IOP Conf. Series: Journal of Physics: Conf. Series **1487** (2020) 012013 doi:10.1088/1742-6596/1487/1/012013

Research on the Application of Artificial Intelligence in Judicial Trial: Experience from China

Jie-jing YAO[1,a] and Peng Hui[2,b]

[1]No.7989 Wai Qing Song Road, Qingpu, Shanghai, China
[2]No.7, lane 622, middle huaihai road,Huangpu, Shanghai, China

[a]Yaojiejing@163.com; [b]penghui@sass.org.cn

Abstract. The impact of artificial intelligence has penetrated into every aspect of life and work, and its value has been continuously explored and received great attention and recognition from business, government and academia. In general, artificial intelligence has begun to be applied in the judicial field in China, the development and practice of the intelligent assistant referee system will be of great significance and the key to the construction of a smart court, which can improve the judicial efficiency to a certain extent, prevent unjust and false cases, and ensure judicial justice. However, it is necessary to see clearly that artificial intelligence as a new thing has two sides. At present, it is still at a relatively preliminary stage and will create a series of risks. such as: the weakening of discretion, judicial discrimination, judicial dictatorship, privacy security, etc., which is essentially contrary to China's judicial reform and rule of law construction. At the same time, in the face of the influence of artificial intelligence on judicial trial, we should have a correct attitude, prevent the worship of technology, and make clear the leading position of judges in the course of judicial trial.

1. Introduction

In July 2016, the General Office of the CPC Central Committee and the General Office of the State Council issued the "Outline of the State's Informatization Development Strategy" and the "Thirteenth Five-Year Plan for National Informatization," and included the establishment of "Wisdom Court" in the national informatization development strategy. The "New Generation Artificial Intelligence Development Plan" issued in July 2017 explicitly includes "wisdom courts" in the plan.

2. The typical functions of judicial big data and artificial intelligence development

Under the overall framework of the "smart court", big data and artificial intelligence technologies are integrated into the four major application scenarios, including serving the public, serving the case trials, serving the judgment enforcement, and serving the justice management [1]. Among them, intelligent assistance providing for judges in handling cases is one of the core goals of the "wisdom court" construction. From the current practice across the country, similar case recommendation, sentencing assistance and departure warning are the most typical applications of big data and artificial intelligence technology in assisting judges in handling cases ("trial intelligence").

In the "Opinions on Accelerating the Construction of a Wisdom Court" promulgated by the Supreme Court, the above three functions were placed under the heading "Using big data and artificial intelligence technology to provide precision intelligence services as required".

Content from this work may be used under the terms of the Creative Commons Attribution 3.0 licence. Any further distribution of this work must maintain attribution to the author(s) and the title of the work, journal citation and DOI.
Published under licence by IOP Publishing Ltd

2. 1 Functional overview of "similar case recommendation"

Similar case recommendation, as its name suggests, recommends the most similar case to the case under processing. The standards judging whether it is similar are mainly the circumstances of the case, the applicable law and the focus of the dispute. This function is an almost necessary module of the case handling system of intelligent court across the country, which mainly includes functions such as quick inquiry and smart push. And the recommendation of applicable law of similar case, controversial focus, main evidence recommended and other functions can be derived.

In daily life, our mobile phone app will receive various pushes which look for relevant categories in the database and push them to the user by extracting the characteristics of the user's favorite products. The similar case recommendation is also to find the most similar cases in the database by extracting the circumstances of the case and recommend it to the judge.

Of course, the degree of sophistication in the structuring of the case (also called "case portraits") largely influences the accuracy of the similar case recommendation.

Case push will occupy an important position in judicial assistance. Previously, the similar case push modules have been embedded into the smart-aided case handling systems of courts in Jiangsu, Beijing, and Shanghai.

2. 2. Functional overview of "sentencing assistance"

Sentencing standardization reform is an objective requirement for nomocracy progression and development of the times. "The specification of discretionary power and the inclusion of sentencing into court proceedings" is a major judicial reform project determined by the central government. In this context, the judge sentencing assistance system come into being [2].

It should be clear that the system is only a tool for judges to refer to, and the verdict directly made by artificial intelligence does not meet the basic ethical principles of justice. From the perspective of the technology path, the sentencing assistance system is like a weather forecasting system, which uses functions to compute the results of various variables (case scenarios).

From the current development, some systems can automatically extract the plots according to the documents (such as the indictment and trial transcripts) within the judicial case handling system so as to match the case and make recommendations for sentencing; some systems can realize sentencing recommendation based on the way where the judge selects the plot; there are also some systems with both functions.

Sentencing recommendation is one of the core modules of judicial big data and artificial intelligence development. The "mirror mirror system" in Guizhou and the "smart auxiliary case handling system" developed in Shanghai's "206 Project" all have the functional modules of sentencing assistance. Hainan Higher Court has specially developed the "Sentencing Standardization Intelligent Assistant System" to provide decision-making reference for judges to handle cases.

2. 3 Functional overview of "departure warning"

If "penalty recommendation" is an intelligent aid to a judge's pending case, "departure warning" is to a greater extent positioned on the quality control of the solved case. It compares sentencing margin presumed by artificial intelligence based on algorithm with magistrate's sentence, calculates the degree of deviation between the two, and gives different levels of early warning according to the level of deviation. Just like an overweight alarm in an elevator, it has the function of preventing and controlling risks for the judge's referee.

The criminal cases are taken as an example. Under the support of class push and sentencing assistance systems, the system can obtain the sentencing intervals for this case through operations. The accuracy of this sentencing interval also depends on the maturity of the system and the completeness of the data. The more complete the data, the more accurate the sentencing interval. The system compares the referee of the judge on the case with the range of sentencing by artificial intelligence. If the deviation is particularly high, it means that the result of the referee may have problems about legitimacy and reasonableness.

Of course, departure warning is a functional module that covers a wide range. With a similar idea, not only can the departure warning of the judgment result be solved, but also the warning can be given through the deviation of the whole process of case handling. For example, the processing time of a case obviously exceeds the processing time of other similar cases. The former is entity departure warning, and the latter is program departure warning.

According to incomplete statistics, the trial aid systems that includes the "departure warning" function module have already been launched in Shanghai, Jiangsu, Zhejiang, Guizhou, Yunnan and other provinces and cities.

3. Technical obstacles of judicial big data and artificial intelligence development

3.1 Technical barriers to map construction

There are more than 400 criminal cases, and the causes of civil cases can be further divided into thousands. Therefore, the over-reliance on the manual work in the construction of the "top-down" legal knowledge map is one of the biggest challenges faced by the development of artificial intelligence for large-scale judicial data. In other words, due to the lack of speed and precision in the construction of case knowledge maps, the coverage of the existing smart case assist system is very limited. For example, the "Shanghai Criminal Case Intelligence Assistance Case Management System" ("206 Project"), launching in July 2017, covers only 18 crimes; subsequently, the first phase of the "Shanghai Civil, Commercial, and Administrative Cases Intelligence Support Case System" (referred to as "206 Project" Civil and Commercial Edition) covered only eight cases. The wisdom trial model created by the courts in Guizhou covers criminal cases such as intentional injury, robbery, and theft [3].

3.2 The technical obstacle of plot extraction

As we all know, although legal instruments are generally carried out in a uniform format, judges and prosecutors have different ways to express the same matters in the writing of legal documents. For example, in a legal document, the defendant may have a variety of natural language expressions when surrendering himself. In addition to "self surrender," there are other expression by the defendant such as "automatic surrender," "substitution for a case," and "truthful confession". The goal of natural language processing technology is to accurately recognize all natural language expressions that actually represent "voluntary surrender," even if the word "surrender" does not appear in the entire text. This will cause AI to make mistakes and omissions when extracting the plot of the case based on the knowledge map of the case.

3.3 Technical obstacles of case identification

The case identification is based on the analysis of the circumstances of the case. If the plot is not extracted in place, it will inevitably lead to a decline in the accuracy of case identification. The business needs of front-line judges for similar case recommendations are different in different scenarios. For simple cases, the "similar case" expected by the judge may be a highly matching plot. For complex cases, the expectation of a "similar case" by the judge may be the legal relationship or the same focus of the dispute. In this application scenario, complete plot matching cannot meet the needs of judges [4].

3.4 Technical obstacles to model training

There are many ways of model training. But no matter which method is used, there is a big problem in simulation training, which is the paradox of artificial intelligence: "Garbage in, garbage out". It means that analyzing bad data or wrong data will produce bad or useless conclusions [5]. "Small sample puzzles" is also faced by model training. In other words, the sentencing model training of artificial intelligence often requires the formation of deep learning combined with massive documents, while the overall sample of some cases in the judicial practice is less. In the case of insufficient samples, big data intelligence will face difficulties.

3.5 Technical obstruction of sentencing prediction

The worries of the front-line judges about this system is that they think the algorithm is a "black box." They do not know what the algorithm is and how this kind of sentencing prediction is calculated. This is actually caused by the paradox of artificial intelligence, that is, the conflict between the concealment of artificial intelligence algorithms and the transparency of the case judgment process [6]. In this case, it is difficult to visualize the sentencing prediction process of artificial intelligence or expose the algorithm completely. Judges and the public are also likely unable to fully understand due to the technical threshold.

4. Expectation

It can be predicted that the construction of "wisdom courts" driven by big data and artificial intelligence will become one of the main focuses of the court system in the coming period. What deserve attention especially is the national key R&D program (thematic task of judicial work) released by the Ministry of Science and Technology on January 9, 2018. The first investment of 450 million yuan (a total investment of 900 million yuan) is used to specifically study scientific and technological issues in the judicial field. With the nationwide increasing investment in science and technology in the judicial field nationwide, we have reason to expect that the application of science and technology in the judicial field will usher in a new upsurge.

4.1 The importance of big data in smart court upgrade plan

Systematically and structurally combing the innovative thinking of big data in court trials, legal services and even social governance methods and existing data application theories and practices. For example, the US prism program, the 21st century digital government strategy, the presidential innovation plan, the digital analysis dashboard of the 18F group government website, the open data strategy for data sharing among EU member states, the UK's health care, energy conservation and other big data applications, South Korea's Intel comprehensive database, 1000 national big data plans, Australia's public service big data strategy, data privacy protection, technology and data processing capabilities sharing. Based on this, the most realistic and objective evaluation of China's national big data strategy has a profound impact on the construction of the wisdom court, and evaluates the strategic, leading and innovative nature of the smart court upgrade plan.

4.2 Methods to enhance big data technology and its application

Explain comprehensively and in detail the profound impact of judicial big data and 206 projects on the trial system, trial ability, judicial reform, and comprehensive supporting experiments of national courts. Comprehensively compare foreign advanced experience in the design of the big data public legal service platform, the electronic case management process of the court, the evidence of the litigation process, and the design of the weight system of the judge performance management, and the frontier of legal big data in other fields. Research and application results, such as the electronic delivery of registration in Germany, the parallel big data capture technology of the world's top legal publishing agency, Lexmark Lianxun Group, and the construction of the big data key segment and label system of the US ABA in the refereeing documents database.

4.3 Big data application to a national support system

Comprehensively summarizing and evaluating the key technical research and trial processes and trial capabilities of big data in Chinese courts, especially highlighting the innovative contributions of big data and artificial intelligence in the theory of optimal allocation of judicial resources, and The international advanced level reached by key technologies in departmental, cross-level, and multi-service judicial coordination. Fully demonstrate a group of big data applications with Chinese

characteristics, leading the world's judicial technology and equipment development, and advanced technological achievements in optimizing the trial system and improving the ability of trial modernization. On this basis, it is creatively proposed to build and form a "national wisdom and judicial operation support system" centered on the wisdom judicial knowledge center and the legal support department's three departments, and to achieve fair and transparent justice and justice for the people. The judicial system provides technical support.

References

[1] Katsh E, Rabinovich-Einy O and Susskind R 2017 *Digital Justice: Technology and the Internet of Disputes* (Oxford, Oxford University Press) 58-67
[2] Power D J 2014 *J. Journal of Decision Systems* Using 'Big Data' for analytics and decision support **23(2)** 222-28
[3] Gill B, Coffeeborden B and Hallgren A K 2014 *J. Mathematica Policy Research Reports* A Conceptual Framework for Data-Driven Decision Making 103-6
[4] Gumzej N 2012 *J. Juridical Tribune* Data protection for the digital age: comprehensive effects of the evolving law of accountability **2(4)** 27
[5] Graves J T, Acquisti A and Christin N 2016 *J. University of Chicago Law Review* Big Data and Bad Data: On the Sensitivity of Security Policy to Imperfect Information **83(1)** 117-37
[6] Pasquale F 2015 *The black box society: The secret algorithms that control money and information* (London, Harvard University Press) 39-43