Achievements and Prospects of Artificial Intelligence Judicature in China

Caixia Zou

Shanghai University of Political Science and Law, Shanghai, China
Email: caier7@163.com

Abstract

Artificial intelligence has affected and is changing our lives, penetrating into all fields of society, and the field of law is no exception. The development of artificial intelligence judicature such as smart court is a positive response of judicial informatization to artificial intelligence technology. Chinese judicature, which has experienced the development of electronization, networkization and digitization, has achieved significant transformation, integration and development in the era of artificial intelligence. At present, artificial intelligence has realized some applications in court system, procuratorate system and public security system, but these applications still remain at the superficial and uniformed level. With the improvement of artificial intelligence optical character recognition technology, natural language processing technology, intelligent speech recognition technology, element extraction technology and machine learning ability, higher-level artificial intelligence judicature urgently needs to be further promoted to run through the whole judicial process of the public security department, the Procuratorate department, the court department, and the Justice department. The data communication between the judicial systems with the data centers should adopt the optical one-way security isolation data automatic import system. The internal network between the judicial system adopts a two-way one-way gatekeeper to build a secure communication network. Based on the Secure network, interconnected and shared data storage, management and Protection platform, convenient transaction processing platform, intelligent legal analysis platform, efficient judicial execution platform, stable judicial supervision platform, extensive legal service platform should be established.

1. Introduction

Since the Dartmouth Conference, artificial intelligence has been around for 60 years and experienced three upsurges. The first was triggered by the Turing test in the 50s and 60s, and the second was the speech recognition representatively in the 80s and 90s. The third was taking deep learning as the direction since 2006, which burst out instantly at home and abroad in 2016-2017. The four branches of artificial intelligence, such as machine learning, robotics, computer vision, and natural language processing, have made great progress on the Internet, big data, Internet of Things, hardware (especially GPU), and algorithm platforms. The maturity of machine learning has become the new starting point of an artificial intelligence revolution.

Since 2017, China has set off an artificial intelligence revolution, and artificial intelligence is changing everyone's life. The success of artificial intelligence in other fields has promoted the penetration of artificial intelligence into the legal field. This is precisely a good medicine to solve the current judicial dilemma in China, such as the expanding number of cases with insufficient judges, different judgments in the same cases, and power rent-seeking. It can be said that the judicature is involved in the torrent of artificial intelligence technology, or artificial intelligence judicature is the result of the penetration of artificial intelligence technology application from service industries to government departments.

2. China's Artificial Intelligence Judicature National Strataegy

2.1. Theoretical Accumulation of Artificial Intelligence Judicature in China

2.1.1. The Connection between Computer and Judicature

In 1979, Professor Qian Xuesen, a famous Chinese scientist, proposed to establish a "rule-of-law system project", and listed: rule-of-law system project = Systematic Science + Marxism-Leninism law + mathematics + electronic computer technology. This is the first time that China has put forward the concept of rule-of-law system project.

In 1983, Comrade Li Keqiang published a paper on Computerization of legal work in the Journal of Law. Combined with the trend of computerization of legal work in the world he has found during his investigation in Europe, he pointed out that "although the history of the combination of computer technology and law is not long, it is only in the experimental stage at present. However, its emergence and development have shown a new and broad prospect for legal practice and legal research… The application and development of computer technology in law are making fundamental changes in legal work. Legal practice and legal research should not only comply with the development of science and technology, but also be modernized… The computerization of legal work is also an inevitable outcome of this new era… Just increasing the number of legal professionals will still be difficult to cope with the expanding demand for legal services, and will also increase the burden on society". Therefore, it is necessary to

improve the efficiency of legal work by using computer technology to achieve this goal (Gong & Li, 1983).

In 1985, Zhang Lixing, a young professor in the Law School of Peking University who ever studied in America, and his graduate students established a foreign-related laws and regulations query system, which in time evolved into China's famous legal information retrieval system "PKU LAW" (Zhang, 1986; Ji, 2018).

These are the change and benefit brought by computer technology to judicature, and the subsequent waves of computer revolution continue to bring judicature into a new stage.

2.1.2. Intersection between Artificial Intelligence and Judicature

In 1985, Professor Qian Xuesen put forward the specific idea of using artificial intelligence, knowledge engineering and expert system in legal affairs, and formally put forward the idea of "artificial intelligence + rule of law".

In 1986, the project "Research on Comprehensive Balance of Sentencing and Computer-Aided Sentencing Expert System", presided over by Zhu Huarong and Xiao Kaiquan, was supported by the National Social Science "Seventh Five-Year Plan" Research Project, which aims to establish a mathematical model of sentencing for larceny. This is a bold attempt by experts in the field of law to use computer-aided judicature.

In 1986, Su Huiyu, Zhang Guoquan, Shi Jiansan and other teachers of East China University of Political Science and Law put forward the problem of computer-aided sentencing (Su, Zhang, & Shi, 1989). The computer sentencing system, which was finally formed by the collection of expert experience and long-term experiment, has a high accuracy rate compared with the manual judgment results, and has been recognized by the court. However, due to the lack of conditions for artificial intelligence judicature at that time, technical constraint and public opinion pressure, this achievement was not widely used, but this highly forward and bold attempt and exploration planted the seeds of breakthrough and innovation for today's artificial intelligence judicature.

In 1993, Professor Zhao Tingguang of Wuhan University established the first research direction of computer crime and legal countermeasures in China and became the "bridge builder between law and computer". It presided over the development of the practical criminal law expert system, which is composed of three parts: consulting and retrieval system, auxiliary qualitative system and auxiliary sentencing system, it has the function of searching criminal law and case reasoning. This system is very close to today's intelligent trial assistant system.

In 1993, the LOA lawyer office automation system developed by Sun Yat-sen University also further expanded the intelligent direction of legal services.

2.2. Strategic Deployment of Artificial Intelligence Judicature in China

China's artificial intelligence judicature is the result of the continuous combina-

tion with science and technology in the process of "judicial reform", which is both accidental and inevitable. Taking technology as the core tool to break through the reform dilemma and promote governance innovation is an important direction for China's judicial reform as a bold attempt following the Information Age. The convenience of China's unified judicial system combined with the Chinese experience of "pilot first" makes the reform not only have no strong resistance, but also avoid the risk of rash progress.

As shown in Table 1, the basic goal of China's judicial reform is to implement the rule-of-law strategy and establish a fair, efficient and authoritative socialistic judicial system. (Chen & Long, 2013) China's judicial reform should realize the rational allocation of judicial power and the openness and fairness of judicial activities. According to these objectives, China's judiciary, especially China's courts, has carried out many institutional innovations, such as case registration system, judge post system, judicial responsibility system, circuit court system, etc., these institutional reforms have an important impact on the continuous and in-depth application of computer technology.

Table 1. Outlines of judicial reform of people's courts (CCORG, 2021).

Release time	Judicial reform scheme	Reform objectives and tasks	Judicial Informatization core task
1999.10.20	Outline of the First Five-Year Reform Plan of the People's Court (1999-2003)	A total of 39 reform tasks in seven aspects. It mainly includes: 1) Improving the organizational system of the People's Court; 2) Improving the well functioning trial mechanism; 3) Improving the scientific judge management system; 4) Establishing an adequate fund management system; 5) Establishing a socialistic judicial system with Chinese characteristics.	The 5 reform task in the Outline is strengthening the modernization of court office—uniformly equipping and applying computer office equipment and computer network system.
2005.10.26	Outline of the Second Five-Year Reform Plan of the People's Court (2004-2008)	A total of 50 reform tasks in eight aspects. It mainly includes: 1) Improving the litigation procedure system; 2) Improving the implementation mechanism; 3) Improving the trial organization and judicial institution; 4) Improving judicial trial management and judicial government administration; 5) Improving the judicial personnel management system; 6) Strengthening the monitoring mechanism; 7) Establishing a modern judicial system that meets the requirements of a socialistic country under the rule of law.	The 19 reform task in the outline is establishing a national court execution information management system; the 32 reform task is judicial statistical index system; the 33 reform task is strengthening the application of information technology in court records.
2009.3.17	Outline of the Third Five-Year Reform Plan of the People's Court (2009-2013)	A total of 30 reform tasks in five aspects. It mainly includes: 1) Optimizing the allocation of court functions and powers; 2) Implementing the criminal policy of tempering justice with mercy; 3) Strengthen team building; 4) Reforming the fund guarantee system; 5) Improving the working mechanism of judiciary for the people; 6) Building a fair, efficient and authoritative socialistic judicial system.	The 24 reform task in the outline is strengthening the informatization construction of people's courts: promoting the application of informatization in court management; constructing trial business information network; reforming the recording mode of court trial activities; developing case management process software and judicial government affairs management software uniformly applicable to national courts; promoting collaborative work with

Continued

			e-government; building a national court case information database. The 25 reform task is standardizing the live broadcasting and broadcasting of court trial; Establishing an online publication system of judgment documents; Establishing an online inquiry system for executive information; the 27 reform task is establishing a network public opinion expression and public opinion survey system; the 29 reform task is exploring and implementing measures to facilitate and benefit the people, such as remote case filing, online case filing inquiry, circuit trial, quick adjudication court, online remote trial and so on.
2015.2.4	Outline of the Forth Five-Year Reform Plan of the People's Court (2014-2018)	A total of 65 reform tasks in seven aspects. It mainly includes: 1) Establishing the circuit court of the Supreme People's court; Establishing intellectual property court; Exploring the administrative division court; Reforming the jurisdiction of specialized courts; 2) Strictly enforcing the exclusionary rules of illegal evidence; Reforming the court dress of criminal defendants; Promoting the rapid adjudication procedure of minor criminal cases; Improving the leniency system of pleading guilty and accepting punishment positively; 3) Reforming litigation registration system; 4) Establishing a legal system for credit supervision, deterrence and punishment of dishonest Judgment executee; 5) Establishing an evaluation system for reasoning of judgment documents; 6) Improving the system of Litigation Service Center; 7) Promoting the system of service of judicial documents; 8) Improving the diversified dispute resolution mechanism; 9) Promoting the reform of the classified management system of court personnel; Reforming the Specified Number of Personnel system of judges; Reforming judge selection system; 10) Flat management reform; 11) Establishing working mechanisms to prevent interference in judicial activities.	The 22 reform task in the Outline is establishing a national court judgment document library and a national court judicial information big data center; the 24: reform task is implementing the online judicial auction mode; the 38 reform task is the construction of national court government website, establishing a unified online litigation announcement processing platform and litigation announcement website for courts across the country, and strengthening the construction of China trial process information disclosure website; the 39 reform task is strengthening the website construction of China Referee Document Network; the 40 reform task is improving the construction of the Information Disclosure System of the Judgment executee; the 41 reform task is establishing an information network for commutation, parole and temporary execution outside prison; the 43 reform task is improving the litigation service hall, online litigation service platform and 12368 judicial service hotline. The 45 reform task is exploring the electronic service system, promoting the informatization construction of people's courts. The 65 reform task is accelerating the construction of "balance project", integrating existing resources and promoting various information applications to serve the work of the court and the needs of the public. Building the people's court informatization version 3.0 with big data analysis as the core as soon as possible, and promoting the modernization of the trial system and trial capacity.
2019.2.27	Outline of the Fifth Five-Year Reform Plan of the People's Court (2019-2023)	A total of 65 reform tasks in ten aspects. It is mainly aimed at further promoting and improving the reform experience in the early stage, especially in the third and fourth five year plans, so as to form a relatively mature, stable and overall system. The outline emphasizes "comprehensive supporting reform" and emphasizes the overall, systematic and coordinated development of the reform. It mainly includes: 1) Perfecting and adhering to the party's leadership; 2) Improving the system of the people's court serving and ensuring the overall situation; 3) Improving the people-centered litigation service system; 4) Improving the Sunshine	The tenth aspect of the outline systematically plans the court informatization construction. The 61 reform task is further promoting the infrastructure construction of smart courts, optimizing and integrating various office case handling platforms, and establishing a cross departmental big data case handling platform; the 62 reform task is building a national court intelligent voice cloud platform, strengthening the construction of software and infrastructure such as remote video court hearing, interrogation and digital court appearance, and strengthening the construction of intelligent auxiliary case handling system; the 63 reform task is gradually realizing three kinds of applications, online filing,

Continued

judicial system; 5) Improving the operation system of judicial power with the judicial responsibility system as the core; 6) Improving the organizational system and institutional function system of the people's court; 7) Improving the litigation system conforming to the development of science and technology; 8) Improving the long-term system to effectively solve the difficulty of implementation; 9) Improving the people's court personnel classification management and occupational security system; 10) Building a modern smart court application system.	online payment and electronic service, covering courts all over the country, and building a world-leading mobile litigation service system. The 64 reform task is establishing a national unified electronic archives management system; the 65 reform task is improving the judicial big data management and application mechanism.

China's judicial reform has been carried out under the leadership and guidance of the Communist Party of China. In 1997, the 15th CPC National Congress first proposed "promoting judicial reform". In 1999, the Supreme People's Court and the Supreme People's Procuratorate formulated and promulgated the Five-year Reform Outline of the People's Court and the Five-year Development Plan of Procuratorial Work respectively. Since then, the Supreme People's Court and the Supreme People's Procuratorate have formulated reform plans every five years; in 2002, the 16th CPC National Congress emphasized "promoting judicial system reform", and the word "system" was added to judicial reform, which further defined the direction of judicial reform; in 2007, the 17th CPC National Congress proposed "deepening the reform of the judicial system", and the reform direction moved from "promoting" to "deepening"; in 2012, the 18th CPC National Congress proposed that "the reform of judicial responsibility system is the core of judicial reform" to ensure the independent and fair exercise of judicial power and procuratorial power according to law, improve the judicial protection of human rights, ensure fair justice and improve judicial credibility; in 2017, the 19th CPC National Congress proposed to "deepen the comprehensive supporting reform of the judicial system, fully implement the judicial responsibility system, and strive to make the people feel fairness and justice in every judicial case". Combined with the requirements of each judicial reform of the Party, the people's Court has formulated the corresponding five-year reform outline. Since the 18th CPC National Congress, judi-cial reform has stepped into the road of judicial informatization step by step.

Facing the iterative development of computer technologies such as Internet, big data, artificial intelligence and blockchain, China's judicial informatization has also experienced four stages: electronization, networkization, digitization and Intellectualization. Now China's judicial informatization basically realize the electronization of files, network integration and data resources, and begin to step into the intellectualization of trial. The process of these four stages reflects the comprehensive trend of goal orientation, technology guidance, iterative development and innovation drive (Jang, 2021). Professor Sun Xiaoxia of Fudan University summarized that the development mode of China's judicial infor-

matization is characterized by central promotion, local autonomy, political and business cooperation, market competition and comprehensive development (Sun, 2021).

2.2.1. Electronization

The electronic stage of China's judicial informatization began in 1986, focusing on computer application. In February 1986, the State Council approved the establishment of the national economic information center, which is responsible for the construction of the national economic information system. At the beginning, the main part of the informatization work was the government administrative system. In June 1996, the Supreme People's Court issued the "National Court Computer Information Network Construction Plan" to start the electronization of the judicial system. With the popularization of computers, the national judicial system has started with the provision of computer hardware, gradually promoted the electronization of files after 2006, and basically realized the electronization of judicature in 2016.

2.2.2. Networkization

The networkization stage began in 1996, with the network as the center. In 1999, the First Five-Year Reform Outline of the People's Court was issued, which started the construction of the network infrastructure of the people's court. At that time, the direction of the court reform was informatization. During the Ninth Five-Year Plan for China's National Economic and Social Development (1996-2000) period, eight higher people's courts in Beijing, Liaoning, Shanghai, Jiangsu, Fujian, Henan, Guangdong and Hainan completed the construction of computer local area network and basically realized the informatization of the whole trial process management; during the Tenth Five-Year Plan or China's National Economic and Social Development (2001-2005) period, courts at all levels accelerated the construction of computer LAN, and the application of information technology expanded to many aspects of trial management and administrative management. The construction of digital court began, and the judicial information service system facing the public and serving the society gradually took shape. On November 24, 2016, Chawalong Township People's Court of Chayu County People's Court of Tibet Autonomous Region, located on the snowy plateau with an altitude of more than 3000 meters, was connected to the national court network, marking that all 3520 courts, 9277 courtrooms and maritime dispatched courts across the country were connected to the court network, realizing full coverage of courts across the country and "one network" for handling cases. Courts across the country are fully connected in network, data and business, so as to realize "full business online handling" and build a "networked" court. The platform carrier extends from a single dimension to diversification and systematization, covering five special networks, including the Internet, court private network, secret related private network, external private network and mobile private network. The internal and external networks are fully covered, and both wired and wireless are applied, realizing all-round net-

work interconnection.

"Internet plus" is the "wings of information" for remote filing and remote litigation. In March 2017, the Supreme People's Court decided to promote cross regional litigation filing services throughout the country, and identified seven higher people's courts including Beijing, Shanghai and Zhejiang and intermediate people's courts including Daqing, Heilongjiang as pilot projects. On August 18, 2017, Hangzhou Internet court, the world's first Internet court, was opened, taking a solid step in electronic litigation. With the goal of "online trial of online cases and no landing of online disputes", explore the use of the internet to try internet related cases. The whole process of prosecution, case filing, evidence presenting, court hearing, trial and judgment delivery is completed online. Any step is recorded and marked in real time. The promotion of online judgment and online delivery is strong, highlighting the advantages of trying internet cases by information means. Internet courts have also been established in Beijing and Shanghai subsequently. Courts at all levels use the intensive advantages of the network platform to move the diversified dispute resolution mechanism from offline to online, break through the time and space constraints, and make dispute resolution more convenient and efficient. In 2020, due to the impact of the epidemic of COVID-19, local courts began to explore remote hearing through the internet platform.

Another important measure of China's judicial networking is to realize the "disclosure of the whole process according to law" and build a "sunshine" court. On July 1, 2013, the Chinese Judicial Documents Network was launched, and the first batch of 50 effective judicial documents was published. Since the end of June 2015, the three-level courts of 31 provinces (including autonomous regions and province-level municipalities) and Xinjiang Production and Construction Corps have all realized the online publication of effective judicial documents, that is, the types of cases are fully covered and the courts are fully covered; in December, the Chinese Judicial Documents Network was revised to further cover the judicial documents in national languages, including Mongolian, Tibetan, Uighur, Korean and Kazakh. As of 18:00 on August 30, 2020, the total number of documents on the Chinese Judicial Documents Network exceeded 100 million and the total number of visits was nearly 48 billion, making it the most influential judicial documents network in the world (SPC, 2020). On November 13, 2014, the Chinese Trial Process Information Disclosure Network was officially opened. Click "case query" and enter the certificate number and password, then the parties can query the case, contact the judge, accept electronic delivery and query the progress of the case (SPC, 2014). On November 1, 2014, Chinese Execution Information Disclosure Network integrated the public information of all execution cases, including dishonest Executees, for the convenience of one-stop query by the parties and the public. The "blacklist" of dishonest Executees publicly released the list information of "Laolai" on the internet, it also coordinated with the competent departments of relevant industries and systems to restrict the Executees listed in the "blacklist" in terms of government procurement, bid-

ding, financing and credit, market access, qualification recognition and high consumption, and publicly released the identity information of "Laolai" through television, newspapers, government websites and outdoor electronic displays, which achieved immediate results, it effectively solves the problem of difficult implementation (CCORG, 2015). On September 27, 2016, the Chinese Open Court Trial Website was officially launched. The public can click "live today" by visiting the live open court trials, or click "case review" to review tried cases videos (CCORG, 2016). Through the establishment of four public network platforms for trial process, live broadcast of court trial, judgment documents and execution information, judicial publicity has been carried out. As of December 4, 2020, the total number of documents published by Chinese Judgment Documents Network has exceeded 107 million, with a total number of visits of 52.4 billion, and visitors covering more than 210 countries and regions, becoming the largest public platform for judgment documents in the world. The live broadcast of the trial has exceeded 10 million, with 30 billion hits (Jang, 2021). Judicial operation has moved from offline to online, from a closed and limited "theater" mode to an open and inclusive "platform" mode, realizing the whole process visualization, and realizing the evolution from "access to justice" to "visual justice" (Ma, 2020).

2.2.3. Digitization

The digitization phase began in 2006, with data centric. 2013 was the first year of China's legal big data. The Supreme Court built a "centralized data management platform for people's courts", covering four levels of courts across the country. The national courts built an electronic file synchronous generation system with cases, which can be automatically targeted and deeply applied. The data is updated every five minutes. It has become the largest trial information resource database in the world. In December 2016, the judicial statistics of the national courts were merged with the big data management and service data of the people's courts, realizing the automatic generation of judicial statistical reports. The people's courts completely bid farewell to the era of manual judicial statistics.

2.2.4. Intellectualization

In 2006, Shandong Zichuan District Court developed a set of independent sentencing software system (Ji, 2007). The system can make corresponding sentencing judgment according to the entered case circumstances and relevant legal provisions, which is the first attempt of applying artificial intelligence to trial practice in China. However, due to the limitation of artificial intelligence technology and the controversy of public opinion at that time, the sentencing software could not continue to be used and developed.

The application of artificial intelligence technology in the legal field often develops rapidly in the period of litigation explosion. China is in a period of rapid growth of litigation. In particular, on May 1, 2015, the filing registration system was fully implemented, the number of cases accepted by the people's court increased significantly year after year, and there was a long queue of lawyers and

parties waiting to file cases at the door of many courts. Mobile client technology soon solves this problem (SPC, 2018). However, the trial of cases has become a huge problem, and the judge post system reform in 2018 has exacerbated the dilemma of increasing cases and reduced judges. Local people's courts at all levels have concluded 25.168 million cases, an increase of 10.6% than 2017, while the number of post judges nationwide is more than 120,000, and the per capita number of post judges has concluded more than 200 cases. In addition to hearing and judging cases, judges also have to undertake litigation guidance, post judgment Q & A, a lot of routine work such as law popularization and publicity, investigation and research. A large number of grass-roots judges are in a high load state, which intensifies the demand for improving judicial efficiency. Therefore, as an artificial intelligence technology that can effectively reduce the transactional work of judges, its application in the judicial field is very necessary.

The intellectualization stage began in 2016. With artificial intelligence as the center, the people's court began to transform to an intelligent era. In July 2015, the Supreme People's court put forward the concept of "smart court" for the first time. Its goal is to modernize the judicial system and judicial capacity by promoting the transformation and upgrading of court information construction. On February 22, 2016, the Supreme People's Court issued the Five-year Development Plan for the Informatization Construction of People's Courts (2016-2020), promoting the overall reform of the trial execution mode of people's courts in China, and accelerating the construction of smart courts. In July 2016, the General Office of CPC and the General Office of the State Council issued the National Informatization Development Outline, which included the construction of "smart court" in the national informatization development strategy, and clearly proposed to build a "smart court" to improve the informatization level of case acceptance, trial, execution and supervision. On November 17, 2016, at the Smart Court and Internet Rule of Raw Forum of the Third World Internet Conference, chief justice Zhou Qiang pointed out "we will actively promote the application of artificial intelligence in the judicial field". On April 12, 2017, the Supreme People's Court issued the Opinions on Accelerating the Construction of Smart Court, guiding the construction of intelligent platform of court management information system and vigorously promoting "smart court". The essence of smart court lies in "the in-depth combination of modern science and technology application and judicial trial activities". On the basis of "one network", the people's court promotes "intelligent trial, intelligent execution, intelligent service and intelligent management", realize judicial networking, sunshine and intelligence, and realize the new revision and overall application of judicial management, judicial service and judicial trial.

On July 8, 2017, the State Council issued the Development Plan for a New Generation of Artificial Intelligence, seizing the major strategic opportunities for the development of artificial intelligence, building the first mover advantage in the development of artificial intelligence in China, and accelerating the construction of an innovative country and a world power in science and technology.

It puts forward clear requirements for the application in the judicial field that "focusing on the hot and difficult issues of social governance such as administrative management, judicial management, urban management and environmental protection, promoting the application of artificial intelligence technology and promoting the modernization of social governance". The plan defines "smart court, which aims at building a smart court data platform integrating trial, personnel, data application, judicial openness and dynamic monitoring, to promote the application of artificial intelligence in evidence collection, case analysis, reading and analysis of legal documents, and realize the intellectualization of court trial system and trial ability". Its status is juxtaposed with "smart government" in "Article III, building a safe and convenient intelligent society". The status of "smart court" is juxtaposed with "smart government", "smart city", "intelligent transportation" and "intelligent environmental protection".

Shanghai courts are at the forefront of the exploration of artificial intelligence judicature. In 2013, the Shanghai court began to implement a strategy and two actions, namely, Big Data Strategy, Internet Plus Action and Artificial Intelligence Action. In 2014, Shanghai Higher People's court was identified as the national pilot unit of judicial system reform, and then formulated the three-year plan for information construction (2014-2016). In March 2016, the "Data" Court Construction Plan (2017-2019) (HGF [2016] No. 318) was formulated, which established the goal of building "data court" and "smart court", from networking to intelligence. In cooperation with IFLYTEK, Shanghai Higher People's Court took the lead in launching the "trial centered litigation system reform software—Shanghai Intelligent Auxiliary Case Handling System for Criminal Cases", (hereinafter referred to as "206" system) on February 6, 2017, and put it into trial operation on May 3, shown in Figure 1. It successfully passed the evaluation and acceptance of Shanghai Information Security Evaluation and Certification Center on August 16, 2018, it began to be applied in the national judicial system. This system aims to combine expert experience, model algorithm and massive data, and embed the unified and applicable evidence standard into the data program. In the intelligent sentencing model constructed by Shanghai "206 system" using deep learning algorithm, only one learning sample of the sentencing model of theft case includes all the case elements and sentencing plot elements of 300,000 theft case samples in China. The sufficient data makes the "206" system quite reliable (Cu, 2019). Then, based on the existing experience, it expanded and developed the "Shanghai intelligent auxiliary case handling system for civil and administrative cases", gradually covering the whole fields of civil, commercial, maritime, finance, intellectual property and administration. With trial as the center and court as the base, it established an integrated artificial intelligence judicial auxiliary system for the public security, procuratorial and judicial administrative department. AI judicature also highlights China's speed. Shanghai has become the leader of AI judicature in China. Shanghai has also lived up to expectations and created a "Shanghai experience" that can be copied and popularized to other areas.
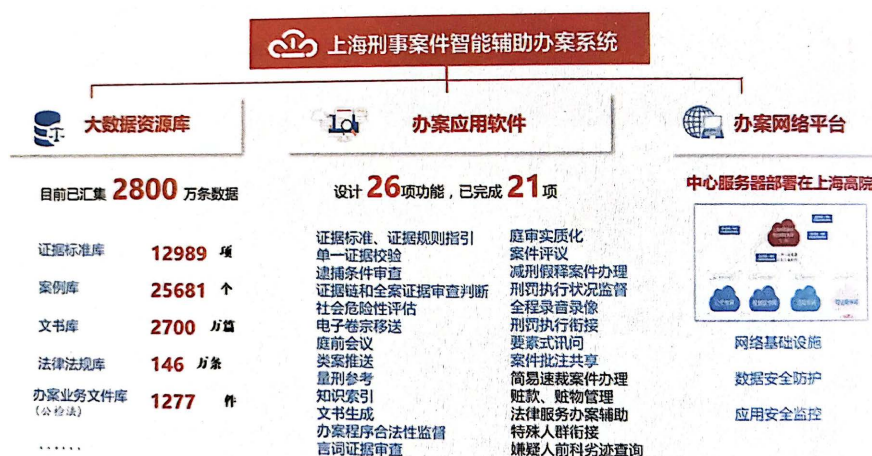
Figure 1. Schematic diagram of shanghai intelligent auxiliary case handling system ("206" system) (CPG, 2021).

During the construction of the "smart court", a competitive exploration mode of "letting a hundred flowers bloom and each shows its magic power" was adopted. Local courts carried out systematic research and development of different types and aspects in combination with social forces, accumulated useful experience and formed a successful model to prepare for the construction of a national unified smart court.

In July 2016, Hebei courts' "Intelligent Rrial 1.0" Trial Auxiliary System went online to realize the push of similar cases and the generation of intelligent documents and files.

In October 2016, at the Hangzhou Yunqi Conference, China's well-known legal retrieval platform "No Litigation" launched "Legal Xiaotao". Based on judicial big data, supplemented by speech recognition technology, it analyzes and models massive data inside and outside the court through extensive collection, mining algorithms, comprehensive processing and scientific analysis, so as to improve judicial prediction and emergency response ability, Make data serve judicial business.

In October 2016, "Guizhou Court Judicial Big Data System", the country's first judicial intelligent auxiliary case handling system, was born in Guizhou High Court, which is the first judicial big data platform in China jointly built by Guianberg Big Data Service Co., Ltd. and Guizhou Provincial Higher People's Court. The system concluded 151 pilot cases during the six-month trial operation, the big data analysis system used for intelligent auxiliary analysis. The deviation degree of the judgment results is zero or within a reasonable value range, which ensures the same judgment in the same case and realizes the balance of sentencing, and the sentence acceptance rate of the first instance reaches 93.38%, which is 8.15% higher than that of other cases not included in the pilot scope in the same period.

In December 2016, Beijing Court, which is at the forefront of the construction of smart court, launched the "Smart Judge" Intelligent Research and Judgment System, which is equipped with functions such as automatic document genera-

tion, voice conversion, case search and prompt.

In February 2017, Jiangxi Court launched the "Receiving and Forwarding E Center" to realize the intensive and intelligent management of the whole process of "receiving, forwarding and sending" of litigation materials.

On May 20, 2019, the People's Court of Yuhuan City, Zhejiang Province officially released the "E Assistant of the Integrated Case Handling System of the Whole Judicial Industry". The system uses the "Ali Feihu" artificial intelligence technology to upgrade the trial affairs from the original manual operation to intelligent operation, realizes and replaces people to complete repetitive tasks through software robots, and becomes a "super plug-in" serving judges and clerks, realize the functions of one key filing, one key delivery, one key police dispatching, one key closing, one key effective execution, one key file transfer, one key document online, etc.

In May 2019, Guangzhou Internet Court also set up 12 "E Law Kiosks" as Figure 2 in Guangzhou, Hong Kong and Macao to provide six litigation service functions for parties in an all-round way, such as self-service certificate deposit, self-service case filing, self-service query, intelligent delivery, online mediation and online court trial (SH, 2019).

In June 2019, the "AI Judge" launched by Alibaba established a complete set of trial knowledge map for transaction dispute cases, which can quickly analyze the case and give judgment suggestions to the judge in a very short time to assist the judge of Hangzhou Internet Court in trial.

On June 26, 2019, Beijing Internet Court held a press conference on "Online Intelligent Litigation Service Center" and jointly launched the world's first "AI Virtual Judge" with Sogou. Relying on the support of Sogou's separation technology, with the help of voice skill synthesis and image skill synthesis technology, and taking the image of Judge Liu Shuhan of Beijing Internet Court as the prototype, shown in Figure 3, it can solve the problems raised by the parties, for real-time answers, the parties can enjoy the whole process litigation guidance of AI judge on the mobile phone, realize 24-hour online service, and use the Internet for online mediation, court hearing and electronic delivery technology (LPC, 2019).

Figure 2. E Law kiosks set up by guangzhou internet court.

Figure 3. AI virtual judge launched by beijing internet court.

Besides above, amount of national pilot courts have cooperated with domestic well-known artificial intelligence enterprises to develop various types of intelligent court systems, as shown in Table 2.

In April 2018, the Supreme People's Court issued a report and a third-party evaluation report, which showed that the construction of national smart courts had taken shape (Li & Tian, 2018).

In 2019, the construction of China's smart courts has ranked among the top in the world. The smart court system focusing on smart trial, smart execution, smart service and smart management has been basically completed, and has embarked on a Chinese road of court informatization. In 2019, 97.8% of the national courts supported online filing, 5,149,570 civil and commercial cases and administrative cases of first instance were filed online by the national courts throughout the year, 2320 courts supported online evidence exchange, accounting for 66.9% of the total number of courts, and 2018 courts supported online hearing, accounting for 58.2% of the total number of courts (Chen & Tian, 2020).

On February 27, 2019, the Outline for the Fifth Five-Year Reform of the People's Court (2019-2023) was released, "building a modern smart court application system with Chinese characteristics", which provides a clear path for the smart court to move forward to a deeper field of intelligence.

With the development of computer technology with the continuous upgrading of the Internet, big data and artificial intelligence, artificial intelligence judicature is constantly studied, explored and practiced all over the world. Due to China's institutional advantages, the depth and breadth of artificial intelligence judicature are in a leading position in the world. During the construction of China's smart court, the positive elements of local-experimentalism, technical-governancelism and government-edlism have been well combined to form a unique Chinese experience (Wang, 2021). Realize all-round intelligent trial, efficient intelligent execution and one-stop intelligent service. The construction of smart court and the construction of traditional judicial informatization have logical inheritance (Wang, 2021).

Table 2. AI virtual judge launched by beijing internet court (BDWK, 2020).

corporate name	Company profile
THUNISOFT	Court informatization leader, an overall informatization solution for the whole business and whole process of the court. In 18 years, the new generation of Huayu smart court application system was launched. The "Rui trial" system for smart court has been successfully implemented in Beijing high court. At the same time, it has also been deployed and applied in more than 10 provinces and cities such as Guangxi, Gansu and Qinghai.
IFLYTEK	One of the leading artificial intelligence enterprises in China. With the outstanding advantages of voice and natural voice technology, the company continues to launch intelligent court trial, intelligent police, intelligent Procuratorial affairs and other products. Signed strategic cooperation agreements with the information technology service center of the Supreme People's Court and 7 provincial higher people's courts to build "Ai + Smart Courts". The smart court trial system has now covered 31 provinces and 4200 courtrooms.
CHNSYS	Jiuqi Software subsidiary has made every effort to build a smart cloud court integrating smart litigation service, smart trial and smart management. It has carried out smart court related projects in intermediate or grass-roots people's courts in Jiangsu, Liaoning, Heilongjiang, Sichuan, Henan and other provinces, and signed a cooperation framework agreement with Alibaba cloud.
TDH	The company specializes in the construction of judicial information system. On November 24, 2017, Nantong Court officially launched the Intelligent Execution App. At present, the company has more than 600 employees and its business covers courts all over the country.
YUNJIACLOUD	The company is Alibaba cloud's only authorized partner in the judicial field. For many years, the company has been focusing on the exploration and research of judicial big data, focusing on the development of the judicial industry and helping to build the information integration of "smart court".
XINSHIYUN	Based on the technology of video cloud computing platform, through software services and cloud computing business model, it provides cloud services for Internet video live broadcast of trial process and case opening video for national courts, processes and classifies trial video data, and builds it into the largest trial video big data storage center and application platform in China.
EASTSOFT	Since 1996, it has entered the field of court system information construction and has been applied to more than 300 courts across the country, covering all links of court work such as court trial, management, technology court, litigation files, administrative equipment, court trial process, electronic signature, with more than 200 court customers and business involving more than 10 provinces.

With the development of "smart court", there are "smart prosecution" and other judicial fields developing together. When delivering the work report of the Supreme People's Procuratorate at the Third Plenary Session of the Fifth Session of the 12th National People's Congress, Cao Jianming, procurator general of the Supreme People's Procuratorate of the people's Republic of China, said that in 2017, the procuratorial departments will strengthen the strategic thinking of big data, deepen the construction of "intelligent prosecution", and realize the full coverage of "six platforms" such as judicial case handling and public prosecution of four-level procuratorial departments. The National Action Guide for Intelligent Prosecution of Procuratorial Organs (2018-2020) is a guide issued by the

Supreme People's Procuratorate to scientifically deal with new problems encountered in procuratorial informatization. On December 15, 2016, the 13th Five-Year Plan for National Informatization issued by the State Council proposed to implement the strategy of "strengthening inspection through science and technology" and actively build "intelligent procuratorate". Relying on information technologies such as big data, cloud computing, mobile Internet and artificial intelligence, intelligent procuratorial affairs is to improve the intelligent level of procuratorial departments in office management, case handling, service and decision-making, internally serve procuratorial police in case handling, externally serve the people, promote justice for the people, facilitate justice for the people, maintain judicial justice, improve judicial ability, and standardize judicial behavior, deepen judicial openness, strengthen legal supervision, enhance judicial credibility, and promote the modernization of procuratorial work.

3. Application of Artificial Intelligence in the Judicial Field

The application of artificial intelligence in the judicial field is mainly reflected in perceptual intelligence, cognitive intelligence, computational intelligence and decision intelligence. Producing production of judicial documents efficiently through speech understanding, visual recognition and emotion recognition, Analyzing and judging the situation through the use of knowledge map and natural language processing ability, efficiently extracting and analyzing data through big data and cloud computing so as to draw key conclusions, transforming the practical problems through the data model and solving them by the algorithm, Judicial artificial intelligence has been successfully popularized and applied in information retrieval, document making, intelligent identification and evidence guidance. It can also realize auxiliary reasoning and put forward sentencing suggestions for some simple cases. Its powerful data processing capacity greatly reduces the burden of judicial staff engaged in daily trivial work. Artificial intelligence judicature realizes personalized judicial openness, directional litigation service, professional trial execution and silent judicial management (Wang, 2021).

3.1. Artificial Intelligence Applied in Court System

In April 2018, the Supreme People's Court issued a report and a third-party evaluation report that showed that the construction of smart courts across the country has taken shape. The application of artificial intelligence in the court system is mainly in the following aspects.

3.1.1. Intelligently Optimizing Judicial Efficiency
After the case is accepted and before the trial, by setting the diversion principle and adjusting the complex and simple differentiation elements, the intelligent case division system can finely process all kinds of cases. During the operation of the platform, according to the characteristics of different cases such as criminal, civil and administrative cases, integrate various weight factors to scientifically calcu-

late the case handling force required for each case, help the court realize the diversion of complex and simple cases, reasonably allocate judicial resources, and ease the pressure of "more cases and fewer people".

Artificial intelligence also simplifies the judicial process. For example, the "pop-up screen" electronic delivery method has been widely used. The short message service content sent by the court to the recipient's mobile phone is not blocked by anti-virus software and mobile terminal settings. Whether the mobile phone is in operation or standby mode, it is immediately locked and can be unlocked after viewing the content (PC, 2018), so as to ensure that the documents can be delivered to the parties accurately, timely and conveniently.

3.1.2. Intelligent Assistant Word Processing

Using speech recognition technology to automatically generate indictment and judgment. As long as the parties enter relevant materials, they can quickly generate the indictment through the intelligent platform; after the court's judgment, the platform can automatically generate part or all of the judgment document, which greatly improves the judge's trial efficiency. For most simple cases, such as dangerous driving, small loan disputes, government information disclosure and other cases, that can simplify reasoning and can use element-listed and formatted judgment documents, the automatic judgment document generation system can automatically identify and extract party information, litigation claims, case facts and other key contents through OCR, semantic analysis and other technologies, According to the corresponding template, a simple judgment document is generated with one click.

3.1.3. Intelligent Conversion of Court Records

Intelligent speech recognition technology is also widely used in court hearing transcripts, assisting the clerks to perform a large number of text conversion work in various aspects of statements, greatly reducing the clerks' recording work.

3.1.4. Intelligent Assisted Case Trial

An intelligent auxiliary system for case trials has been developed by using big data, machine learning and other technologies. Through the study of a large number of cases, the intelligent system can learn to extract and verify evidence information and predict the outcome of case judgments, providing references for judges. This will also further promote the standardization of trial procedures and consistency of judgment results, and improve judicial credibility. The smart court has initially realized the collection, screening, integration, management and application of judicial big data, coded legal rules into technical rules through machine learning, and skillfully used remote trial and asynchronous trial (Wei, 2021).

3.1.5. Intelligently Provision of Judicial Services

Legal consulting services had been provided to the public through virtual robots

or physical robots. The former is more typical of official account robots, such as the "legal system Canghai" of Xiamen Court, the "Small 3i" of Shenzhen International Arbitration Court, etc.; the latter has the "Nan Xiaofa" of Shenzhen Nanshan Bureau of Justice, and the comprehensive legal service robot "Law Doggie" (BJH, 2019).

3.1.6. Smart Contract Dispute Resolution

The whole process control in the contract field is realized through the judicial blockchain technology, from generating smart contract, completing real person authentication and signing, uploading the original contract and smart contract to the judicial blockchain, automatic operation of smart contract, transfer to diversified mediation process after the contract cannot be executed, and incorporate the credit reward and punishment joint mechanism, filing, trial and execution. Evidence preservation and fact finding have been handled through the authoritative platform without dispute. The whole dispute handling can be completed automatically through the intelligent system. On December 19, 2019, Hangzhou Internet Court pronounced a judgment on this type of case, which is the first "intelligent trial" case in China with "no manual intervention and no interference from external factors".

3.1.7. Intelligent Litigation Service Supply

A perfect litigation service platform can be established through intelligent service system. Shanghai Court has created three service platforms, established a digital, networked and intelligent "Shanghai Court Litigation Service Center", provided one-stop, comprehensive and intelligent services for the parties, and realized that "the Litigation Service Center provides all litigation and non litigation services except court trial", shown in Figure 4, with an average daily service of 3680 people, it effectively solves the prominent problems of the parties, such as tired asking, tired running, tired suing, difficult filing and difficult execution; a digital, networked and intelligent "Shanghai Court 12368 Intelligent Litigation Service Platform" has been established, and artificial intelligence technology has been implanted into 12368 Litigation Service Center. Through telephone connection, all-aspect, all-day, zero distance and barrier free legal services can be realized, with an average of 3000 person-times per day, effectively solving the problems of contacting judges, case inquiry and litigation consultation; a digital, networked, intelligent and cross regional "Shanghai Court Lawyer Service Platform" has been established, so that lawyers can complete litigation affairs without leaving home. In 2019, 97.8% of the national courts supported online filing, of which the support rate of the High Court reached 100%; 66.9% of the national courts supported online evidence exchange and 58.2% supported online court sessions; the proportion of the national high courts disclosing the information of the final case reached 100%, and the intermediate courts and grass-roots courts reached 98.8% and 96.6% respectively. The parties contacted the judge 73,203 times through China Executive Information Disclosure Network, and the judge's timely response rate was 85.2% (Chen & Tian, 2020).
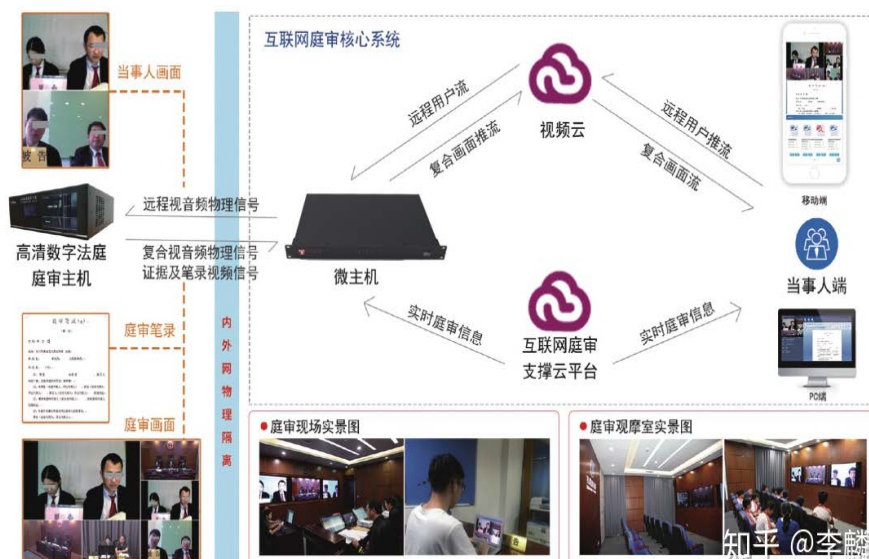
Figure 4. China internet court trial system.

3.2. Artificial Intelligence Applied in Procuratorate System

The Supreme People's Procuratorate proposes the construction of smart prosecution, strengthens the construction of smart prosecution theoretical system, planning system, and application system, and forms a smart prosecution overall structure of "full-service smart case handling, full-element smart management, full-scale smart service, and full-field smart support", promoting the procuratorial work to leap from informatization to Intellectualization.

3.2.1. Review and Prosecution Stage
Review and prosecution is the main function of the procuratorate system. The application of artificial intelligence is reflected in the sentencing suggestion auxiliary system, which uses artificial intelligence to capture structured data such as case facts, legal and discretionary sentencing circumstances.

3.2.2. Trial Supervision Field
Trial supervision is another important function of the procuratorate system. The application of artificial intelligence is to conduct data summarization, analysis and intelligent judgment of court sentences and provide references for the supervision of court trials.

3.3. Artificial Intelligence Applied in Public Security System

Facing a complex social environment, the social governance capabilities of the Public Security System face greater challenges and opportunities. The construction of smart public security with public security informatization as the core is also on the agenda, which is aimed at promoting the public security system functions strongly integrated, highly shared and deeply applicated, with the technical support of the Internet, the Internet of Things, Cloud Computing, Smart Engines, Video Technology, Data Mining, etc. Specific applications are mainly

reflected in the following aspects.

3.3.1. Changes in the Pattern of Detecting

Artificial intelligence technologies such as face recognition, iris recognition and gait recognition have begun to be widely applied to the substantive work of public security agency in arresting criminal suspects. The artificial intelligence system integrating criminal tendency analysis and case feature analysis can automatically collect all kinds of information and data, and intelligently analyze the relevant elements to improve the efficiency of detecting in criminal case.

3.3.2. Changes in the Pattern of Patrolling

Big data is used to promote intelligent pre-judgment and early warning, intelligently analyze high-incidence locations and high-incidence periods, automatically divide important areas and key periods for public security prevention, that can be help the public security agency to adjust police deployment and defense priorities as needed, and achieve precise patrol prevention and intensive use of police.

3.3.3. Changes in the Pattern of Information Early Warning

Artificial intelligence is widely used to cope with new social governance issues such as driverless driving. "Urban data brain" has been established to intelligently adjust traffic lights. Manpower has been replaced progressively with machines, which improve the ability of public security agencies to predict early warning and prevent various hidden risks.

3.3.4. Changes in the Public Safety Landscape

Through the "Snow Bright Project", the construction of public security video surveillance network applications has been promoted. With the overall goal of "full domain coverage, whole network sharing, full-time availability and whole process controllability", the construction of video surveillance systems in key public areas and key industries had been pushed forward. The public security video surveillance systems have been linked progressively. Various video image resources have been integrated mostly. Video image information has been applicated widely in public security prevention and control, social governance, intelligent transportation, livelihood service, ecological protection, etc. High integration and deep application of basic information resources in the field of public safety promote "Safe China" established rapidly.

4. In-Depth Application Exploration of Artificial Intelligence in the Judicial Proceeding

The aforementioned application of artificial intelligence in the judicial field is still at a superficial level, mainly through intelligent data capture to achieve information recognition and classification. With the improvement of artificial intelligence optical character recognition technology, natural language processing technology, intelligent speech recognition technology, element extraction tech-

nology and machine learning capabilities, it is possible to explore higher-level artificial intelligence applications in the judicial field. Legal artificial intelligence can be used in expand in a substantial sense. Artificial intelligence judicature should not only realize the integration of physical technology, but also realize the cross-border integration of personnel. It should integrate the police, prosecutors, judges, prison officials, trial managers and technicians into an inclusive team to cooperate with various system integration and core technologies. This requires that the legal interpretation, evidence standards, litigation procedures and judicial ethics in software design should be unified. They should be unified at the national level, not at the local level (Sun, 2021). China's artificial intelligence judicature aims to realize the transformation and upgrading of "comprehensive coverage, mobile Internet, cross-border integration, in-depth application, transparency and convenience, security and controllability" (Ma, 2020). In order to achieve a unified, efficient and intelligent electronic judicial system, it must be developed in the following aspects.

4.1. Ensure the Security of Communication Networks and Operating Systems

4.1.1. Ensure Network System Security

Network security should be strengthen by adopting network firewalls, intrusion prevention systems, antivirus systems, security management systems, operation and maintenance management systems, etc., to at least meet the three-level protection. Networks such as the departments of Public Security, Prosecution, Court, Justice are classified as third-level protection security networks. Each unit uses an internal network and is isolated from the external network to prevent sensitive information and confidential data from flowing into lower-secret networks. The communication between the four departments and the data center should adopt an optical one-way security isolation data automatic import system, and the internal network construction of the departments uses a two-way one-way gatekeeper.

4.1.2. Ensure Operating System Security

It is necessary to strengthen the system kernel to effectively protect the confidentiality, integrity, and reliability of user information, improving the overall defense level of the operating system to at least meet the three-level protection, and effectively resist external attacks against the operating system.

4.2. Establish an Interconnected and Shared Data Storage, Management and Protection Platform

4.2.1. Judicial Data Management

Massive judicial data management automatically could be realized through data asset scanning, intelligent identification, classification management by recording the physical location, logical location, storage format, status, data volume, access hotspots and other information of sensitive data, and locating all sensitive data contained in the business system according to the definition the type and mode

of sensitive data, then classifying and identifying the sensitive data.

4.2.2. Judicial Data Protection

Data security protection should adopts a unified data protection system based on data transparent encryption technology, data anti-tampering technology, data dynamic desensitization technology, data firewall technology, and data monitoring technology to establish an unified data protection system.

4.2.3. Blockchain Protection of Judicial Data

The Intranet of the departments of Public Security, Procuratorate, Court, Justic transmit data through a one-way optical gate, and a private blockchain of access certificates can be added on the basis of "one center, four platforms" to prevent data tampering. The private blockchain nodes in each platform can realize that each platform has the right to read and write itself, while other platforms only have the right to read, which guarantees the security and reliability of data.

4.3. Create a Convenient Routine Processing Platform

In judicial activities, a large number of activities are routine activities, and artificial intelligence can fully play a role in these activities. At present, the judicial field, especially the court system, has built an intelligent platform to realize this function, but there are still deficiencies in the quality and quantity of judicial data. Many judicial information is not digitized. The intelligent system mostly provides some simple data statistics, material preparation and text templates. Its main functions are input, retrieval (automatic retrieval of related cases), induction, sort, and generating primary documents. The degree of intelligence needs to be further improved through machine learning.

4.3.1. Files Transfer

The data interface of the business system between the departments of Public Security, Procuratorate, Court and Justic can be opened up, and each department can realize "one-click sending" in case node circulation, and realize the electronic circulation of case files. At the stage of criminal proceedings, the files can be seamlessly connected to the Public Security, Procuratorate, and Court business systems; at the stage of criminals serving their sentences, the data interface between the Court and the Bureau of Justice can be opened up to realize online submission and online handling of commutation and parole.

4.3.2. Category Cases Recommendation

A machine learning sample could be formed by labelling the case facts incouding criminal subject, criminal behavior, subjective state, evidence chain and other case elements. Then deep neural network model could be constructed using deep neural networks to automatically extract case information from documents such as the arrest decision, indictment, and judgment. At last, the most similar cases could be searched from the massive criminal case information resource database using intelligent and automatically be pushed as reference for case han-

dlers.

4.3.3. Knowledge Index

A professional knowledge base could be established through sorting and integrating the laws and regulations, judicial interpretations, business documents, judgment documents and other data according to the characteristics of the case, which is pushed to the case handlers to provide information resource support for the entire process.

4.3.4. Document Generation

More accurate required legal documents could be generated automatically in the case-handling process after integrating system data resources organically. This function will be further refined and personalized on the basis of the previous application. At present, the document template in the intelligent system, especially the judgment template, is still relatively rough, especially the reasoning part involving rationalization and personalization. Artificial intelligence does not have enough authoritative data reference, furthermore, it can not completely replace the judge's personalized rational judgment, and it is necessary to avoid the phenomenon of "stereotyped" judgment documents. By continuously expanding the input of case guidance data of the Supreme People's Court, reasonable reference could be provided for judges. But a certain duplication checking system should be installed to avoid judges falling into the situation of "losing personal rational thinking".

4.4. Develop an Intelligent Legal Analysis Platform

In addition to basic data storage and transaction processing, artificial intelligence judicature is more important to analyze evidence and judgment documents with the help of big data and algorithms, mine judicial laws, and assist prosecutors and judges in decision-making. At the same time, it should be noted that at present, China's intelligent judicial spheres have not systematically customized a complete set of proprietary technologies for the "law", and most of the technologies used are general common technologies (Zuo, 2019). This will inevitably lead to many hidden dangers. In response to the particularity of the legal industry, the judicial artificial intelligence R & D team should be established with national strength, requiring a high degree of confidentiality and preciseness for unified development.

4.4.1. Evidence Guidance, Analysis and Verification

Evidence standards and evidence rules could be digitized and embedded in the judicial office system to provide a list of guidelines for the eight types of evidence in the procedural law, as well as guidelines for stratification, classification, and segmentation.

Evidence verification rules and evidence verification standards for similar crimes could be formulated according to the "objectivity", "relevance" and "legitimacy" of evidence, adopting the method of "mass data mining plus case-handling

expert summaries". The three aspects of the procedure, the form and the content of evidence are compared and verified, then the review conclusion is automatically generated, and the case handler are prompted to correct or explain the flawed evidence.

Then, the evidence chain model could be built to form a standardized evidence chain for different types of cases. It could be used to review and judge the relationship between evidence verification under the same verification item, the logical conformity between different verification items, and the conflicting facts stated by the parties or witnesses of the case. The relationship between the located evidences of persons, locations, times, objects, etc., could be analyzed and digged out, which could be classified according to the evidence chain model for the reference of case handlers. However, the developed evidence standard guidelines can not be used as hard indicators. Judicial personnel can only use the data provided by the intelligent system as a reference, not as an authority.

4.4.2. Social Risk Assessment

A social risk assessment model could be established by quantifying and weighting the various factors that affect the degree of social risk through big data analysis and deep learning method to determine whether to approve arrest or approve probation and parole for criminal suspects or defendants.

4.4.3. Review of Arrest Conditions

The basic evidence that needs to be provided for each crime to meet the arrest conditions could be listed through the in-depth analysis of laws and regulations and the summary of judicial practice, to provide evidence guidance for arrest conditions.

4.4.4. Suggestions on Sentencing Prediction

The three-dimensional data of "statutory punishment, benchmark sentence, and pronounced sentence" could be accurately labeled through the study of massive historical precedents and in-depth analysis of the sentencing process. Then a sentencing prediction model could be formed assisted by the main influencing factors of discretion, extracting the main factors that affect the sentencing result such as statutory circumstances, discretional circumstances and other related circumstances to provide a reference for case handlers.

At the same time, the judge will automatically alarm and remind the judge of the obvious difference in sentencing. If the judge insists on his manual judgment, he needs to provide more sufficient reasoning and demonstration. The sentencing results need to analyze the four circumstances: legal heavier punishment, legal lighter, mitigated or exempted punishment, discretionary heavier punishment and discretionary lighter punishment. Artificial intelligence needs to distinguish the data of these four "dimensions" for calculation, and convert the corresponding provisions of legal provisions into computer algorithms, so as to obtain the corresponding sentencing suggestions. The difficulty of sentencing is that the determination process should consider many discretionary circumstances,

which are not expressly stipulated by law, so it lacks the basis of algorithm. It is necessary to further assess the personal risk, subjective and social harm of the criminal suspect and the criminal act. Personal danger refers to the possibility that the perpetrator will commit a crime in the future, including first-time crime and recidivism; Subjective malignancy refers to the bad ideological state of the perpetrator in the crime; social harmfulness refers to the harm caused by the criminal act itself. Among them, the most easily transformed into an algorithm is the highly objective social harmfulness. Most of the "dimensions" of determining personal danger and subjective malignancy are criminal motivation, means, time and place, object of infringement, damage result, attitude of confession, etc. However, due to the lack of unified legal provisions, the conclusions drawn through these "dimensions" will fall into a dilemma that varies from person to person. Sentencing people's way of thinking, knowledge structure, life attitude and value tendency may have an impact on sentencing suggestions, and the personality characteristics contained in the word "discretion" itself lead to the process of sentencing suggestions can not be traced back, which is easy to lead to the arbitrariness of sentencing. Therefore, the application of artificial intelligence in sentencing prediction needs to be cautious or even conservative. At the same time, it should be noted that most countries have no rules or standards for algorithm elements. Furthermore, the technology companies responsible for designing algorithms refuse to disclose their algorithm elements to prevent suspect prediction algorithms and avoid punishment. Starting from the principle of due process of law, the defendant has no way to know how these algorithms are designed, which obviously undermines the fairness and transparency of judicature.

In the case of Eric Loomis in Wisconsin U.S.A., the police mistakenly arrested him as a shooter for stealing a car abandoned by the shooter. In view of his theft and resisting arrest, the case entered the proceedings. Based on the test of artificial intelligence "Compass", Loomis had a high risk of recidivism. Accordingly, the judge ruled that he would serve six years in prison. The court used an algorithm software in the sentencing process. Loomis questioned the fairness of the algorithm after learning that the judge violated the principle of due process and appealed to the state Supreme Court. However, the Supreme Court of Wisconsin supported the ruling of the lower court and affirmed the reason for its ruling: the risk assessment of artificial intelligence "Compass" was completed with the help of independent sub items and complex algorithms. Finally, the level assessment from 1 to 10 was neutral and objective. The appeal was rejected on the grounds that the defendant did not provide sufficient evidence to prove that the algorithm software became the only consideration for the judge's sentencing. Although the judge in the position of judgment still exercises the power of judgment in form, he has no right to use judgment in practice. Because in this judgment process, they rejected their own judgment, did not reflect the wisdom of creating new knowledge, and chose to obey the judgment of artificial intelligence.

This situation should also be reasonably avoided in China. Artificial intelligence only plays an auxiliary role, and judges still need to be treated individually in sentencing. However, for the use of algorithms in judicial proceedings, no one knows to what extent judges rely on algorithms, which forms a doubt about the judge's black box operation to a certain extent. At the same time, some countries treat artificial intelligence judicature very strictly. For example, France clearly stipulates that the personal data of judges and registrars cannot be used for evaluation, analysis, comparison, or prediction of their actual or upcoming professional behavior. However, if these data are not analyzed, the lack of data relied on by machine learning will greatly reduce the accuracy of intelligent sentencing prediction.

4.5. Establish an Efficient Judicial Execution Platform

The main role of artificial intelligence technology in the field of judicial execution is to promote the automation and intelligence of prison security, the refinement and personalization of correction and discipline, and the openness and efficiency of civil judgment execution.

4.5.1. Prison Security Management

In the field of supervision and security, the consumption of police force in criminal supervision can be greatly reduced through artificial intelligence technology. Video image analysis, identity recognition, behavior recognition and event extraction based on in-depth learning, and speech recognition, semantic understanding and micro expression analysis technologies of artificial intelligence can realize in-depth analysis of criminals' family meetings and individual conversations, extract sensitive content, capture criminals' abnormal emotions, and collect important data that are difficult to obtain by manpower; deep learning and knowledge reasoning intelligent technology can be used to evaluate the risk of criminals and predict the risk of major prison security events; according to the difficulty of supervision, a scientific number of artificial intelligence duty robots can be arranged to replace the police in the prison to perform safety control tasks.

4.5.2. Community Correction Management

In the field of community correction, artificial intelligence can combine the social activities and trajectory data collection of correction personnel to realize the dynamic analysis and evaluation of personnel behavior, early warning of risks, greatly improve the management and control ability of community correction, and provide support for expanding the scale of community correction; artificial intelligence can generate and optimize the emergency disposal scheme of emergencies through scheme planning technology.

In the field of correction, discipline and treatment, artificial intelligence can provide reliable scientific and technological support for evaluating whether criminals are improved. Through the combination of in-depth learning and modern

wearable and Internet of things collection technology, artificial intelligence can accurately evaluate the psychological state and predict the evolution trend of criminals, community correctors and drug addicts, make fine portraits of criminals and drug addicts, build a scientific evidence-based correction and treatment model, and match effective personalized correction and treatment methods; artificial intelligence can set problem reasoning, predict the risk factors of recidivism and relapse according to the correction and treatment performance of criminals and drug addicts and the family social environment, assist in subsequent resettlement assistance and community drug rehabilitation, and effectively reduce the recidivism rate and relapse rate.

4.5.3. Referee Execution Management

In the field of civil and administrative trial execution, artificial intelligence can register the personal information of the person subjected to execution, track and analyze the financial changes and activity track data of the person subjected to execution, timely urge the person subjected to execution to cooperate with the judgment execution, and automatically start relevant mandatory measures in time to freeze the person's bank account, restrict his transportation, remind the transaction partner subjected to the executee of its transaction risk, etc.

4.6. Establish a Stable Judicial Supervision Platform

4.6.1. Improve Supervision through Data Tracking

All the process of case handling could be systematized, and all the data of evidence could be sealed and stored in chronological order of collection, fixation, review and judgment during the process. All the processes of the cases could be recorded in real time through voice recognition technology, and case reviews are automatically generated. Transcripts can keep traces throughout the entire case, so as to achieve standardized and transparent judicial procedures and facilitate effective supervision.

4.6.2. Strict Supervision of Intelligent Judicial Judgment

In particular, the cases tried by artificial intelligence should be supervised afterwards. For the object of post supervision, the subject and method of raising supervision, the subject of post supervision, the specific form of implementing supervision and other general procedural issues, it is necessary to design another rigorous system to rationalize the interpretation through the judicial judgment made by the artificial intelligence system, so as to minimize the possible risks and the damage from the risk into reality. The whole process silent supervision is realized by means of automatic identification, labeling processing, system push, node control and permission freezing.

4.7. Build an Extensive Legal Service Platform

4.7.1. Intelligent Legal Consultation

Artificial intelligence can be used to expand the supply level of public legal services at a low price, so as to solve the problems of insufficient supply, regional

inequality and insufficient service function of public legal services in China. Semantic retrieval and legal question answering technology based on natural language processing and in-depth learning can provide intelligent and automatic legal retrieval for social workers of public legal services, online legal services and robot legal services for the public, and realize general legal consultation, such as will consultation, marriage consultation, traffic accident consultation, etc. Online lawyers also can be connected with to obtain remote legal services, so that everyone can enjoy standardized and high-quality legal services.

4.7.2. Intelligent Legal Aid

Technologies such as automatic review and generation of legal documents and online dispute resolution can be applied to provide basic legal aid to parties, intelligent and automatic litigation tools to legal aid lawyers, so as to significantly improve the efficiency and quality of legal aid.

4.7.3. Aid Intelligent Legal Mediation

The speech recognition, semantic understanding and emotion analysis technologies of artificial intelligence can help people's mediators automatically build the element structure of social contradictions and disputes, predict cases based on artificial intelligence and big data, plan mediation strategies through in-depth learning, provide powerful scientific and technological means for the solution of social contradictions and disputes, and greatly reduce the difficulty of resolving social contradictions and disputes, realize accurate data collection of contradiction and dispute cases.

4.7.4. Intelligent Judicial Expertise

The successful experience of artificial intelligence in the field of medical diagnosis can be used for reference in the field of judicial expertise to provide scientific and reliable judicial expertise services for the public.

4.7.5. Intelligent Law Popularization Publicity

Based on the massive public legal service case data, according to the knowledge level, business scope and life track of the analysis object, through in-depth learning technology, we can accurately tap the needs of law popularization and legislation demand, extract the characterization indicators reflecting the level of regional social rule of law, and provide accurate decision-making basis for promoting the construction of a rule-of-law society.

5. Conclusion

This article studies the in-depth application of artificial intelligence in the judicial field. An intelligent judicial application system could be constructed comprehensively, combining intelligent optical character recognition technology, natural language processing technology, intelligent speech recognition technology, element extraction technology and machine learning technology. According to the specific conditions of judicial theory and practice, this paper sorts out the ba-

sic functions and modules of the intelligent judicial application system, and provides a certain path for the cooperation between the artificial intelligence and the judicial proceeding.

China's artificial intelligence judicature has made great achievements. Computer assisted human beings have crossed the influence of communication barriers, forgetting curve and emotional fluctuations, and exceeded human rationality to make more stable, unified and fair judgments. In view of the limited judicial resources, the simple cases with "precedents" are mainly tried by artificial intelligence, and the major and difficult cases involving complex value judgment are assisted by artificial intelligence. The cases are shunted in this differentiated way, so as to save more judicial resources and allocate them to complex cases. However, judicial judgment is a skill of understanding and an art of value measurement, including legal interpretation, formal reasoning, dialectical reasoning, etc., combined with multiple scenes and multiple factors, the experience and wisdom contained can not be understood by artificial intelligence. Allowing artificial intelligence to automatically generate judgments and correct the deviation of legal decisions according to big data is bound to form a dual structure of trial subjects and even lead to the pluralization of decision makers. In fact, programmers, software engineers, data processors, information technology companies and judges will make decisions together (Ji, 2018).

It should be made clear that the technical application of judicial artificial intelligence faces challenges in language ambiguity, data bottleneck and algorithm "black box". The collection and application of judicial data are related to personal privacy, social risks and national security. No matter from the perspective of intelligent technology or judicial ethics, artificial intelligence can only stay at the level of "intelligent assistance", it can not and should not completely replace "judge", "prosecutor" and "police" in value judgment.

On December 9, 2019, the World Bar Congress was held in Guangzhou, Guangdong. Jos de Freitas, President of the EU Bar Association, talked about the application of artificial intelligence tools in the judicial and legal fields in his speech at the world bar Congress. He believed that "artificial intelligence tools must be designed in accordance with ethical norms and respect procedural guarantees in judicial and litigation procedures. The European Union, the Council of Europe, OECD and organizations from other countries, as well as some international organizations, are reviewing the ethical standards that must be observed in the use of these tools. In order to use reliable tools in the judicial and legal fields, such AI tools must be: ethically designed; people oriented; respect for fundamental human rights and freedoms; all data must be anonymous; allow review and potential remedies and compensation" (TP, 2019).

the development of judicial artificial intelligence not only needs to optimize algorithms, avoid black boxes, protect data and respect privacy, but also strictly abide by the bottom line, avoid overexposure and distort "public trail" into "bare trail" (Sun, 2021). The uncontrolled use of artificial intelligence to transform the trial system will only bring irreparable trauma to the modern rule of law.

In the future, China's artificial intelligence judicature needs to be transformed from local pilot doctrine combined with "political tournaments" to unified top-level design.

Conflicts of Interest

The author declares no conflicts of interest regarding the publication of this paper.

References

BDWK (2020). *Research on China's Smart Court Industry—Industry Competition Characteristics, Major Enterprises, Business Model and Industry Rarriers*. https://wenku.baidu.com/view/8551b1bf9b8fcc22bcd126fff705cc1755275f99.html

BJH (2019). *China's First Case of Applying Blockchain Smart Contract Technology*. https://baijiahao.baidu.com/s?id=1653352700931312559&wfr=spider&for=pc

CCORG (2015). *Grasping Real Work, Promoting Benefits and Eliminating Disadvantages with Real Ammunition—A Documentary on the Joint Rectification of "Six Difficulties and Three Cases" by the Courts all over the Country*. https://www.chinacourt.org/article/detail/2015/01/id/1527939.shtml

CCORG (2016). *Vigorously Promoting Live Broadcast of Court Trials and Comprehensively Deepening Judicial Openness*. https://www.sohu.com/a/115244862_117927

CCORG (2021). *Outline of the First Five-Year Reform of the People's Court (1999-2003), Outline of the Second Five-Year Reform of the People's Court (2004-2008), Outline of the Third Five-year Reform of the People's Court (2009-2013), Outline of the Forth Five-Year Reform of the People's Court (2014-2018), Outline of the Fifth Five-Year Reform of the People's Court*.

Chen, G. & Long, Z. (2013). Reflections on Several Issues of Deepening Judicial Reform. *China Law, No. 4,* 5-14.

Chen, S. & Tian, H. (2020). *China Court Informatization Development Report No. 4*. Social Science Literature Press.

CPG (2021). *What Is the "206" System? How Can It Become a "Sharp Weapon" for Shanghai to Effectively Prevent Unjust, False and Wrong Cases*. http://www.chinapeace.gov.cn/chinapeace/c100045/2021-02/17/content_12451709.shtml

Cu, Y. (2019). *Artificial Intelligence and Judicial Modernization* (p. 168). Shanghai People's Publishing House.

Gong, X., & Li, K. (1983). Computerization of Legal Work. *Journal of Law, No. 3,* 16-20.

Jang, W. (2021). *How Can Smart Courts Achieve Leapfrog Development?* http://www.chinapeace.gov.cn/chinapeace/c100007/2021-01/11/content_12437164.shtml

Ji, W. (2007). Dialectical View of Computer Sentencing. *Political and Legal Forum, No. 1,* 124-128.

Ji, W. (2018). Changes in Judicial Power in the Era of Artificial Intelligence. *Oriental Law, No. 1,* 125-133.

Li, L., & Tian, H. (2018). *China Court Informatization Development Report No. 2*. Social Science Literature Press.

LPC (2019). *The Appearance of "AI Virtual Judge" Makes the Judicial Temperature Accessible*. http://legal.people.com.cn/n1/2019/0627/c42510-31199828.html

Ma, C. (2020). Reshaping Effect and Limits of Judicial Artificial Intelligence. *Legal Research, 42,* 23-40.

PC (2018). *Beijing Internet Court Launched Spring Screen SMS Service*. http://ip.people.com.cn/n1/2018/1024/c179663-30359887.html

SH (2019). *It's "E Law Kiosks", Not "A Court"! The Last Kilometer of Opening up Judicial Services in Guangzhou*. https://www.sohu.com/a/358291574_120152148

SPC (2014). *Chinese Trial Process Information Disclosure Network Officially Opened*. http://www.court.gov.cn/zixun-xiangqing-8377.html

SPC (2018). *A Case Must Be Filed and a Lawsuit Must Be Handled—A Summary of the Reform of the Case Filing Registration System of the People's Court*. http://www.court.gov.cn/zixun-xiangqing-83922.html

SPC (2020). *The Total Number of Documents on China's Judicial Documents Network Exceeded 100 Million, Judicial Openness Standardize Judicial Behavior and Promote Judicial Justice*. http://www.court.gov.cn/zixun-xiangqing-251141.html

Su, H., Zhang, G., & Shi, J. (1989). *Sentencing and Computer—On the Fair and Reasonable Sentencing Application* (p. 100). Publishing Houses.

Sun, X. (2021). The Humanistic "End" of Judicial Informatization. *Legal Review, 39,* 22-37.

TP (2019). *Speech of President of the EU Bar Association on the Judicial Application of Artificial Intelligence: Respect for Procedural Protection in Litigation*. https://www.thepaper.cn/newsDetail_forward_5187998

Wang, L. (2021). China's Experience in the Construction of Smart Courts and Its Path Optimization—Application Based on Big Data and Artificial Intelligence. *Inner Mongolia Social Sciences, 42,* 104-114+2.

Wei, B. (2021). Jurisprudential Reflection and Response to Smart Justice. *Politics and Law, No. 8,* 111-125.

Zhang, L. (1986). The Impact of the Computer Revolution on the Legal Profession. *Journal of Peking University (Philosophy and Social Sciences Edition), No. 3,* 83-87.

Zuo, W. (2019). Hot and Cold: Rethinking of Chinese Legal Artificial Intelligence. *Law Review, 41,* 53-64.