nature of algorithms, and this type of discrimination often remains concealed. The value biases of the technicians themselves are covertly embedded within the algorithmic black box, potentially leading to algorithmic discrimination. The issues of algorithmic bias caused by data defects can have more severe consequences than the outcomes of individual case misjudgments.

Finally, data bias is difficult to avoid. When collecting and selecting data, various biases often infiltrate the data due to human involvement, resulting in data with inherent prejudices. Using biased data to train algorithms can lead to deeper algorithmic biases and a range of issues such as algorithmic discrimination. The data biases in generative artificial intelligence models can lead to issues with the authenticity of information outputs and even introduce inherent prejudices in ways of thinking [19]. Once applied in judicial practice, this could potentially lead to biased conclusions in adjudications [20].

4. Conclusion

The rapid advancement of generative artificial intelligence technology has brought unprecedented opportunities, but its application in the judicial field still requires in-depth research into its potential data flaws and algorithmic issues. The future application of ChatGPT and similar technologies necessitates more interdisciplinary research and practical application feedback to ensure that while they enhance judicial efficiency, they do not compromise the fundamental fairness and transparency of legal adjudication. For such a technology with significant potential, it is essential to actively explore its application prospects while not overlooking the legal and ethical challenges it presents.

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