

The Application of AI in Case Trials: With Chinese IP Law as an Example

Junqi Ge

Abstract—As technology evolves, artificial intelligence has been applied to various fields and law is no exception. Intellectual property law is a representative realm. As Chinese companies continue to innovate and become more aware of intellectual property protection, the number of intellectual property cases has shown a significant increment in recent years. In order to strengthen the trust of enterprises in the national legal system, China has assigned considerable judicial resources to intellectual property law cases. However, with the rapid development of artificial intelligence technology, the implementation of continual learning combined with the characteristics of intellectual property law cases has made it possible for artificial intelligence to support the trial of intellectual property law disputes. This paper shows the logical and technological basis of the artificial intelligence system in assisting the trial by simulating the procedure of a real-world case trial, which is highly similar to the logic framework of human judges and reasonably processed. And the surge of intellectual property cases in recent years might be able to provide some support for the construction of real and sufficient legal data base. Concerns related to black box, algorithm errors and discrimination are coincidentally raised up by many scholars, exposing thorny but possibly solvable challenges of applying artificial intelligence in case trials. Meanwhile, the application of AI in the judicial field is restrained and regulated by the ethical system to ensure the standardized and orderly development of AI in the judicial field.

Index Terms—Algorithm, artificial intelligence, intellectual property law, legal data

I. INTRODUCTION

The discipline of artificial intelligence (hereinafter referred to as “AI”) was founded in the summer seminar held at Dartmouth College in New Hampshire on August 31, 1956 (BBC News). On February 25, 2016, the Supreme People’s Court of People’s Republic of China released the People’s Court Informatization Version 3.0, which clearly and concretely depicts the blueprint for judicial embedding of AI (Li, 2020). The issue of the application of AI in judicial trials has been widely debated. Some scholars insist that the implementation of AI application in trial cases should not be promoted unless the law and techniques are perfect. For example, Paliwala (2016) talks about the negative aspects brought by AI assisted system under the current inadequate or faulty jurisprudence, which would lead to faulty trial results. Others, on the other hand, believe that the regulation for AI assisted system should be continuously improved and the algorithms should be optimized in the process of AI assisted case trials. For instance, Zuo (2018) supports for AI application in case decisions, clarifies the auxiliary status of

legal AI and recognizes the enormity and long-term of future applications of legal AI. He also trusts in the approach to practically explore algorithms that fit the law and to correct possible errors through human intervention during the hands-on implementation. Nowadays, artificial intelligence technology is gradually improved and formally applied to real life to raise people’s quality of life and work efficiency, such as autopilot. Thus, I want to research whether artificial intelligence can be applied to the legal field to improve the accuracy and efficiency of case trials. This paper discusses the possibility and feasibility of the application of AI from the perspective of intellectual property rights (hereinafter referred to as “IPR”) disputes. Section I mainly explores the concept of AI generally accepted at present and introduces the current AI auxiliary applications in real world. Section II not only aims to analyze the practicability of applying AI assisted system to IPR disputes but also draws on the current credible AI judicial assistance system and a judicial case in China to simulate the trial logic of human judges. Moreover, under the development of AI, some issues and questions about AI algorithms have arisen, and Section III dissects and provides insights into the current realistic and pressing challenges of AI.

II. THE DEVELOPMENT OF AI IN MAKING CASE DECISIONS

A. Revisit the Concept of AI

The earliest definition of AI was given by Turing, a machine that can think or can pass the Turing test¹ (Russell and Norvig, 2022). By 2004, McCarthy defined AI as an intelligent machine capable of understanding human intelligence, especially for intelligent software. But this does not necessarily need observing biologically. For now, the ideal approach to AI is to think and act rationally, and the human process, as Turing and McCarthy explained, is to think and act like a human being (Russell and Norvig, 2022). This paper will adopt the broad definition of AI based on the definition of AI regarding the human approach.

B. The Up-to-Date Application and Classification of AI in Making Case Decisions

In China, AI applications have been applying in case decisions making for many years. In the previous application, AI only played the role of secretary in simple procedures with

¹Turing test: consisting of an interrogator, a computer system, and a human unit in different rooms. Their means of communication were through a keyboard and a screen only. The interrogator asks a question to both the teams located in other rooms and tries to distinguish between the responses received from both the branches (human and computer), i.e., which answer is given by the computer and which one by the human if the interrogator fails to correctly identify the computer’s response because of the minor difference (or even no difference) then the system is supposed to be intelligent.

processes of extracting textures for case hearings and searching law articles and charges. Nonetheless, in 2019, the Hangzhou Internet Court launched the AI Assistant Judge and started to have the ability to judge cases independently, and the fastest case can be completed within one second (Zhu, 2019).

This AI Assistant Judge is equipped with a novel legal judgment prediction framework via topological learning, named “TopJudge”, to simulate the judicial logic of human judges under the civil law system (Zhong *et al.*, 2018). TopJudge was tested with a series of experiments in real-world scenarios and achieved the most excellent outcome compared to other legal judgment prediction frameworks, such as term-frequency inverse document frequency (hereinafter referred to as “TFIDF”) to extract word features and utilize support vector machine (hereinafter referred to as “SVM”) for text classification, convolutional neural networks (hereinafter referred to as “CNN”) with multiple filter widths for fact encoding and type (Zhong *et al.*, 2018).

It is easy to see that the application of AI in the field of justice is making breakthroughs with the efforts of researchers. So, it would be optimistic to assume that if AI in the judicial area has a category as the taxonomy of driving automation for vehicles², the AI in the jurisdiction should be at L2 (partial driving automation: the driver supervises the driving automation system and intervenes when needed) in respect to the taxonomy with the description of TopJudge (Zhong *et al.*, 2018). It could finally be upgraded to L5 (fully driving automation: the driving automation system takes control over everything while driving) in the future based on the thorough development of diligent researchers.

III. THE APPLICATION OF AI IN CHINESE IP LAW CASES

A. An Observation of Chinese IP Law Cases: Proliferation and Traits

With the rapid development of technology and the popularization of social laws, the awareness of IPR protection is also gradually increasing, making China’s IPR cases increase annually since 2013. According to the IPR cases in local courts published in the White Paper on Judicial Protection of IP by the Supreme People’s Court of China for each year (2013–2021), the following Fig. 1 can be drawn:

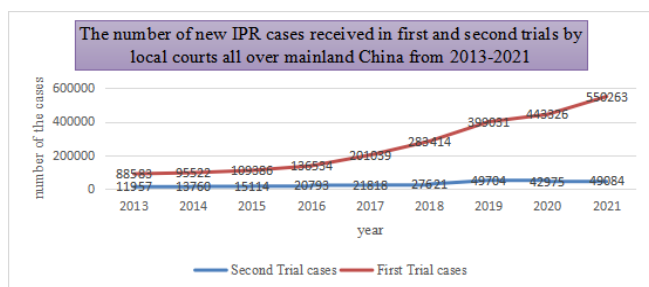


Fig. 1. The number of new IPR cases received in first and second trials by local courts all over mainland China from 2013–2021.

It is obvious that the number of intelligent property rights

² Level 0: No Driving Automation; Level 1: Driver Assistance; Level 2: Partial Driving Automation; Level 3: Conditional Driving Automation; Level 4: High Driving Automation; Level 5: Full Driving Automation. Framed by SAE (Society of Automotive Engineers).

cases in China has increased nearly five times as the number of cases in 2013, which is undoubtedly a great challenge for the judicial system to overcome. Therefore, along with the annual growth of cases, in order to solve the problems of long IPR trial cycle, high cost of rights protection, low compensation, increased types of cases with novel and complex cases, different verdicts for the same type of case, and general situation: “enterprises winning the lawsuit and losing the market” through judicial reform, the Central Leading Group for Comprehensively Deepening Reform, considered and adopted the Program on the Establishment of IPR Courts at its third meeting and the establishment of IP courts in Beijing, Guangzhou and Shanghai was completed in January 2015 (Data rule of law institute, 2021). In order to handle online disputes more efficiently, the establishment of Hangzhou, Beijing and Guangzhou Internet Courts was completed in September 2018.

Based on the completion rate of IP cases in first instance in local courts published in the White Paper on Judicial Protection of IP by the Supreme People’s Court of China (2013–2020), Fig. 2 to the change of completion rate of first trial of national wide IPR cases from 2013–2021 can be drawn (Data rule of law institute, 2021):



Fig. 2. Concluding rates of first trail IPR cases in local courts all over mainland China from 2013–2021.

Fig. 2 shows that the challenge has been well conquered after the corresponding judicial resources were tilted to deal with the contingency of IPR cases. However, in the context of limited judicial resources, a large number of judicial resources are tilted towards IPR cases and will continue to increase. For example, on July 5, 2022, 27 provinces in China announced the construction of 57 IPR protection centers. Nonetheless, A question can be raised about whether the measure that has been practicing in achieving IPR is really in line with the strategic policy of sustainable development in China.

The data shows the number of IPR cases in China is drastically ascending every year. Especially from the recent years, the number of new IPR cases received in first trial has increased by 10.41% in 2020 compared to 2019, and 23.60% in 2021 compared to 2020. It should be difficult for the growth rate of the number of judges to keep up with the growth of IPR cases. Because with the implementation of the Chinese judge personnel system, the number of judges has been strictly controlled. Moreover, probably with the impact of the rapid growth of IPR cases and the Chinese judge personnel system, the concluding rate of the first trial IPR cases in local courts all over mainland China in 2021 has dropped approximately 6% with the contrast of the one in 2020. Therefore, increasing the IP-specialized investigators and judges and tilting judicial resources, like the construction of 57 IPR protection centers in 27 provinces of China, to IPR

cases might not be an optimal plan in the longer term. Throughout history, the development of technology has been affecting our lives all the time. From the submission of paper pleadings to the submission of online electronic pleadings, from using paper-form code to find the appropriate law to entering keywords to retrieve the law in the current law search system, the innovation of technology has been influencing our judicial system gradually.

Moreover, cases on IP law cover more specialized subject matter than other legal branches. For example, in the case of infringement of a new plant species, the judge may need additional specialized knowledge in order to better determine whether there is an infringement. But through continual learning or life learning, an ability for machines to learn consecutive and multiple tasks without forgetting the previous trained tasks, AI is supposed to have the potential to deal with multiple tasks cross over distinctive disciplines (Thrun, 1995)³. With the help of AI, judges can better handle disputes in cases under different professional backgrounds and speed up the dispute processing of IP cases.

Furthermore, the continuous development of information technology and the digital economy have made the means of infringement, the object of rights and the measures to defend rights increasingly digitize. Online infringement seems to occur more frequently. According to the report of the Supreme People’s Court of The People’s Republic of China on the work of the People’s Courts in IP trials, the Internet has become one of the most important places where IP infringement violations occur (Zhou, 2022). This makes IP disputes naturally fit for digital trial and processing under AI algorithm.

Therefore, today’s IP protection is of particular concern and IP cases are proliferating, it is of the author’s view to use the AI to empower IP trials under the powerful computing power and the deep learning ability of AI to reduce the burden of IP judicial personnel and to use IP case trials as a pilot to try to optimize the allocation of judicial resources for writing up a new chapter of technological reform for judicial construction.

B. How AI Can Be Applied in Real Cases: With the Invention Method of Making an Ancient Painting Case as an Example

Generally, in most cases of IP infringement disputes, the judge, along with the team of experts he/she needs, uses the inventive purpose of the parties’ patents as a guide to compare the claims in question and ultimately reach a decision on whether is infringed or not. The “method of making an ancient painting” patent infringement case is an example to simulate the AI application in case analysis. The procedure in the framework of TopJudge is shown in Fig. 3.

The reason to use the framework of TopJudge as an example to simulate the analysis process of AI is that TopJudge is the most accurate among several existing legal judgment prediction systems, such as CNN with multiple filter widths, Hierarchical Long-Short Term Memory and etc. The comparison of results is shown in the Table I.

³ With continual learning, AI-assisted systems can learn multidisciplinary content without data forgetting, making it easy to deal with the professional diversity of IP cases.

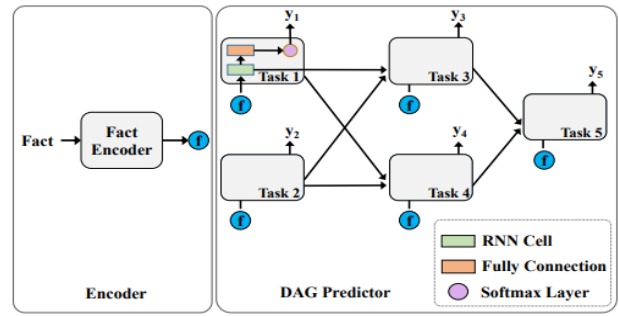


Fig. 3. The framework of TopJudge (Zhong et al., 2018).

TABLE I: JUDGMENT PREDICTION RESULTS ON CJO (CHINA JUDGMENT ONLINE) (ZHONG ET AL., 2018)

	Tasks	Law Articles				Charges				The Term of Penalty			
		Acc.	MP	MR	F ₁	Acc.	MP	MR	F ₁	Acc.	MP	MR	F ₁
Single	TFIDF+SVM	82.4	45.5	26.7	30.2	82.2	47.4	27.9	31.3	48.5	36.0	16.7	16.5
	CNN	92.5	46.9	38.4	40.0	92.3	41.2	32.3	33.7	57.4	35.6	22.2	22.7
	HLSTM	91.4	38.6	37.3	36.9	91.8	37.8	36.0	35.2	56.1	22.5	25.0	23.3
Multi	Fact-Law Att.	93.5	50.9	45.6	45.9	93.4	47.2	41.4	41.5	56.3	31.3	26.4	26.7
	PM	93.7	51.9	44.1	44.9	93.6	45.5	39.1	39.3	58.2	38.2	24.9	26.8
	CNN-MTL	94.3	53.0	46.0	46.9	94.1	48.5	41.7	42.5	58.7	39.9	28.8	29.4
	HLSTM-MTL	92.4	45.5	41.4	41.0	92.3	41.9	36.6	35.9	54.9	30.6	26.6	26.4
Ours	TOPJUDGE	94.4	53.9	47.3	48.2	94.9	53.9	48.2	49.1	58.8	40.2	32.9	32.8

First, as required by the system, the plaintiff’s IPR infringement brief, the plaintiff’s method patent, the video of the production process of the plaintiff’s method patent (a simulation of a judge watching the production process from the scene), the production process of the defendant’s product (paintings on the ceiling) and other evidence will be uploaded. These uploads will be transformed into computer language by a fact encoder.

Secondly, according to the illustration of the judicial logic of human judges in the civil law system in Fig. 4, the AI system will generate several tasks. In task 1, finding appropriate legal provisions, the AI system will input the encoded fact in the Recurrent neural network (hereinafter referred to as “RNN”) cell⁴. The output will be passed through a full connection and then transferred to the SoftMax layer⁵. After the final calculation is processed in the SoftMax layer, the outcome can be proceeded for task 1, which could be “the content of Article 59, paragraph 1 of the Patent Law can be applied”. In the following tasks, the same procedure will be implemented. So, for task 2, it could be to determine whether the two sides have the same production method, which may take more time to judge through judges’ attention, but the AI system can be equipped with the Video Comparison & Analysis Tool, such as the Amazon Rekognition Video⁶. Thus, with the help of an automation analysis tool, it is possible to reduce human eye fatigue, minimize the probability of manual errors, and improve efficiency.

⁴ A recurrent neural network is a type of artificial neural network commonly used in speech recognition and natural language processing. Through taking outputs or hidden layers as inputs, recurrent neural networks recognize data’s sequential characteristics and use patterns to predict the next likely scenario (Laskowski, 2021).

⁵ Fully connection is a layer of an artificial neural network where each element of the layer is connected to each element of the following layer (Savin and Ivakhnenko, 2019); The softmax function is a function that turns a vector of K real values into a new vector of K real values that sum to 1. Here, K real values in the new vector could be considered as the probability of law articles matched up with the case (Wood).

⁶ Amazon Rekognition Video is a fully managed machine learning service that supports both real time streaming video events and stored video analysis.

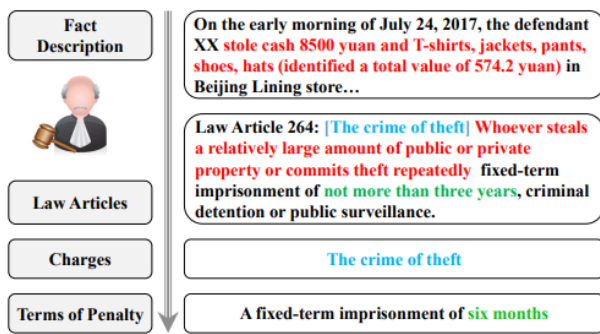


Fig. 4. An illustration of judicial logic of human judges in civil law system (Zhong *et al.*, 2018).

And what's more, Task 3 could be to determine whether the facts are consistent with the plaintiff's claims, and this task should be accomplished by using the outcomes of Tasks 1 and 2. Then task 4 might be to determine whether the infringement (the stage of specific charge) and this task can be accomplished by using the conclusions of tasks 1 and 3. Then task 5 can be a particular penalty or sentence derived from the conclusions of tasks 3 and 4. It is not difficult to find that the logical framework in TopJudge, shown in Fig. 3, fits the traditional judicial logic of judges, shown in Fig. 4. And if the AI assisted system follows the complete set of tasks above and the topological dependencies between tasks, it is not difficult to conclude similar to the final decision in the official jurisdiction (Zhong *et al.*, 2018).

However, with the implementation of legal judgment prediction and video analysis tools, judgment's efficiency can be improved and the parties' anxiety can be alleviated in the aspect of "difficulty in proof" through advanced technology because parties are able to record their production processes and the video can be compared through the video analysis tool to find the similarity of the production methods. It is worth mentioning that though this article is talking about a reasonable hypothesis, this conjecture needs to be verified through practical application. However, under today's technological conditions, TopJudge and Amazon Rekognition Video, the basic requirements to achieve the above simulation process might have been formed already.

IV. REFLECTIONS ON THE CHALLENGES OF APPLYING AI

The data information that is currently available may not be reliable. The algorithm standards are vague and opaque, and blind faith in legal AI can create new problems such as invisible discrimination (Lyria and Chan, 2014). AI, as an emerging industry, undoubtedly has great potential. There are several precedents for AI in the judicial field, such as the COMPAS in the United States and the "judge assistant" in the Internet Court in Hangzhou, China, both of which have received the consent of some parties who are willing to try something new to trial the AI case decisions making system (Zhu, 2019; Angwin *et al.* 2016). But it should still be applied with caution in the judicial field.

A. Inadequate and Untrue Legal Data

The phenomenon of insufficient and untrue legal data is particularly noteworthy. For example, in China the legal data of AI is basically derived from the judgment documents on the China Judgments Online, but the number of online

judgment documents may only be 50% of the concluded cases (Ma *et al.*, 2016). Moreover, the decision document barely contains anything except the conclusion of the decision and key actions in the legal decision-making process, such as internal discussions that form decisions, are often highly non-textual and non-data based. However, the information and data that play a role in the decision-making process are not reflected in the decision document (Zuo, 2018). Insufficient data on legal adjudication information will make it difficult for the AI system, which relies on the legal framework system provided by humans, to reach a comprehensive and credible conclusion, except for a limited amount of partial legal information to assist in the analysis.

Although in recent years some courts are constructing their own full database of adjudication documents, in which the data is closer to full sample and full data, these data also only include current data without historical data and a large amount of judicial process data, such as the non-public trial transcripts (Zhang, 2015). In the circumstance of the lack in cross-corroboration between large amounts of long-term data and current data, it is difficult for AI systems to use their superior computational analysis capabilities to carry out effective information analysis even based on official data (Zuo, 2018).

In addition, in the judicial field, the "representational" nature of legal data, meaning that the information available to the outside world is information created according to certain criteria to justify legal decisions, may not fully and truly reflect the "substantive information" that courts and judges actually use in their decisions, and also indicates the untruthfulness of legal information data (Zuo, 2018). In a situation where legal information and data cannot be proven to be exactly true and the credibility of an AI system as an adjudication aid can be questioned, a decision based on an AI system cannot be convincing.

B. Possible Solutions to and Reflections on Inadequate and Untrue Legal Data

As China's law popularization and legal system continue to improve, the public is becoming more aware of their legal rights, and IPRs are being taken seriously by individuals, businesses and other social organizations due to the rapid development of technology. This is evident from Fig. 1 above, which shows that from 2013 to 2021, the number of new cases of first-instance IPR disputes has increased rapidly. The proliferation of IPRs in recent years has in turn provided an idea to address the inadequacy and inauthenticity of the legal database required for AI systems. At the stage of growing IPR dispute cases, using IPR dispute cases as a breakthrough to apply AI systems to assist the courts in the judicial process by acting as "judges' assistants". The problem of inadequate and untrue legal data can be effectively solved and supplementing the database with absolutely true and case-related data collected.

Nevertheless, a program should constrain the development team legally to ensure that information that is legally withheld from the public or involves the privacy of the parties is treated with due confidentiality. This does not mean that the application of AI in the judicial field can officially enter the era of judicial intelligence at once. It still needs time for the database to be properly established to make up for the

deficiency of inadequate and untrue legal data. It is believed that the rapid growth of IP dispute cases will also help to improve the efficiency of database establishment.

C. Algorithmic Black Boxes, Discrimination, and Errors

In addition to the inadequate and untrue data of legal adjudication information, challenges based on algorithms are also highly controversial, with three main areas of controversy. Firstly, the nature of the algorithm black box is due to the professionalism and complexity of the algorithm content is usually not understood by the general public (laymen) (Kieslich *et al.*, 2022). Secondly, algorithmic discrimination is the implicit value that algorithm developers embody in the entire coding process of the algorithm (Beer, 2017). Thirdly, algorithms effectively assist humans in making decisions in life, acting to improve the efficiency of human decision-making and reduce the incidence of errors to occur (Lee *et al.*, 2013). But there is no perfect algorithm that is 100% error-free, and when humans encounter algorithm errors, they trust and use algorithms less and create a phenomenon called algorithm aversion (Laetitia *et al.*, 2021).

In fact, algorithmic black box, algorithmic discrimination, and algorithmic error can lead to users distrusting in algorithms and questioning the decisions generated based on them. Users' trust in algorithms directly leads to their perception of them. Because the more they believe their data will be treated fairly, the more they will allow the algorithm teams and companies to use their data, thus allowing the AI algorithm to develop positively. Or conversely, the lack of humans' trust in AI algorithms would make the development hindered or even stagnant. As the use of algorithms and analytics in society has been increasing, and AI is beginning to permeate the justice system, a field that places a high value on fairness, it is essential to actively engage in public discussion to change and improve public attitudes toward algorithms (Shin *et al.*, 2019).

D. Possible Solutions to and Reflections on Black Boxes, Discrimination, and Errors

Throughout the history, as human society has been growing in complexity, it has inevitably given rise to various "black boxes" in organizational and technological forms (Hu, 2017). Users may forgo the need for complete and transparent access to the underlying algorithms and databases and be more likely to use the system properly and trust the development team if there is a qualified and trusted expert or entity providing easily understood information about the system to the public (Lee and Boynton, 2017). And the establishment of additional professional regulatory departments, under the authorization of the Chinese people, to review the content of the algorithm can reduce the possibility of the black box bringing anxieties to people (Hong, 2022).

Indeed, discrimination seems to be very common. It is difficult to eradicate, whether based on ideological aspects or on the interests of a particular group (Nathan, 2021). Thus, to minimize the occurrence of algorithmic discrimination instead should be the right strategy to follow. Perhaps taking the form of user interaction in recommendation systems, informing users about how their data is analyzed, and encouraging them to participate in the design of the program to give their opinions will be able to approach the ideal state,

"no discrimination", through public discussion (Shin *et al.*, 2019).

Lastly, for algorithmic errors, the general public has a harsher intuitive response (i.e., less acceptance and more negativity), weaker perceptions of justice (i.e., "less blame, less forgiveness and less accountability") and stronger behavioral intentions even though there is a possibility that the algorithm's maturity is better or equal to human performance and the severity of the error is lower (Lee *et al.*, 2013). Thus, it follows that the public is less accepting of algorithmic errors than human errors, which means that the public may have higher standards for algorithms. But it is necessary to think about the fact that algorithms are also coded by people, and the final form of AI is to think like people. So, it is debatable whether it is a human's prerogative to make mistakes or whether algorithms can also make mistakes. Even if it is a human prerogative to make mistakes, it should be considered, at the "legal and moral" level, about whether the mistakes made by programs coded based on programmers' efforts deserve the same tolerance and understanding as human mistake, besides reducing the occurrence of algorithmic errors at the technical level.

E. The Establishment of Ethical Standards for the Application of AI

As a matter of fact, these issues reflect an essential question, that is, how to govern the application of AI. As two instruments that have historically maintained social order, law and ethics must be viable in terms of how to constrain the application of AI. Law is a restraint on people's external behavior, while morality aims to restrain external behaviors through people's internal activities (Pound, 1945). The law has the coercive power, universality and formality, which moral norms do not have, to promote the progress of morality, while moral norms also constrain the enactment of laws. Nonetheless, the process of legislative activity is actually the process of externalizing the moral concepts of the legislator into legal rules (Pound, 1945).

However, as the technique of AI emerges and rapidly grows, the law might not coincide with the development of AI, and professional institutions and others might consider flexible ethic codes to amend the regulation of AI (Boddington, 2017). Therefore, an AI ethics system suitable for China's social system and national conditions can be established and complemented with existing laws to accumulate administrative and practical experience and pave the way for further legislative activities based on the practical experience. In fact, on September 26, 2021, the Ministry of Science and Technology of the People's Republic of China has promulgated the "Codes of Ethics for the New Generation of AI". And there are seven requirements of trustworthy AI of the High-Level Expert Group on AI (hereinafter referred to as "AI HLEG") set up by the European Commission (2019).

Table II shows the comparison between two authoritative moral requirements. With the comparison between two standards of moral codes, the ethic codes promoted by the Ministry of Science and Technology of the People's Republic of China do not contain "human agency and oversight" as the requirements illustrated by AI HLEG. But "human agency and oversight" is not in line with the Chinese national

conditions because Article 3 of the Constitution of the People’s Republic of China states that the state institutions of the People’s Republic of China shall apply the principle of democratic centralism, which means that the people in China obviously have the right to supervise the state administration, the judiciary, the procuratorate, etc. Under the Constitution, the Chinese citizens, who have statutory oversight, can certainly monitor AI systems applied in judicial proceedings.

TABLE II: THE COMPARISON OF TWO MORAL SYSTEMS

“Code of Ethics for the New Generation of AI”	AI HLEG
1. promote human welfare	1. societal and environmental well-being, and finally
2. promote fairness and justice	2. diversity, non-discrimination and fairness
3. protect privacy and security	3. privacy and data governance
4. ensure control and trustworthiness	4. technical robustness and safety
5. strengthen responsibility	5. accountability
6. enhance ethical literacy	6. transparency
	7. human agency and oversight

Thus, strictly complying with the ethic codes announced by the Ministry of Science and Technology of the People’s Republic of China and accumulating practical experience in intelligent judiciary could be a good way to incorporate the ethical system into the legislative activities and build the legal foundation of the new China when AI is maturely applied to judicial trials.

V. CONCLUSIONS

As artificial intelligence is getting increasingly advanced, applying AI system in IPR disputes can be a breakthrough to overcome the challenges of the application of AI in the judicial system. It is beneficial to summarize and correct the irrational factors of AI in IPR disputes before applying it to the entire judicial system. Although there are potential risks and trust crises in the process of application, AI is an important part of modern rule of legal system construction. Therefore, it is imperative to actively explore the establishment of a suitable regulatory review system to ensure the safe and reliable operation of AI -assisted trial systems. At the same time, the establishment of an authentic and sufficient legal database will guarantee the effective learning of AI assisted system. The construction of database and algorithmic supervision could safeguard for the formation and implementation of AI assisted system. Artificial intelligence, fed under sufficiently real data, will be more credible. Under the operation of supervision mechanism, the system can be implemented, be performed in an orderly manner, and eventually play a supporting role in judicial trial reasonably. Moral codes have been put forward to govern the application of AI assisted system under the absence of explicit and relevant legislation, which could also be expected to provide a legislative basis for AI-related enactment in the future China. The simultaneous implementation of a regulatory regime for AI and realistic and viable applications of AI in the IP field will revolutionize the legal landscape in China.

CONFLICT OF INTEREST

The author declares no conflict of interest.

REFERENCES

- Amazon. Amazon recognition video. Available: https://aws.amazon.com/cn/rekognition/video-features/?nc1=h_ls
- Angwin, J, Larson, J, Mattu, S, *et al.* 2016. Machine bias: There’s software used across the country to predict future criminals. And it’s biased against blacks. Available: <https://www.propublica.org/article/machine-bias-risk-assessments-in-criminal-sentencing>
- BBC News. 70 years of artificial intelligence: The convergence of science fiction and reality. Available: <https://www.bbc.com/zhongwen/simp/science-48380424>
- Beer, D. 2017. The social power of algorithms. *Information Communication & Society*, 1–13. Available: <https://doi.org/10.1080/1369118X.2016.1216147>
- Boddington, P. 2017. *Towards a code of ethics for AI*. Oxford: Springer.
- Data rule of law institute. 2021. Data analysis report on judicial protection of intellectual property rights in the Internet domain. Available: http://m.legaldaily.com.cn/IT/content/2021-08/16/content_8580737.html
- European Commission. 2019. Ethics guidelines for trustworthy AI. Available: <https://digital-strategy.ec.europa.eu/en/library/ethics-guidelines-trustworthy-ai>
- Hong, X. 2022. Some reflections on strengthening digital rule of law—A perspective on algorithms, data, and the legalization of platform governance. *Journal of Law Application*, 5.
- Hu, L. 2017. The legal imagination of AI. *Culture Vertical*, 2(2): 108–116.
- Kieslich, K., Keller, B., & Starke, C. 2022. AI ethics by design. evaluating public perception on the importance of ethical design principles of AI. *Big Data & Society*.
- Laetitia, A. R., Mast, M. S., & Bekbergenova, A. 2021. To err is human, not algorithmic—Robust reactions to erring algorithms. *Computers in Human Behavior*, 124: 1–12.
- Laskowski, N. 2021. Senior news director, recurrent neural networks. Available: <https://techtargget.com/searchenterpriseai/definition/recurrent-neural-networks>
- Lee, B., & Boynton, L. 2017. Conceptualizing transparency: Propositions for the integration of situational factors and stakeholders’ perspectives. *Public Relations Inquiry*, 6(3): 233–251. Available: <https://doi.org/10.1177/2046147X17694937>
- Lee, C. S., Nagy, P. G., Weaver, S. J., & Newman-Toker, D. E. 2013. Cognitive and system factors contributing to diagnostic errors in radiology. *American Journal of Roentgenology*, 611–617. Available: <https://doi.org/10.2214/AJR.12.10375>
- Li, C., & Li, Y. 2020. *The directions, main points and solutions of the application of artificial intelligence in judicial field*. China Academic Journal Electronic Publishing House. In Chinese.
- Lyria, B. M., & J. Chan. 2014. Using big data for legal and law enforcement decisions: Testing the new tools. *University of New South Wales Law Journal*, 37(2): 643–678.
- Ma, C., Yu, X., & He, H. 2016. Big data analysis: A report on the online disclosure of Chinese judgements online. *China Law Review*, 4: 195–246.
- McCarthy, J. 2004. What is AI? Available: <http://www-formal.stanford.edu/jmc/>
- Nathan G. A. 2021. The curse of race prejudice: Debates about racial “prejudice” in the United States, 1750–1900. *Patterns of Prejudice*, 55(1): 25–46.
- Paliwala, A. 2016. Rediscovering artificial intelligence and law: An inadequate jurisprudence? *International Review of Law, Computers & Technology*, 107.
- Pound, R. 1945. Law and morals—Jurisprudence and Ethics. *North Carolina Law Review*, 23(3): 185. Available: <http://scholarship.law.unc.edu/nclr/vol23/iss3/1>

- Russell, S., & Norvig, P. 2022. *AI: A modern approach* (4th ed.). Pearson Education.
- Savin S, Ivakhnenko A. 2019. Enhanced footsteps generation method for walking robots based on convolutional neural networks. *Handbook of Research on Deep Learning Innovations and Trends*, IGI Global, 16–39.
- Shin, D., & Park, Y. J. 2019. Role of fairness, accountability, and transparency in algorithmic affordance. *Computers in Human Behavior*, 98: 277–284.
- The State of Intellectual Property Protection in China in 2013–2021. Available: <https://www.cnipa.gov.cn/col/col91/index.html>
- Thrun, S. 1995. A lifelong learning perspective for mobile robot control. *Proceedings of international conference on intelligent robots and systems*.
- Wood. T. SoftMax function. Available: <https://deepai.org/machine-learning-glossary-and-terms/softmax-layer>
- Zhang, W. 2015. On the legalization of the court transcripts. *Chinese and Foreign Law*, 4(4): 903–918.
- Zhong, H., et al. 2018. Legal Judgment prediction via topological learning. *Proceedings of the 2018 conference on empirical methods in natural language processing (association for computational linguistics)*. 3540-3549. Available: <http://aclweb.org/anthology/D18-1390>
- Zhou, Q. 2022. President of the Supreme People’s Court of the People’s Republic of China, Report on the Work of the Supreme People’s Court—March 8, 2022 at the Fifth Session of the Thirteenth National People’s Congress. *People’s Court Daily*. Available: http://www.rmfb.com/paper/html/2022-03/16/content_214968.html
- Zhu, M. 2019. Pilot application of “AI assistant judge” in Hangzhou Internet Court. *Zhejiang News*. Available: <https://baijiahao.baidu.com/s?id=1636313472795379686&wfr=spider&for=pc>
- Zuo, W. 2018. Some reflections on the prospects of legal AI use in China. *Tsinghua Juriprudence*, 12(2): 108–122.

Copyright © 2023 by the authors. This is an open access article distributed under the Creative Commons Attribution License which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited ([CC BY 4.0](https://creativecommons.org/licenses/by/4.0/)).