Research on the Inspection and Management of Certificates in the Process of Professional Title Evaluation by Blockchain Distributed Management Technology

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Abstract. In addition to the rigid indexes of scientific research, papers, teaching materials and monographs, the flexible indexes of teaching, ethics, professional ability and performance contribution are also added in the process of the evaluation of the titles of colleges, enterprises and institutions. Among these flexible indicators, we can only measure and quantify them according to various awards certificates, and how to reasonably quantify and grade various certificates. This brings new requirements and new problems to the evaluation of professional titles. In view of the above-mentioned new requirements and new forms of the existing series of problems, the use of blockchain distributed management technology can well solve the existing problems.

Introduction

In recent years, a series of new changes have taken place in the evaluation of professional titles of institutions of higher learning, enterprises and institutions. In the original evaluation framework based on papers, scientific research, teaching materials and monographs, many flexible indicators have been added. But the following problems also appear, which increase many elastic indicators, it is difficult to quantify. Basically, they can only be identified by relevant certificates or materials such as award certificates, award projects, qualification certificates, performance materials, etc. However, there are many kinds of unofficial organizations from various academic groups, social organizations and non-governmental organizations. All kinds of unofficial certificates are mixed and hard to distinguish. This brings new problems to the fairness of the evaluation work. To solve this problem is an urgent problem for us to think about and solve. This paper will take the blockchain distributed management technology as the technical core and the certificate authenticity check as the goal, and discuss the technical methods to solve the above problems one by one.

Problems Existing in the Verification and Quantification of Certificate Authenticity in the Process of Professional Title Evaluation

In the new evaluation method of professional titles, according to the requirements of the new evaluation documents, all kinds of certificates account for a great deal of weight in the evaluation quantification. However, the authenticity of certificate sources and the weight of certificates are two very difficult problems. How to solve these two problems, in the new title evaluation requirements, is the primary problem we cannot avoid at present.

On the Verification of Certificate Authenticity in the Process of Professional Title Evaluation

How to identify or check the authenticity of certificates in professional title evaluation is the first problem we must solve. If the authenticity of certificates cannot be effectively solved, there will be a serious lack of evidence in the review of evaluation data, which will bring a great test to the subsequent evaluation work and the fairness of evaluation results.

The Quantification of Certificate in the Process of Professional Title Evaluation

In the process of evaluation, the certificates provided by the assessors are various and colorful. The unofficial certificates from various academic groups, social groups, organizations and other
organizations will make the audit units at a loss. It is also a very difficult problem to determine the authenticity and level of the certificates and quantify their weight.

The Difficulty and Feasibility Analysis of Solving the above Problems with Traditional Database Management Methods

The traditional way of database data storage is that the database is stored in the background database. The client can only access the background database through the database management system. The full control of the data is generally the background database administrator with the highest authority. The background administrator can add, delete, modify and other series of operations to the data unlimited. The whole operation mode of traditional database is shown in Figure 1.

If this traditional database is used to solve the problem of certificate checking, there are many problems. First of all, the database administrator can only input the background data according to the data provided by the customer, and cannot verify the authenticity of the data provided by the customer. Secondly, there is no controllable method and technical monitoring means to ensure that the database administrator cannot steal and resell the certificate. Third, the technical problems of the traditional database itself have certain security risks, in case the database is hacked, tamper or delete the background data.

To sum up, it is not feasible for traditional database management mode to solve the problem of verifying the authenticity of verification certificate. Blockchain distributed database management technology is the feasible solution to solve this problem.

Feasibility Analysis of Using Blockchain Distributed Management Technology to Solve the Problem that Traditional Database Cannot Solve

Due to the advantages of physical dispersion and logical unity of data storage, blockchain database has the inherent characteristics of decentralization, transparency, autonomy, scalability and other blockchain databases.

Therefore, using the blockchain distributed management technology to solve the certificate checking problem that the traditional database cannot crack has the technical feasibility. Next, we will start from the characteristics of blockchain distributed management technology, and discuss the feasibility of solving the certificate checking problem one by one.

Analysis of the Characteristics of Blockchain Data Distributed Management Technology

1. The data storage structure of blockchain database is decentralized. The decentralized feature of blockchain data structure is the P2P based distributed data structure mode.
2. Block chain database data distributed management data storage characteristics. There are two ways to store data in blockchain, generally divided and duplicated. Segmented management is to divide the data into several disjoint segments, and then save the segmented data on different nodes. The replication management method is to split the data and save the same piece of data on different nodes.
3. Data query characteristics of blockchain database. Based on the characteristics of distributed storage of blockchain data, the query data of blockchain is generally executed in the local node.
4. Data consistency maintenance features of blockchain. How to maintain the consistency of data is a basic feature of traditional database. Similarly, the consistency maintenance of blockchain data is also a very important content. Generally, the consensus mechanism is used to maintain the consistency of data in blockchain, so as to ensure the consistency of data in each node of blockchain. The common data consistency maintenance mechanisms are as follows: proof of rights and interests mechanism (Proof-of-Stake, PoS),
Workload certification mechanism (PoW) and authorized rights and interests certification mechanism (Delegated Proof-of-Stake, DPoS).

Characteristics of blockchain data security mechanism.

Blockchain data security features mainly through data tampering verification, encryption security mechanism and data traceability three security mechanisms. In order to achieve data security management, data tampering verification requires verifying the hash value of the block before and after the tampered node. Blockchain uses anonymous transaction mechanism based on key address to realize secure transaction for shared data. The data traceability mechanism of blockchain ensures the traceability and traceability of data, thus improving the data security and reliability.

A Comparative Study of Blockchain and Traditional Database Management Technologies

Blockchain data is characterized by strong data transparency, complete data copies stored in each node, traceability to data, strong scalability, and high autonomy of all participating nodes. The data storage and operation mode of blockchain is shown in Figure 2.

Compared with blockchain database, traditional database has many substantive differences in data volume, data modifiability, data traceability, data transparency, storage efficiency, space occupation, security, authority and so on. Next, we will make a brief comparison between the two database features. The details of the comparison are shown in Table 1.

Table 1. The comparison details.
Advantages of Blockchain Database Management Technology

We can see from table 1 that the blockchain database management technology has many technical advantages and feature advantages.

① The node has strong scalability.
② Data storage rules are rigorous and relevant, and it is difficult to tamper with all data.
③ Data appending and query are implemented according to rules, which is universal.
④ Data has complete traceability characteristics, and data is safe and reliable.
⑤ Data is completely transparent to all nodes.
⑥ The write and delete of data need to be confirmed by multiple nodes, so the data security and reliability are strong.
⑦ The authority is controlled by rules, and the management is open, transparent and reliable.

Using Blockchain Management Technology to Solve the Problem of Examining and Studying Each Certificate in the Process of Professional Title Evaluation

In the process of professional title evaluation, many unofficial certificates from various academic groups, non-governmental organizations, social organizations, and various societies and associations of all walks of life are verified. Due to the unique advantages of blockchain distributed management technology, it is the first choice of technology to solve the problem of certificate checking.

Layout Block Nodes in all Industries in China with Strong Expansibility of Blockchain

Due to the strong scalability of the blockchain database, all the block nodes that can well lay out the copies of the national unofficial database can join the block only according to the rules formulated by the blockchain database, and obtain complete query and write permissions according to the rules.

Block Chain Node of Each Social Hall Layout

Although blockchain has strong expansibility, if all users join a node, there are still inconveniences in the implementation process, so the universality is considered. Only one blockchain node needs to be arranged by the human resources and Social Security Department of each province. If all professional title evaluation units need to check the authenticity of the certificate, they can quickly check the authenticity of the certificate from the human resources and social security department node, which will bring convenience and feasibility to the actual operation.

Problems beyond Blockchain Technology to Be Solved

The blockchain technology solves the problem of checking the authenticity of the verification certificate. In principle, it has strong generality, high reliability, implementation and operability. But there are still many problems to be solved in the specific practice process.

How to Start the Overall Layout and Implementation Scheme of Blockchain

There are still many problems to be solved in the certification level of social groups and academic groups in various industries, as well as the formulation of Certification Evaluation and quantitative standards. The solution to this problem is not a technical line that can be implemented. It is necessary for the government functional departments to formulate relevant policies and regulations, require all non-governmental organizations to join the blockchain according to the established rules, and add and update the blockchain database according to the rules in the data operation.

Technical Power of Various Groups Joining and Using Blockchain

It also needs time and technical force to solve the problem that academic groups and social organizations are forced to enter the blockchain, which is not achieved overnight due to various
constraints of human, financial and material resources. Not all social groups have the technical strength to join and skillfully use blockchain.

**Early Start Layout and Overall Design of Blockchain**

The formulation of various agreements and rules in the early stage of blockchain, as well as a series of technical routes and policy routes in the early stage, maintenance work, etc., and the unification of relevant technical forces and policy routes, all need a lot of effort to be solved.

**Summary**

Blockchain distributed database management technology is used to check the authenticity of certificates in the process of professional title evaluation. Because of the characteristics of blockchain technology, it has strong practicability and feasibility. However, in terms of technology, it is feasible and universal, because its implementation requires the full cooperation of government departments, relevant technology enterprises and various societies. Therefore, in the process of implementation, there are many contents to be discussed and discussed, which need us to explore and solve.

**Reference**

[1] Yu Ge, Nie Tiezheng, Li Xiaohua, Zhang Yanfeng, Shen Derong, Bao Yubin. Distributed data management technology in blockchain system - challenges and Prospects [J/OL]. Journal of Computer Science, 2019:1-27[2019-12-02].

[2] Cai Xiaoqing, Deng Yao, Zhang Liang, Shi jiuchen, Chen Quan, Zheng Wenli, Liu Zhiqiang, Long Yu, Wang Kun, Li Chao, anaphylaxis. Principles and core technologies of blockchain [J/OL]. Journal of Computer Science, 2019:1-51[2019-12-02].

[3] Chen Hancong, Qian Dandan, Gu Zhaoyu, Cai Yao. Innovation and development of student health records management based on blockchain Technology [J]. China's collective economy, 2019(35):147-150.

[4] Huang Huiyun, Yang Xianghao, Wang Xiaoli, Shi Shunyu. A review on the research of domestic blockchain based on CNKI [J/OL]. Software Guide: 1-4[2019-12-02].