Application of Blockchain and Artificial Intelligence Technology in Large Forestry Enterprise Archives Management

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Abstract:

The archives management information system of large forestry enterprises is an important part of the construction of "digital forestry" in China. As the underlying technology foundation of the next generation of trust Internet, the importance and extensibility of blockchain cannot be ignored. As an emerging technology and tool, it will also have an important impact on the development of library, information and archives discipline. This paper studies the application of blockchain in large enterprise archives management. This paper constructs the archives intelligent service system of "artificial intelligence + blockchain" from four dimensions of infrastructure layer, archives resource layer, technology processing layer and service application layer. At the same time, this paper deeply excavates the practical application examples of "AI + blockchain archives" at home and abroad, and discusses how AI can enable archives intelligent service. Finally, the archives intelligent service system of "artificial intelligence + blockchain" was initially constructed. The results show that the service system can improve the efficiency and accuracy of archives management in large enterprises.

Keywords: *Blockchain, large forestry enterprise, file management, artificial intelligence.*

I. INTRODUCTION

Artificial intelligence (AI) is a subject that studies how to make the computer complete the task that can reflect human intelligence [1-2]. The main research fields include knowledge representation, problem solving, machine learning, natural language processing, pattern recognition and expert system.

As early as 1991, the central archives for the first time applied the artificial intelligence simulation catalog retrieval algorithm to complete the design of the "medium-sized computer

archives intelligent software historical archives catalog database", which improved the recall rate and precision rate of archives. Since then, the archivists began to study the influence and application of artificial intelligence in the field of archives, mainly including the application and development of artificial intelligence technology in archives management, digital archives, enterprise archives management, archives work and so on [3-4]. On April 11, 2019, the joint laboratory signed a cooperation agreement with Zhejiang Provincial Archives, which officially opened Zhejiang Provincial Archives as a "national achievement application demonstration base", which also laid the foundation for the transformation and upgrading of archives management wisdom, and will promote the development of China's Archives in the new era [5-8].

At present, China has entered the international frontier development group in the field of technology development and market application of artificial intelligence. In the future, the vertical fields of various industries will gradually integrate with artificial intelligence. In addition, from 2017 when the government work report of our country first wrote "artificial intelligence", 2018 proposed to strengthen the application of artificial intelligence, to 2019 when the government first proposed "intelligence +" and expanded "intelligence +", enabling the transformation and upgrading of China's manufacturing industry, the pace of development of artificial intelligence in China has been accelerating. Under the background of the rapid development of artificial intelligence, artificial intelligence has gradually penetrated into various fields. Algorithms and technologies of artificial intelligence, such as speech recognition, image recognition and deep learning, play an increasingly important role in the field of archives.

II. BASIC CONCEPT OF "ARTIFICIAL INTELLIGENCE +" ARCHIVES INTELLIGENT SERVICE

2.1 Artificial intelligence and "artificial intelligence +"

American computer scientist Elaine rich's definition of artificial intelligence is: artificial intelligence is to study how to make computer simulate human brain to engage in various thinking activities, so as to solve problems that need to be handled by experts. Professor Stuart J. Russell of the University of California, Berkeley defines artificial intelligence as the study of agent, which can perceive information from the environment and map the perception sequence to the action to execute the action [9]. Although scholars in different fields and periods have different definitions of artificial intelligence, the author thinks that in essence, artificial intelligence studies how to make computer simulate human perception, reasoning and action. As an important research branch of computer science, it is a new discipline which has been

developed on the basis of the integration and penetration of computer science, economics, psychology, philosophy, linguistics, mathematics and other disciplines.

In short, "artificial intelligence +" is the core feature of the development of science and technology in the whole industry, which realizes the deep integration with various industries by extracting artificial intelligence technology. For example, "artificial intelligence + medical" broadens the traditional medical diagnosis methods and the time space of personal diagnosis. With the help of artificial intelligence technology, it realizes the intelligent application of medical image utilization, medical auxiliary diagnosis, drug research and development, disease prediction and other aspects, so as to help the development and upgrading of medical service wisdom. Figure 1 shows the basic structure of the blockchain.
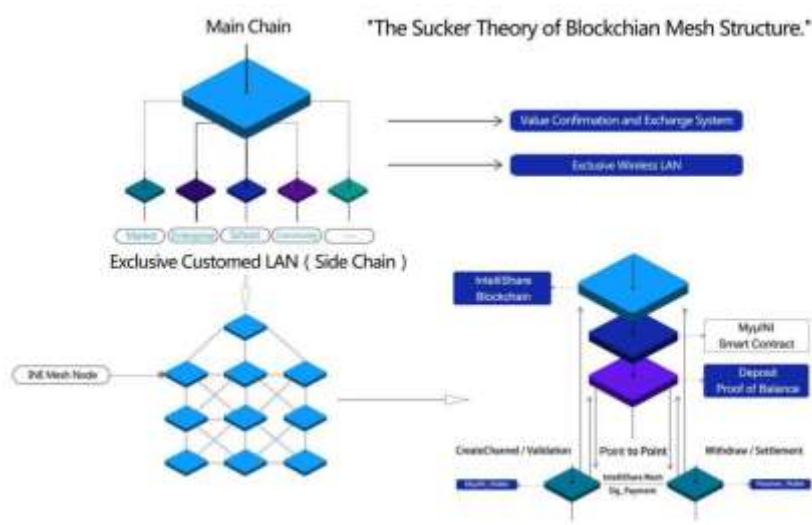

Fig 1: The basic structure of the blockchain.

2.2 Smart service

Wisdom is the ability to use knowledge to raise problems, analyze problems and finally solve problems, including the ability to recognize, understand, analyze, handle and innovate things. Wisdom can realize the generation, development and creation of knowledge. There is no universally accepted unified definition of intelligent service in the academic field. Liang pointed out that intelligent service is a service based on knowledge service, which can transform knowledge into productivity by using wisdom, and can produce knowledge value-added products and support the application and innovation of user knowledge. Zeng Jianxun believes

that intelligent service is a kind of innovative service with the functions of perception, calculation and visualization, which is integrated with humanity, personalization, intelligence and interaction [10]. In general, intelligent service is based on creative wisdom, and transforms knowledge into creative, intelligent and interactive services of productivity on the basis of knowledge service.

2.3 "Artificial intelligence +" archives intelligent service

"Artificial intelligence +" is deeply integrated with the major real economy, such as "artificial intelligence + education", "artificial intelligence + medical", "artificial intelligence + transportation", etc. "artificial intelligence + archives" is also in line with the development trend of the intelligent era, promoting the intelligent transformation and upgrading of archives" "Artificial intelligence + archives" is not a simple combination of artificial intelligence and archives, but through the deep integration and application of artificial intelligence in the field of archives to create a new format for the development of archives.

Archives intelligent service cannot do without the support of Internet of things, artificial intelligence, big data and other information technology. From the artificial intelligence of intelligent service infrastructure, the in-depth mining of archives resources, to the multiple intelligence of service mode, all need the integration and embedding of artificial intelligence technology" "Artificial intelligence +" archives will further promote the intellectualization and intellectualization of archives service, and subvert the original archives service concept and mode. Therefore, the author believes that the essence and connotation of "artificial intelligence ten" archives intelligence service is that archives institutions should deeply integrate artificial intelligence into all aspects of archives service in response to the new economic development pattern and the transformation and upgrading of archives in the artificial intelligence era. In order to provide technical support and operation and maintenance assistance for archives intelligent service, it is a change of traditional archives information service and a new ecological product of deep integration of artificial intelligence and archives.

III. CONSTRUCTION OF "ARTIFICIAL INTELLIGENCE +" ARCHIVES INTELLIGENT SERVICE SYSTEM

3.1 Software and hardware facilities

Software and hardware facilities are mainly composed of network equipment, storage equipment, perception equipment, digital processing equipment, security equipment and a series of computer software and hardware facilities. Software and hardware facilities are the important

foundation to support the "artificial intelligence +" archives intelligent service system. Only when the software and hardware facilities are gradually intelligent, can they lay a solid foundation for the construction of intelligent service system.

Network equipment includes interconnected government network, internal network of archives institutions at different levels and Archives Service Internet, which is the network basis for realizing ubiquitous intelligent service of archives. Through the archives service platform and archives of "micro services" such as Internet, wechat and microblog, archives utilization can realize ubiquitous service anytime and anywhere. Figure 2 shows the basic structure of the data storage system.
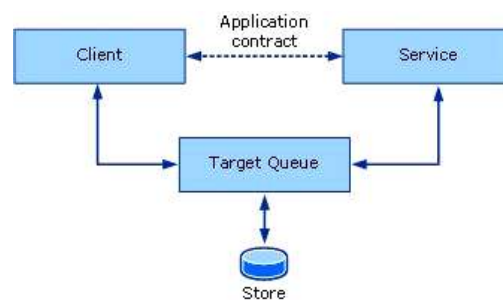

Fig 2: The basic structure of the data storage system

Large capacity and high-performance storage devices are the premise of data mining and data analysis of archives intelligent service, and the material basis of the exponential growth of electronic archives and metadata, and the comprehensive perception and analysis of user information. In the face of massive electronic documents and digital archives computing and storage, storage space has become an important bottleneck of intelligent archives service. Cloud computing technology with distributed processing, distributed database, artificial intelligence, virtualization technology as the main technology is indispensable. Among them, artificial intelligence is a more secure and efficient technical means to build a new generation of distributed storage file cloud.

Perception devices include RFID technology, face recognition, fingerprint recognition, iris recognition and other artificial intelligence technology products for dynamic intelligent perception of Physical Archives and personnel, which can realize the content and geographical location perception of archives entities, the location and information perception of archives business personnel and users, and realize comprehensive perception and intelligent recognition of Archives institutions. RFID technology is an automatic identification technology that uses radio frequency signals to identify objects and ultimately obtain data. It has the characteristics

of waterproof, antimagnetic, large storage capacity, high temperature resistance, large reading distance, etc. it can improve the efficiency of file inventory, quickly find files, simplify borrowing and returning procedures, and realize shelving error correction.

Digital processing equipment is mainly for the collection and digitization of archives facilities, to realize the digitization of archives, pictures, videos and other content is the premise to realize the intelligent archives service. At present, the achievements of archives digitization mainly include the digital description of title, author, time and other characteristics, which is difficult to provide the retrieval and service utilization of the full text and content of archives. To solve this problem, artificial intelligence is the key technology, especially OCR recognition technology, speech recognition, image recognition technology.

To sum up, the perfect intelligent archives infrastructure system has the comprehensive capture, perception, intelligent analysis and service optimization of archives resources, archives business management and archives users, which provides a stable and reliable material basis for realizing the real intelligent archives service.

3.2 Archives resource layer

(1) Collection of archival resources
Archives resources are important resources for archives to provide intelligent services, including physical archives and electronic archives. After digitization, entity archives and electronic archives form the basic resource database of archives, which is mainly composed of catalog database, full-text database, multimedia database, professional archives database, historical literature database, etc. But nowadays, archives are mostly stored in the form of text, image, video and so on, and the digitization of archives by the archives department only stays in the preliminary digitization stage. It is difficult to realize the functions of knowledge mapping, data mining, data automatic clustering, semantic association, semantic relationship mining, which affect the quality of archives service. At present, many units have carried out special research on archives digitization and digitization by using artificial intelligence. In the science and technology project plan of the State Archives Administration in 2019, there are two items about archives digitization. The first is the research on the application of artificial intelligence technology in the arrangement and utilization of audio and video archives carried out by Zhejiang Provincial Archives and iFLYTEK Zhiyuan Information Technology Co., Ltd., and the second is the research on the digitization method of ECG paper archives based on artificial intelligence deep learning carried out by Shandong Binzhou Medical College. Figure 3 shows the basic structure of the file management system.
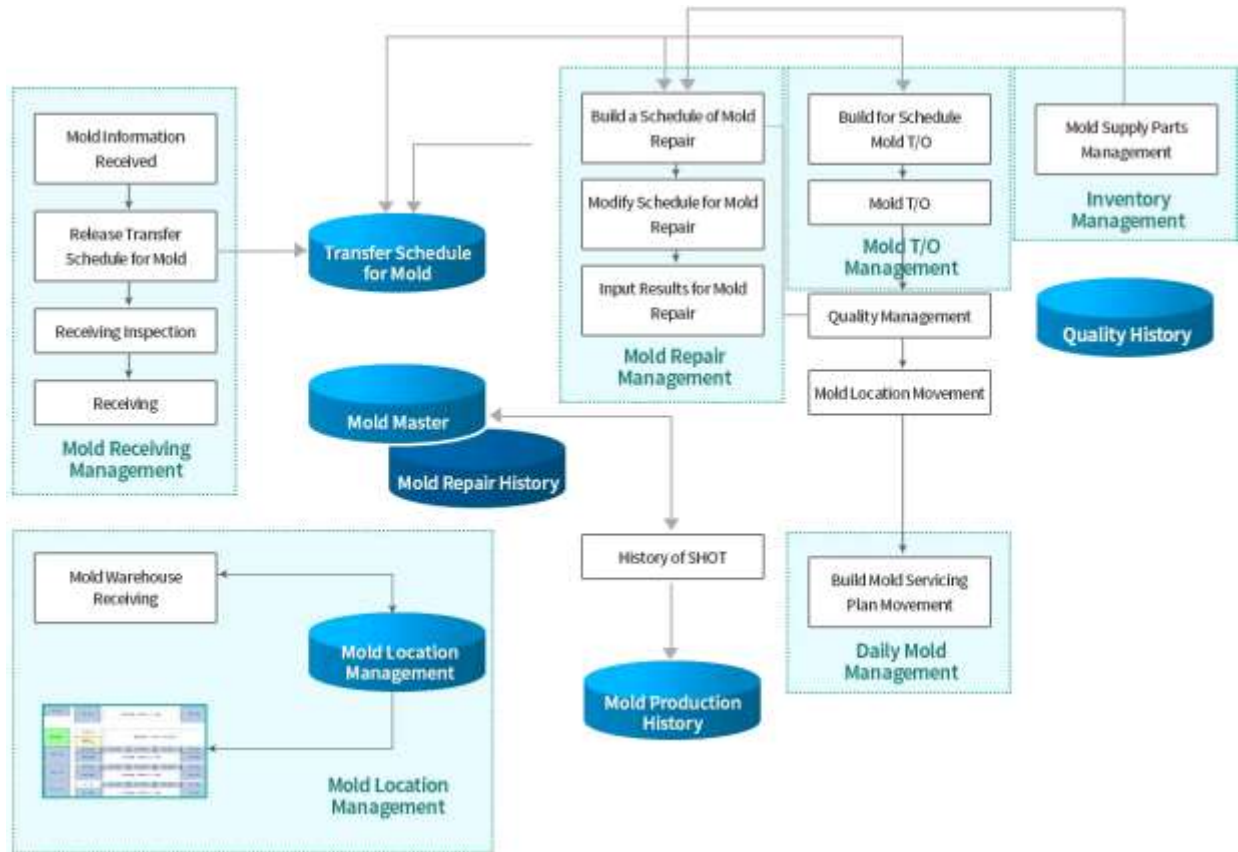
Fig 3: The basic structure of the file management system.

(2) Business management data

Business management data is the data generated by the daily business operation of archives, mainly including equipment perception data of archives institutions, management data of archives business personnel, archives work objectives and plans data, assessment data of archives institutions, building management data, etc. Device sensing data mainly includes the data generated by intelligent sensing devices in infrastructure in daily operation. Long term storage and statistics of these data can comprehensively observe the working status and management ability of daily archives institutions. Analysis of these data can directly observe the advantages and disadvantages of archives work, and assist archives institutions to continuously improve their management ability. The management data of archives business personnel includes the completion of their work tasks, time statistics of commuting, work salary, assessment and promotion, etc. The target and plan data of archival work include the work target, plan and actual work situation set by the archival organization every year. Assessment data of archives organization refers to the business data and assessment results generated by archives organization in various assessments. Building management data mainly

refers to the video monitoring data, personnel in and out data, water and electricity data generated in the management process of the archives entity building.

(3) User service data

User service data refers to a series of data generated when users visit archives and archives service platform, including user registration information, user file query records, file transfer data, file copy download data, user web browsing data, etc. The collection of user service data is divided into two parts. The first is the collection of basic personal information and behavior data, such as registration information, borrowing and copying, query and retrieval, retrieval path, demand expression, etc., formed by archives users in the process of archives institutions using archives information system. The second is the user data of retrieval, browsing, dissemination and utilization generated by archives users on different archives official websites, archives social media, archives micro blog platforms and other network platforms. The collection and storage of user service data can more accurately analyze the user's behavior preferences, interests, personal needs, etc., and lay the foundation for the establishment of file user portraits, better providing file intelligent services for file users, and meeting the user's personalized file utilization needs.

(4) User open data

User open data refers to the external public data generated by users' query, browsing, and writing on non archival service platforms, including a series of user behaviors and user generated content (UGC) generated on social media, library service platforms, museum service platforms, etc., which can reflect users' interest preferences and information needs. Professor Xu Yongjun, School of information management, Renmin University of China, pointed out that UGC is an open content designed and produced by amateurs through their own creative work and non professional channels. In a real sense, it realizes users' file description and improves the file quality. The connection of these multiple data can provide great convenience for the accurate service analysis of artificial intelligence users, make the archives intelligent service more targeted, and improve the users' archives intelligent service experience. However, it is more difficult to collect such archival user data than user service data, which requires more public sector cooperation and sharing, and needs to take more secure measures to ensure that user privacy is not violated.

IV. "ARTIFICIAL INTELLIGENCE +" ARCHIVES INTELLIGENT SERVICE: A REALISTIC DILEMMA

4.1 Archival data and personal privacy

The vast majority of data resources in the file resource layer are semi-structured and unstructured data, and the file data is growing exponentially year by year. The massive file data resources require more file storage space and computing space. However, due to the limitations of structure and mechanism, traditional relational database can not adapt to massive, heterogeneous and changeable data storage, and can only store structured data with good paradigm and fixed mode. A series of structured and unstructured service data generated by the rapid growth of electronic archives and artificial intelligence embedded in archives management services need large storage system and running space. Therefore, in order to realize the intelligent service of archives, we must expand the storage space and operation space of archives data, ensure that valuable archives information has enough long-term storage space, and provide service sharing and operation space for realizing the real intelligent service of archives data. Therefore, the storage space of archives data is one of the problems to be solved in the construction of "artificial intelligence +" archives intelligent service system.

The wide application of artificial intelligence is based on the breakthrough of big data technology and deep learning. The artificial intelligence products in transportation, home, mobile, security and other industries are mainly computer voice vision products designed by using iris recognition, face recognition, speech recognition, image recognition and other recognition technologies. It is widely used in language translation, fingerprint unlocking, face verification, personal assistant, case investigation and other fields" The strong ability of sensing data and data analysis of "artificial intelligence +" archives intelligent service is based on the acquisition, mining and analysis of a large number of users' archives service information. Archives institutions must consider the protection of personal privacy before building archives intelligent service system. We should provide smart services on the basis of respecting user privacy, and balance the conflict between user data and personal data rights. If archives institutions do not protect users' privacy, resulting in user data leakage or even being stolen by hackers, it will seriously affect the public image of archives institutions, lose the trust of users, and greatly damage the interests of users, resulting in irreparable serious consequences. Figure 4 shows the management implementation process of the file management system.
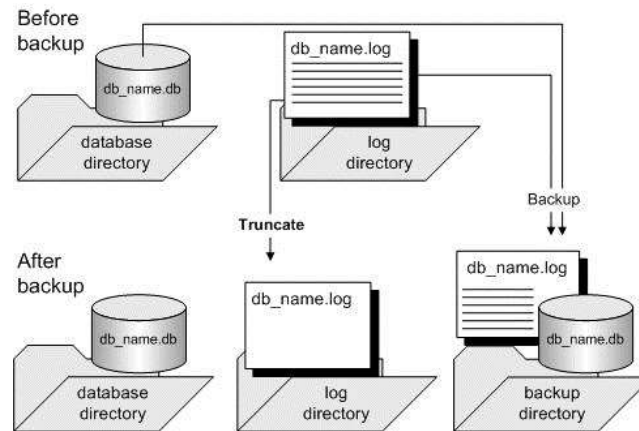
Fig 4: The management implementation process of the file management system

4.2 Development bottleneck and application risk

Artificial intelligence technology is still in the stage of "weak artificial intelligence". From the three brief stages of the development of artificial intelligence, artificial intelligence can be divided into three stages: being able to see and recognize, being able to listen and speak, being able to understand and think. At present, artificial intelligence has basically realized the goal of the next stage, that is, to be able to see, understand and speak, to understand and think. Therefore, artificial intelligence is still at the level of "weak artificial intelligence", which has formed certain technical constraints on the deep integration of artificial intelligence and Archives, such as human computer interaction (HCI) technology (Research on human and computer). And the immature technology of the interaction between the two will also affect the information communication between users and archives, it is difficult to provide users with perceptible, immersive human-computer interaction wisdom experience. Professor canes Sierra, director of the International Council on artificial intelligence and member of the National Research Council of Spain, pointed out that the main bottleneck is to ensure that the development of artificial intelligence is led by people to avoid risks. Michael Wooldridge, director of the computer department of Oxford University and academician of the European Academy of Sciences, believes that the efficiency, scalability and resource demand of computing of artificial intelligence are all bottlenecks. Therefore, we should continue to pay attention to the improvement of artificial intelligence technology, find solutions to the bottleneck of artificial intelligence development, and lay a technical foundation for the deep cross-border integration of "artificial intelligence +" archives.

V. "ARTIFICIAL INTELLIGENCE +" ARCHIVES INTELLIGENT SERVICE SOLUTION STRATEGY

5.1 Optimization and protection of archival data

When building the "artificial intelligence +" archives intelligent service system, the archives institutions must strictly abide by relevant norms and adhere to the principle of people-oriented. The relevant algorithm design must take into account the contents of personal authorization, service selection, privacy definition, etc., and the use of user portrait must also take into account the feelings of the users of archives in accordance with the law, and provide accurate and intelligent services for the archive users on the premise of protecting the privacy of archive users and respecting the privacy of users by using data desensitization technology. In addition, we must always pay attention to the dynamics of the relevant rules and regulations, understand and abide by the ethical norms of artificial intelligence technology, and do a good job in the emergency management measures of archival data service, so as to balance the use of user data to provide services and the protection of user privacy. For example, in the civil code of the people's Republic of China issued in June 2020, there is a law on app's excessive handling of personal information. Article 1035 stipulates that "the handling of personal information shall follow the principles of legality, legitimacy and necessity, and shall not be over handled". The terminal product of the combination of artificial intelligence and archives must also embed the relevant laws into the product algorithm to ensure the personal information security of archives users.

5.2 Technology development and security defense

At present, in the stage of "weak artificial intelligence", the integration of artificial intelligence and various industries needs to be further deepened. In the face of the technological bottleneck of the development of artificial intelligence, seeking technological development is an important way to break through the bottleneck. Continuously promoting the development of artificial intelligence technology can speed up the deep integration of artificial intelligence. The integration and application of artificial intelligence in the field of archives can not only promote the transformation and upgrading of archives intelligent services, but also help the transformation and transformation of the archives industry. The bottleneck of the development of artificial intelligence technology may not be able to get effective solutions in the short term, but the archival academia should take the initiative to study the deep integration of artificial intelligence and archival work and the ethical, management and institutional problems caused by it. Archives institutions should always pay attention to the development of artificial intelligence technology, understand the relevant planning and system of artificial intelligence application, actively think about how artificial intelligence can enable archives service, and provide archives intelligent service for archives users on the basis of reducing the cost as much

as possible.

The network security problem behind artificial intelligence cannot be ignored. The application of big data, Internet of things, artificial intelligence and other technologies in archives are all in the cloud or network open platforms such as government network and Internet. These network open platforms are vulnerable to network attacks such as password cracking and data forgery. Once hackers catch the technical loopholes of network platform and artificial intelligence, they may cause huge security risks such as information leakage and data tampering. In view of this technical problem, first of all, it is necessary to continuously promote the development of artificial intelligence technology, reduce the loopholes of artificial intelligence itself, speed up the integration of artificial intelligence and archival intelligence services, and at the same time, use the application of artificial intelligence technology in network security to establish a risk prediction model. For example, an American company has developed a set of anti-virus software cylance protect by using artificial intelligence technology. This software can use machine learning method to establish risk prediction model offline, effectively identify potential risks and protect system security in real time. Secondly, we should make use of artificial intelligence technology to detect the security loopholes in the archives system, and after filling the loopholes, we should establish a more perfect security defense system to detect and prevent the system loopholes in real time, and effectively improve the security defense level from machine prediction, librarian supervision, user education, legal protection and other aspects.

VI. CONCLUSION

The upsurge brought by artificial intelligence has had a revolutionary impact on all walks of life. In order to adapt to the rapid change and development of the times, meet the needs of file users, and improve the development level of file cause, it is necessary to explore the deep integration of artificial intelligence and file work. The application of artificial intelligence in archival work can be extended to many aspects, but the ultimate goal of archival work is to meet the people's growing demand for the use of archives, "artificial intelligence +" archival intelligence service is crucial. The establishment of "artificial intelligence +" archives intelligent service system can theoretically enrich the theoretical research of artificial intelligence and archives, and fill the current vacancy in this area. In practice, it can give some inspiration to archives institutions, and provide reference for the intelligent transformation and upgrading of archives work. We need to constantly research and develop innovative products integrating artificial intelligence and archives, and strive to build an "artificial intelligence +" archives intelligent service system, so as to provide reference for the intelligent transformation and upgrading of archives work, and finally promote the development of China's Archives in a

new era! I believe that with the continuous development of the times and the continuous change and progress of technology in the future, the practical difficulties in the construction of "artificial intelligence +" archives intelligent service system will be solved one by one with the joint efforts of people.

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