"Artificial Intelligence + Arbitration": Research on the Implementation Path of Driven Intelligent Arbitration

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Abstract. With the advent of artificial intelligence technology and big data era, artificial intelligence technology continues to expand its application scope. Against this background, artificial intelligence law emerges. In China and beyond, the artificial intelligence law application systems including electronic data-oriented information, intelligent case-handling auxiliary systems, prediction and supervision systems of entity judgment and unified and electronic evidence standards have gradually been formed [1]. This paper will start from the arbitration field, the branch of artificial intelligence law, and explore the implementation path of artificial intelligence + arbitration, in order to make a contribution to the development of intelligent arbitration in China.

Keywords: Artificial intelligence law · The arbitration · Block chain

1 Introduction

With the rapid development of artificial intelligence, it will have a broad application prospect in law, and it's expected to serve as an important means that can play a decisive role. The establishment of the Internet Courts in Beijing, Guangzhou and Hangzhou successfully classified the Internet disputes [2], realized the whole-process online handling of cases, and greatly saved labor costs and time spent on litigation. Artificial intelligence + arbitration can help to achieve the major purpose of informational system development- "digital rule of law and smart justice", adapt to the big data, promote economic and social development, and follow the trend of social governance. Therefore, the establishment of the artificial intelligence + arbitration platform can improve arbitration services and increase its credibility among the public.

2 The Emergence and Current Situation of "Artificial Intelligence + Arbitration"

In recent years, artificial intelligence technology has developed rapidly. In July 2020, the Cyberspace Administration of China (CAC) and other four departments jointly released
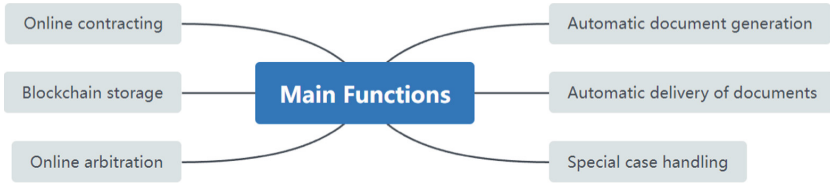
Fig. 1. Main functions of intelligent arbitration system.

the Guidelines for the Construction of the National Standard System for a New generation of artificial intelligence, which stated that China will initially establish an artificial intelligence standard system by 2023.Driven by the central policy, departments of courts and procuratorates at all levels actively seek cooperation with artificial intelligence technology departments in the market, and carry out a series of R&D and experiments of intelligent judicial (procuratorial) platforms, thus "artificial intelligence + law" emerges. As one of the judicial approaches, arbitration plays an important role in solving commercial disputes, but it is also costly and time-consuming. Therefore, in order to follow the trend of intelligence, artificial intelligence arbitration emerges and plays an important role in the judicial field [3].

Some countries, such as the United States, South Korea also have explored in smart arbitration in recent years, which involves the application of smart contracts, blockchain and other technologies in judicial field. For example, a south Korean scholar put forward intelligent contracts linked to the online arbitration are more adaptive to the international nature of trading, so as to exclude national participation, reduce transaction costs and have a positive influence on international trade. However, there is a lack of practice in its research.

In China, with the prosperity of socialist economy, private lending is increasing day by day. Such simple and frequent cases involve a small amount of loan and are difficult to obtain evidence. Traditional arbitration will cause a great waste of judicial resources. Through the introduction of blockchain, artificial intelligence and other new-generation information technologies, the platform can greatly improve the arbitration efficiency of private lending disputes, reduce judicial costs, save judicial resources, create a good modern market environment, and promote the construction of a credit society [4].

3 Implementation Path Planning of "Artificial Intelligence + Arbitration"

3.1 Functions and Implementation Principles

(1) Signing and processing of online contracts

The platform provides standard loan contract template. The system firstly collects key data input by users through input function or Scanner, including contract target amount, loan amount, repayment term, loan date, etc., and performs string slicing and filtering, data cleaning and other steps. Then Python, Java, and other machine learning technologies are used to convert natural language into contract template. Finally, current laws and regulations are accessed through web crawler,

and preliminary compliance review is made by comparing with contract terms (relying on NLP, OCR and knowledge graph technology, to automatically extract the important content of contract text and ensure structured information identification, extraction and review) (Fig. 1).

By means of intelligent analysis and understanding of text data, this system can help to transform unstructured text into structured data. Besides this,it can also extract key field information of borrowing contracts, including the name of the contract, borrowers and lenders, types of loan, specific purpose, terms, method of interest settlement, guarantee and so on. In addition, it can connect clients online from different places and ensure that the connection port of the notary office and the lawyers can witness and notarize contracts instantly so the contracts can take effect immediately.

(2) Blockchain storage

Blockchain has the characteristics of distributed storage and decentralization, which can effectively prevent personal tampering, destruction, loss and other problems. It is the key factor to confirm the legal effect of electronic storage. Block chain can verify the data structure and data storage and its distributed node consensus algorithm can generate and update the data. The use of cryptography can ensure the security of data transmission and accession and the intelligent contracts composed of automated script code can program and operate data. Therefore, block chain can be used as a digital ledger for economic transactions that cannot be tampered with digital books.

Blockchain technology in the system is mainly used to preserve the parties' biometric information (such as fingerprints, iris, facial features, etc.) and other highly sensitive information relevant to the original contract, including the recording of hashes and time stamps generated by electronic signatures, for comparison and subsequent identification in case of disputes. Based on the above characteristics of blockchain technology, the system adopts distributed storage means, and at the same time uses database and cloud backup to ensure the integrity and authenticity of storage information. As joint judicial appraisal, audit, notarization, arbitration and other authoritative institutions participate in the alliance chain consensus, data verification can be ensured.

The specific process of blockchain storage on the platform is as follows:

Step one: users register and authenticate with their real names on the platform.

Step two: the borrower and the lender sign an electronic contract;

Step three: the basic data of identity information of both parties and electronic contracts and hash value should be obtained and packaged into a data package of storage.

Step 4: electronic signature and stamped time should be added;

Step 5: each node in the alliance chain (notary, arbitration, audit and other authorities) stores the depositing data block in their respective distributed database and stores it.

At this point, the blockchain storage is completed, and each node in the alliance chain has an identical ledger of evidence. At the same time, each node in the alliance chain carries out data verification with each other to protect the stored data in the blockchain from tampering.

(3) Online Arbitration

In the process of solving online disputes, the Internet-based arbitration is convenient, flexible, executable and subject to no regional restrictions [5]. The platform applies cloud video and instant messaging technologies to innovate a new mode of Internet arbitration. As a third party between the parties and arbitrators, the platform will connect the port to the user's PC or mobile phone terminal so that they can enter the same chat room for mediation and arbitration. The use of face recognition technology can verify biological identity, compare bank card information and enterprises' information and adopt multi-verification to ensure that the parties themselves are present. For the submitted evidence, the system scans, identifies and extracts the evidence content online through OCR character recognition technology, assists in arbitrators writing documents, and inputs electronic files into block chain as evidence. When the parties defend themselves in court, the platform will automatically convert their speeches to text and reduce the pressure of the clerk to record, by means of speech recognition technology.

(4) Automatic Document Generation

Automatic document generation mainly uses the legal knowledge graph technology to deconstruct the structure of the legal provisions and legal documents in a two-way way, and forms the legal knowledge graph and the basic logic of document generation that meet the needs [6]. According to the elements of content processing functions in electronic file, the knowledge map with semantic features for legal documents can be generated. Combining the case information obtained from intelligent evidence review, the element information node is configured on the document generation template, and the corresponding language text is automatically synthesized according to the natural language understanding (NLP) technology in the legal field to realize the automatic document generation.

The main principle is to use the web crawler technology to extract the existing legal provisions through the innovation of distributed algorithm and text field adaptive technology, and then divide the text into strings for retrieval, find the applicable laws, and finally fill the template automatically. In addition, the paper makes accurate classification, highly aggregation, hierarchical analysis and association analysis on the massive heterogeneous data and document form format, and uses the advantages of the algorithm to construct a deep connection between the contents, so that the documents of the parties can be generated automatically. Based on big data and artificial intelligence analysis, as well as legal knowledge graph and legal cognition engine technology, it organizes relevant elements of cases, supports automatic generation of contracts, arbitration applications, legal opinions and awards, and improves the writing efficiency of user documents.

3.2 System Practice and Operation Process

Firstly, users login system with real-name authentication and ensure the safety of the contracting parties by multiple biological information certification. Then, the two parties can select the suitable standard borrowing contract template provided by the platform, fill key details (such as contract bid, borrowing, reimbursement deadline date, borrowing,
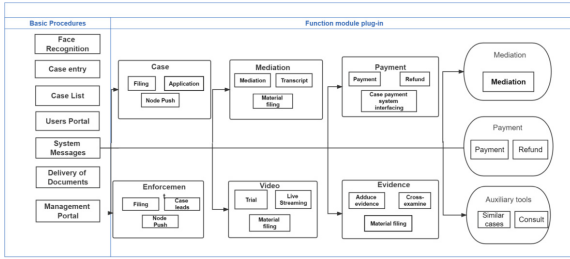
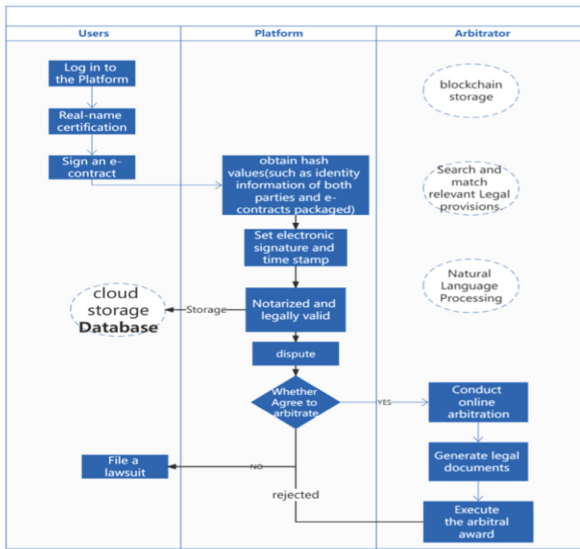**Fig. 2.** Product Structure

Fig. 3. Flow chart of the operation of intelligent arbitration

etc.) after consultation, and designate the contract dispute solution and arbitration clause. At this point, the platform will collect fingerprints, facial features and electronic signature hashes and store them in the blockchain platform, or upload them to the cloud database for future use (Fig. 2).

After the contract is submitted, the system will make a preliminary comparison with the existing regulations through the string slice, review the illegal clauses, and submit the doubtful contract to the lawyer port for further human review. The original contract becomes legally effective after being notarized (Fig. 3).

In case of subsequent disputes, the user can file disputes on the platform for settlement. For the case agreed by parties to arbitration, relevant evidence will be transferred to the terminal of the arbitration court with cooperative relationship and filed in real time; if there is no agreement, it will be submitted to the court of the jurisdiction. The arbitration commission will give feedback to the parties after successfully filing the case, and the time will be designated and arbitrators will be selected. The two parties will use
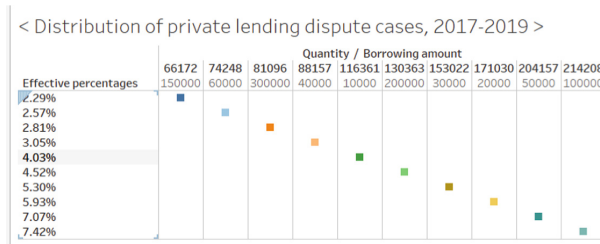
< Distribution of private lending dispute cases, 2017-2019 >

	Quantity / Borrowing amount									
Effective percentages	66172 150000	74248 60000	81096 300000	88157 40000	116361 10000	130363 200000	153022 30000	171030 20000	204157 50000	214208 100000
2.29%	■									
2.57%		■								
2.81%			■							
3.05%				■						
4.03%					■					
4.52%						■				
5.30%							■			
5.93%								■		
7.07%									■	
7.42%										■

Fig. 4. Distribution of private lending dispute cases, 2017–2019

the instant communication technology to implement online arbitration. Artificial intelligence assists arbitrators in generating arbitrary award through legal knowledge maps and stores them on the blockchain platform. If there is an objection to execution, the system will transmit the evidentiary materials of the case together with the arbitrary award to the court to file a lawsuit for enforcement (Fig. 4).

4 Challenges and Prospects

There are still challenges in the popularization of intelligent arbitration and the overcoming of technology. Blockchain, smart contracts and other technologies are mostly applied in some emerging fields, but have not been widely used. The public have little knowledge of the new technology and its operation mechanism and using method and can not fully trust this technology, which make it difficult for the popularization of intelligent arbitration. And these new technologies also have certain technical difficulties. For example, the transaction information on the original chain of blockchain is an external information to another chain, and it is not guaranteed that the external information is correct and final when it enters another chain.

Intelligent arbitration has broad prospects both at home and abroad. In terms of domestic application, the platform mainly serves for private lending between natural persons, builds a bridge of trust for lending and acts as a third-party intermediary. In the future, it will also be extended to lending between some small and micro enterprises or between natural persons and legal persons, with a wide range of applications. Moreover, arbitration application documents can be made and signed online, connected with electronic contract and documentary data, and directly transmit a batch of case data, which is more efficient than litigation and is expected to become a universal choice and habitual tool. From the perspective of users, it can be applied between natural persons. Besides this, it can also gain nationwide popularity as seen in the in-depth collaboration with arbitration committees and law firms around the country.

From the perspective of users, besides the application between natural persons, it will be gradually promoted nationwide and carry out in-depth cooperation with arbitration committees and law firms around the country. Each user can log in the platform to carry out work by himself, which is conducive to expanding the user group of AI arbitration.

However, domestic arbitration only accounts for a small proportion. Efforts to constantly expand its application should be ensured for its long-term development. Considering the international economic activities mentioned in the sixty-eighth session meeting

of the United Nations Commission on the International Trade Law of (dispute resolution) the second working group, the secretariat of the working group submits a series of proposals related to "quick settlement" dispute matters (priority to arbitration related matters) to the UNCITRAL. Most countries' delegation proposed expensive and inefficient international arbitration has obstructed international commercial development. Obviously, there are still many difficulties in the application of international arbitration. In addition to international commercial arbitration, arbitration is also applicable to international investment arbitration, sports arbitration and many other aspects. So breaking the barriers between countries, enabling blockchain, smart contracts and artificial intelligence to secure their place in the international arbitration court, combining with international arbitration rules to deal with cases quickly and effectively, building an internationally-recognized intelligent arbitration platform, and giving a helping hand to international arbitration will become our goal.

5   Conclusion

The implementation path of smart arbitration driven by "artificial intelligence + arbitration" is driven by the most cutting-edge technological means –"blockchain" in the arbitration handling system. In this process, the scientific analysis and application of big data are included to make the arbitration information cases more visible, and to respond to public concerns and to provide thorough interactive arbitration service. On the other hand, the research on the implementation of basic intelligent arbitration methods such as APP and block chain to store information makes the "intelligence + artificial intelligence" arbitration mode expected to become a "full ecological closed loop" integrating businesses in various fields of law. Arbitration and new technology are mutually beneficial and can coexist for a long time. The use of new technology is bound to produce certain conflicts. However, the arbitration procedure is the best way to adapt to the complex and unpredictable procedures. Vice versa, new technology can also reduce the arbitration disadvantages. It is worth noting that smart arbitration can improve the efficiency and quality of arbitration. At the same time,smart arbitration can also benefit social development.

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