



A Preliminary Study on the Integration of Big Data Resources in University Libraries from the Perspective of Blockchain

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Abstract. With the innovative application of “blockchain+” in the field of public services, university libraries are exploring the introduction of blockchain technology in multiple dimensions of big data fusion. Blockchain technology is a scalable technology integrating information security, automated contract control, decentralization, de-trust and distributed storage. Blockchain technology can make information collection more accurate, data storage more secure and data application more effective in the process of big data fusion in university libraries, and provide reliable technical support for the fusion of big data resources in university libraries.

Keywords: blockchain · libraries · big data · data resource fusion

1 The Meaning and Technical Value of Blockchain

1.1 The Meaning of Blockchain

Blockchain is a technology and an innovative idea. Blockchain technology, also known as distributed ledger technology, is an innovative technology in the Internet era based on distributed data storage, consensus mechanisms, encryption algorithms, peer-to-peer transmission and other technologies. The core of the technology is a decentralised distributed database, which is made up of a single link of data blocks generated by applying cryptographic methods [1], and each block can be traced back to all the transaction information that occurred, thus ensuring reliability and security. Blockchain technology has four features - distributed processing, decentralisation, automation and cryptographic management. Blockchain technology innovates data resource processing rules and “blockchains” specific data processing objects in order to achieve secure trust between the various data processing nodes of the database system. The blockchain technology innovates the rules of data resource processing and “blockchains” the specific data processing objects, so as to realize the security trust between the data processing nodes of the database system and thus build an effective platform for peer-to-peer use of data resources [2].

1.2 The Technical Value of Blockchain

Blockchain technology creatively uses a distributed ledger (database) stored in a chain structure. This timestamp-based chain block structure and consensus mechanism of distributed nodes help users to establish a set of trust mechanisms in a distributed manner. Based on consensus mechanisms and cryptographic algorithms, the nodes that store the data ledger can share information and form a data trust network without the need for third-party institutions, enabling multi-node trusted communication [3]. Blockchain's concept of "bookkeeping for everyone" allows each participating subject to keep the latest book and historical records, so that the book data can be tampered with and the whole process can be traced, thus promoting information sharing and collaborative operation among multiple parties. The blockchain's unified distributed ledger technology effectively realizes the identity, power, responsibility and benefit reciprocity of each participating subject, and realizes the real-time synchronization and update of data among all participating subjects.

2 The Basic Idea of Data Resource Fusion in University Libraries

The fusion of data resources in university libraries can be understood as a high degree of fusion of the massive data resources owned by libraries across time and space, which in turn provides sufficient data information guarantee for the next step of data analysis and data application, so as to maximize the appreciation of data information value. The specific ideas of data resource fusion [4] are as follows.

2.1 Data Collection

Data from university libraries are generated quickly and in many types, including lending data, retrieval data, teaching data and research data. All data are collected from both time and space dimensions to ensure the integrity and reliability of the collected data results.

2.2 Data Processing

The data collected will contain redundant, incorrect and duplicate data information, which will affect the efficiency and accuracy of data processing.

2.3 Data Application

Taking the specific needs of users faced by university libraries as the starting point, blockchain technology and big data technology are applied to process the data resources of libraries to provide a basis for problem solving; a special type of database management system of blockchain is applied to store and manage the massive data generated by university libraries and data transmission, and big data mining technology is applied to process and analyse the data information so as to meet the university users' The information and data service needs of university users are met.

3 Blockchain Technology-Based Fusion Architecture of Big Data Resources in University Libraries

Blockchain technology can solve some of the drawbacks in the process of big data fusion and make the fused data resources more beneficial to users. The fusion of data resources is based on the data fusion platform to further realize the comprehensive fusion of platform, service and technology. Blockchain technology is used in the process of big data fusion, using distributed ledgers and asymmetric encryption algorithms to transform the collection of big data from the traditional one-to-one one-way collection to multi-directional and multi-node synchronous collection, making the entire data circulation process from the source of data generation to data application more secure and guaranteed. At the same time, the trust technology provided by blockchain can ensure the privacy and security of data sources associated with big data. In the process of applying blockchain technology innovation to data fusion, blockchain technology can build a better technical architecture through technical features such as tamper-proof, multi-party maintenance and cross-validation, giving the core collection and analysis functions of big data a more systematic operational thinking [5], thus making the trust and reliability of big data analysis results higher. The preliminary framework for the integration of big data resources in university libraries based on blockchain technology is shown in Fig. 1.

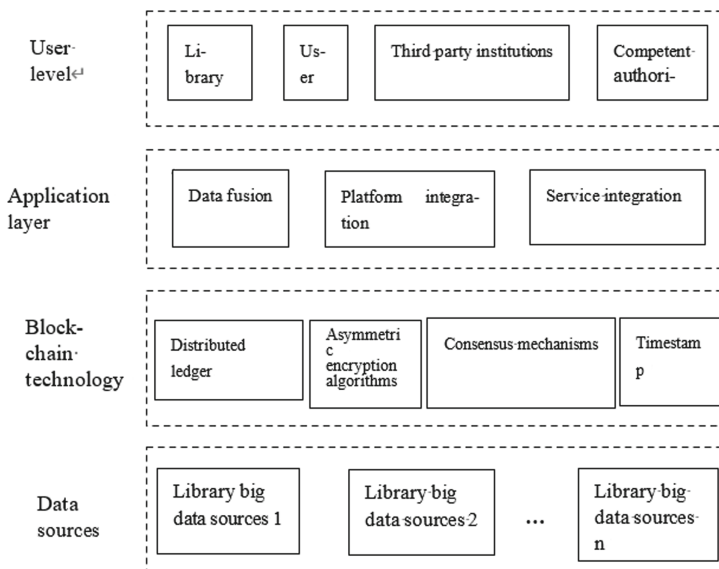


Fig. 1. Preliminary framework for the integration of big data resources in university libraries based on blockchain technology

4 Analysis of the Application of Blockchain Technology in the Fusion of Data Resources in University Libraries

4.1 Distributed Network Data Fusion Platform

In response to the problems of scattered and heterogeneous library data resources, the decentralized features of blockchain technology can fit the diversified problems of data resources, using the blockchain's structure to verify and store data technology, where each subject is a node, enhance the transparency of information between subjects, achieve data inalterability and full traceability of all fused information records on the distributed data collection network, and improve the traceability of data fusion, and build a highly shared system platform on the basis of full fusion of data resources to meet the information resource query and processing needs of university users.

4.2 Security of Data Resources

In the process of collection, fusion and application of big data of university library information, it is necessary to solve the data security problem firstly. Due to the large scale, heterogeneity and complexity of the big data of the library, it leads to the high risk of data fusion and the effect of data fusion is not fully guaranteed. Blockchain technology can fully protect the security of the database system for distributed processing of data resources, mainly in the following three aspects: Firstly, after embedding blockchain distributed network technology into the data fusion process, the data resources have distributed security characteristics, and the problem of a certain node will not affect the whole network, which ensures the openness and security of the relevant data and provides sufficient security for the resource fusion platform. Secondly, the encryption algorithm and mining algorithm of blockchain enable the big data platform of university libraries to algorithmically process the collected user information at different data nodes, then categorise data resources with the same characteristics and assign the resources to specific information databases for long-term storage [6]; thirdly, the data mining mechanism of blockchain can encrypt data resources in the process of data resource mining and utilisation, because encrypted database has one-way closed characteristics, which helps to improve the security of data resources in university libraries.

4.3 Intelligent Information Service

Information service is the top priority of the work of university libraries, and high-efficiency data service is also the goal of achieving data resource integration in libraries. Under the blockchain technology, users and information resources realize the innovative service of direct communication and interaction through the distributed rules of blockchain to meet the diverse and personalized needs of users for data resources. Building an intelligent information service mode based on blockchain technology to meet users' personalized needs requires the use of the open source characteristics of blockchain technology and data encryption characteristics to carry out in-depth processing of information resources, data analysis for different users' usage preferences and needs, and then information service push [7] to make information services more

accurate and professional, and truly give full play to its resource advantages, so that university users in In the process of using library information resources, users can get good intelligent service experience, so as to deepen and upgrade library information service and improve intelligent information service level.

5 Conclusion

Blockchain technology has a broad application prospect in the fusion of big data resources in university libraries, and the fusion of data resources will be more secure, intelligent and efficient.

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