Empirical Research on the Application of Computer Artificial Intelligence in Law

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Abstract. This article uses empirical research methods to explore the status of the application of artificial intelligence in Chinese law. It is found that although the application of artificial intelligence in China's law has improved, it has also fallen into a dilemma. Its dilemma is mainly manifested in: inadequate deep learning and lack of algorithm transparency. On this basis, this article concludes that the application level of Chinese legal artificial intelligence is relatively elementary. Therefore, we should appropriately reduce the expectation of legal artificial intelligence and reconstruct the conclusion of the development system of legal artificial intelligence.

Keywords: Legal Artificial Intelligence, Empirical Research

1. Introduction

Since the advent of artificial intelligence technologies and products such as AlphaGO, artificial intelligence has been increasingly discussed as a hot topic in the world and China. In the legal field, with the development of legal artificial intelligence, legal institutions and legal persons are standing at the crossroads and will face the drastic changes seen in the next 20 years, the degree of change will exceed the sum of the past two centuries\(^1\). If so, legal artificial intelligence has become a hot topic in academia and practice for a long time; according to statistics, after 2015, the number of literatures discussing legal artificial intelligence in China's academia and practice has soared. The 15 articles in 2015 rose all the way to 871 articles in 2019, an increase of 5706.67% (see Figure 1). However, compared with the enthusiasm for the discussion of legal artificial intelligence, the practical application of legal artificial intelligence is in fog, which has become a major problem in the current research on legal artificial intelligence in China.
In order to explore the current status of the application of artificial intelligence in Chinese law, the author adopted the method of empirical research. Among many research methods, empirical research, as a data-centric research method, has certain advantages in phenomena description and cause analysis\cite{2}. In this paper, the author will investigate the actual application of Chinese legal artificial intelligence in a quantitative way, reveal its existing problems, and propose targeted solutions. The specific objects of the empirical investigation are the court system of Provincial Province A in eastern China, the court system of Provincial Province B in central China and the court system of Provincial Province C in western China. The development levels of the three provinces are in the upstream, midstream and downstream respectively, which can better represent the national situation. It is quite typical and is an excellent research material.

2. Empirical investigation of the application of legal artificial intelligence

2.1. Current status of the application of legal artificial intelligence

An empirical study found that at present, provinces A and B and city C have responded to the call of the party and the state to apply legal artificial intelligence in a large area in the court system. Currently, 73% of courts in province A have used legal artificial intelligence technology; 56% of courts in province B have used legal artificial intelligence technology; and 41% of courts in province C have used legal artificial intelligence technology. This shows that the application of legal artificial intelligence in practice still has a lot of heat. At the same time, through empirical research, the author found that the current operating principles of legal artificial intelligence in the three provinces A, B, and C all follow the classic legal reasoning model proposed by Peter Wahlgren\cite{3}: 

\begin{figure}[h]
\centering
\includegraphics[width=0.5\textwidth]{chart.png}
\caption{2015-2019 China's academic and practical circles discuss the number of literature on legal artificial intelligence (unit: articles).}
\end{figure}
As can be seen from Figure 2, Apart from the starting point situation, identification, interpretation, law-search, rule-application, evaluation, learning and formulation constitute the current seven stages of legal artificial intelligence operations. Among them, identification is a process of evidence reasoning or fact determination. The cases are divided into simple cases and difficult cases though identification. For simple cases, because the facts of the case are simple and clear, without complicated evidence reasoning, you can directly enter the law-search stage and then enter the rule-application and evaluation stage. In complex cases, due to the complicated plot and the large number of contents involved, it will enter the interpretation phase after identification, followed by the rule-application and evaluation phase. Objectively speaking, this mode of operation is basically a reproduction of the judge's manual case-handling mode, which meets the actual needs of judicial trials. It can be seen that the current legal artificial intelligence is basically improved, and it can almost be said to be miraculous in imitating judges to handle cases.

2.2. The dilemma of the application of legal artificial intelligence

2.2.1. Insufficient learning depth

Insufficient learning depth caused a large number of cases to stay in the identification stage. In the operation of legal artificial intelligence, artificial intelligence understands the input situation and matches it with the legal situation in the identification stage is a very critical step. However, the empirical research found that in the process of legal artificial intelligence applied in the three provinces A, B, and C, only a little over 20% of the cases can pass the identification and enter the next stage. The remaining 70% of the cases are returned. In the end, only It can be handled manually by the judge (see Table 1), which causes a lot of waste of related resources.

Table 1. Proportion of whether the cases handled by the legal artificial intelligence of the court systems in provinces A, B, and C passed the identification stage in 2015-2019 (unit: %)

| Whether to pass the “identification” stage | Through the “identification” stage | Failed the “identification” stage |
|------------------------------------------|----------------------------------|----------------------------------|
|                                          |                                  |                                  |
The reason for the situation in Table 1 is due to the lack of deep learning in legal artificial intelligence. Deep learning is essentially an algorithm technology, which analyzes data through multi-layer neural network technology, and then builds a model to predict problems. \[4\] It is the fundamental way for artificial intelligence to achieve self-upgrade and even update iteration. The key to deep learning is data. Only with a sufficient amount of data can deep learning for artificial intelligence have a foundation. However, in practice, the court system does not have the capacity to provide sufficient data. The current data source of the Chinese court system, including courts in A, B, and C, is the Judgment Document Network, but the Judgment Document Network itself is an incomplete database. According to statistics, it has only included less than 30% of the judgments, and the included judgments have been specially processed, and the effect of data is greatly reduced. In this context, the courts naturally do not have enough data for the deep learning of legal artificial intelligence and the establishment of a perfect prediction model. A large number of cases therefore cannot be recognized by the prediction model and thus fail the identification stage. As a result, the lack of data foundation and insufficient deep learning is a major dilemma in the application of legal artificial intelligence.

2.2.2. Lack of transparency in algorithms

The second is that the lack of transparency of the algorithm makes the processing results of legal artificial intelligence not credible. For those who are fortunate to pass the identification stage, whether they enter the law-search stage or enter the interpretation stage, their destination is rule-application, and only after the rule-application is the case processed. However, empirical research has found that more than 80% of the case processing results through the rule-application stage will not be directly used by the judge, and less than 15% of the processing results will be directly written into the judgment (see Table 2). To a large extent, the current legal artificial intelligence processing results are not credible.

**Table 2.** In 2015-2019, Whether the results of legal artificial intelligence processing cases of court systems in provinces A, B, and C were directly adopted by judges (unit: %)

| Whether directly adopted by the judge | Directly adopted by the judge | Not directly adopted by the judge |
|--------------------------------------|-------------------------------|----------------------------------|
| A province                           | 13.55                         | 86.45                            |
| B province                           | 11.61                         | 88.39                            |
| C province                           | 10.79                         | 89.11                            |

The reason for the situation in Table 2 is due to the lack of transparency of the algorithm in the rule-application stage. Algorithm is the foundation of artificial intelligence, which can be understood to some extent as the principle of artificial intelligence operation. Legal artificial intelligence is no
exception. At each stage of its operation, there is a set of algorithms to control the output of results, especially at the rule-application stage. The algorithm directly determines the judgment result of the case (such as what is convicted in criminal trials, What is the sentence?) In other words, in the application of legal artificial intelligence, the algorithm is the real judge. However, the technical characteristics of the algorithm determine that it is an end-to-end black box. It is not known which variables are set and which texts are referenced during the conclusion process—even the actual developer may not be able to say To be clear. Moreover, the current court systems that use legal artificial intelligence are not actual developers. At best, they are only users of technology companies, and technology companies also do not disclose their algorithmic technology or reservations to the court system for reasons such as technical confidentiality. Many judges do not trust the results of their processing without knowing the decision-making process and reasons of legal artificial intelligence. Therefore, lack of algorithm transparency and judges' distrust of the processing results of legal artificial intelligence are also a major dilemma in the application of legal artificial intelligence\cite{5}.

3. Conclusion

After the above empirical research, the author found that although my country's legal artificial intelligence has made progress, there are two major dilemmas: inadequate deep learning and lack of algorithm transparency. By analyzing this phenomenon, the author draws the following conclusion: Although the application of legal artificial intelligence in China has a wide coverage, the actual effect is not good. Not only a large number of cases have not been processed by legal artificial intelligence technology, but also a large number of cases after legal artificial intelligence processing Being trusted. As a result, a large amount of judicial resources are wasted. All in all, the application of Chinese legal artificial intelligence is still very elementary. In this context, the expectation of legal artificial intelligence should be reduced at this stage, and it is no longer debated whether it should replace the judge. At the same time, rebuild the legal artificial intelligence development system, such as establishing a special database for legal artificial intelligence, independent or cooperative development of a relatively trustworthy algorithm system for the court system. Only in this way can the application of Chinese legal artificial intelligence achieve real progress\cite{6}.

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