Tracing the Source of News Based on Blockchain

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***Abstract*—With the rapid development of the Internet, there are more and more ways of spreading news, and it's spreading faster and faster. This creates a lot of fake news that confuses the reader's vision. In order to construct a healthy news communication environment, it is necessary to suppress fake news and to crack down on the source of fake news, so it is necessary to trace the source of news. This paper tracks the news based on the distributed storage, decentralization and other features of the blockchain, with the technology of consensus algorithm and intelligent contract.**

Keywords—Blockchain; Tracing the source of News; Distributed network

I. INTRODUCTION

In recent years, with the development of new media, competition in the news industry is heating up. In order to attract readers, many media start to make some eye-catching fake news, fake news keeps appearing, which has caused trouble to our daily life. Fake news in various fields is emerging endlessly, which has a bad influence on society. As news media, news reports should pursue authenticity, rather than "headline party", exaggerated and eye-catching [1]. And as readers, we also want to see real and effective reporting, not fake news that is useless and contains misleading information. As we all know, fake news like fake and inferior products, it has led to improper guidance in our lives, make us deeply hated. And the bad influence of fake news is spreading gradually in the process of transmission [2]. Therefore establishing a correct news source mechanism, can effectively track of fake news source, thus the fake news strangled, accountability on the source of the fake news, so that we can effectively make the news public opinion environment more healthy.

In order to realize tracing the source of the news, this paper attempts to combine the recently popular blockchain technology with data tracing technology. As is known to all, with the increasing popularity of bitcoin, the digital cryptographic currency, the blockchain technology has gradually come into view. As a technique to validate and store data by using blockchain data structure, blockchain can play a better role in dynamic data management. Blockchain technology uses distributed node consensus algorithm to generate and update data.

As a decentralized computing paradigm, blockchain technology can also be applied to various fields. At the beginning, blockchain technology is mainly used in finance field. With the development of blockchain technology, it is increasingly applied to various fields. Due to the blockchain has the characteristics such as tamper-resistant, we can set up the system of a data source, which is applied to trace the source of news, realize tracing the source of news, and plays a positive and effective role in combating fake news.

Blockchain can create a new mechanism to trace the news and evaluate its reliability. This mechanism includes source evaluation, untampering content, and multi-node content verification, which complement each other and constitute a complete constraint mechanism. This is also closely related to the characteristics of the blockchain. Block chain technology uses the distributed storage structure, using cryptography, consensus algorithm, intelligent contract and other technologies, to realize tamper-proof, forgery and traceability of information in the process of information collection, transfer and sharing. This paper takes the characteristics of the block chain and the tracing of information as the entry point, combining with the traditional data tracing technology and the process of news communication, to analyzes the application of blockchain technology in tracing the source of news.

II. RELATED RESEARCH

Through reading and analyzing literature, the current tracing the source of news mainly use some techniques and methods of data traceability. There are few researches on data traceability in China, but there are some effective data tracing methods. Many foreign research machines have taken the data traceability as a research topic. Data transmission process of information (i.e., traced) acquisition and storage is the precondition for traceability [3].

In general, the data traceability method is divided into two categories, the method of annotation and the method of non-annotation [4].

The method based on annotation is to change each data item to <s,d,i> triples, where s represents the data source, d represents the target data, and i represents the intermediate data result.

In the process of news transmission, such a label can be used for every step of transmission, so that the whole news

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communication path can be connected in series. Therefore, it supports the tracing process of news propagation path in the future. Using this method for data traceability is simple and can be implemented in relational databases, but storing these labels also requires additional storage space in the process of news transmission.

For non-annotated traceability methods, there is no need to store additional source data and destination data information, need to store and maintain the data to be processed, so that the source data is pushed back. For example, reverse query method, also known as inverse function method, is much better for fine-grained data, especially for big data. The core of this method is to construct the inverse function, to invert the query, and to derive the results according to the transformation process, and then trace the results back to the source data. Such traceability, data processing is reversible. However, the reverse function also directly affects the effect of traceability. This method is only suitable for reversible functions, and the construction of inverse functions is complicated and has certain limitations, so it is relatively difficult to realize.

There are some limitations to the current traditional traceability. The traditional traceability system either uses the centralized accounting model of today, or it is recorded and saved in isolation by various market participants, which is an information island mode [5]. The first is that there is no way to go all the way to every piece of news, all the media that go through it, it's impossible to go all the way back. The role of blockchain in this area is to solve this problem effectively by key, distributed bookkeeping, intelligent contract, and these three technologies. The second is the risk of accountability. When there is a fake news, there is a penalty, but there is no problem or reward, and no one wants to take risks in the process of accountability. Distributed bookkeeping can solve this problem. Block chain technology platform, everyone has a secret key address, through all the person of charge to an account, to distributed storage and synchronization of books, distributed to an account on the block chain, first emphasizes the reward, every news release, the global keys will be synchronous recording this information again. This is the nature of mining, bookkeeping. In order to reward the publishers, the system will reward, calculate well, calculate fast, calculate accurately, the reward is much. Blockchain technology is considered to be the basic technology for the construction of bitcoin data structure and transaction information encryption transmission. It can realize the mining and trading process of bitcoin [6].

Combined with the existing research results, this paper combines block chain technology, to realize the traceability of news transmission, and prevent tampering, thus effectively to crack down on fake news, the news dissemination environment more healthy.

III. BLOCKCHAIN DATA TRACEABILITY TECHNOLOGY

A. Distributed network

Blockchain is composed of distributed ledger. Keeping track of the distributed ledgers can trace the source of the news [7]. A complete bitcoin network contains nodes that can be divided into three types: bitcoin core nodes, complete block nodes, and lightweight nodes [8]. The core nodes of bitcoin hold detailed information about the storage of bitcoins, and complete block nodes and lightweight nodes have only partial data. But running and lightweight block node client also can access all data. This distributed network has realized the decentralized. There is no central node in the bitcoin network, the data of the whole network is open and transparent, and each node can be modified and maintained, just as the news dissemination is decentralized. Every piece of news is open and transparent in the process of communication, and it can be modified and maintained by the whole network.

B. Trace the source of the news

Tracing the source by the blockchain is mainly achieved through the design mechanism of time stamp service and the chain connection between blocks. In the process of news source, all the news is open and transparent, can also be cut in maintenance modification. Therefore, in order to know the communication path of a news, it is necessary to step by step to trace which node has modified and maintained the news, and should pay attention to the timestamp.

In the blockchain, each block contains the block header and block body. The block header encapsulates a lot of information, including the current block header hash value, preblock header hash value, time stamp, and so on. The block body encapsulates the transaction of the current block and stores the text at random through the hash function. As shown in Fig. 1, it is the structure of a single block.

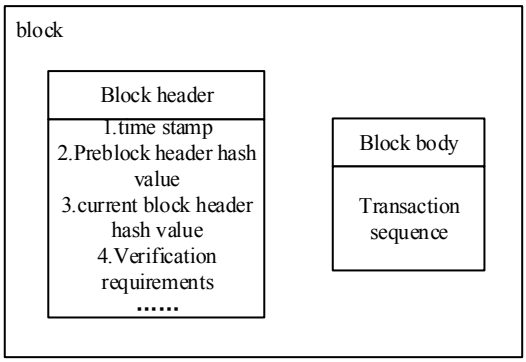

Fig. 1. Structure of a single block

The block header provides a great convenience for data tracing, and the block head of each block contains the hash value of the preblock header, thus forming the chain structure. The sequence of the blocks in the block chain can be arranged by the time stamp. And then we have the chain structure that has the order of time, which is what we call the block chain. As shown in Fig. 2, it is a schematic diagram of the chain connection between blocks.

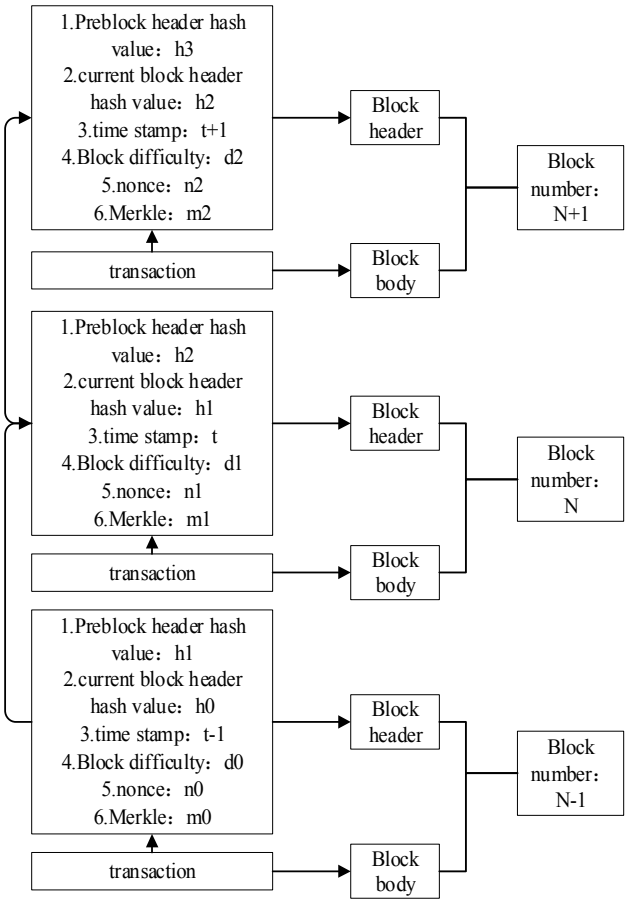

Fig. 2. the chain connection between blocks

This kind of chain structure provides great convenience for the tracing of our news. When we want to track a news, by encapsulating the time stamp in the block header of this news section and the pre-block hash value, you can find the preblock of the block. By analogy, the corresponding block chain is found to determine the transmission path of the news, and the source of this news is realized.

C. News tamper-proof

The biggest feature of blockchain is "decentralization", which is similar to the distributed bookkeeping method. Each participating trader can record the transaction information and therefore cannot be tampering with it [9].

Since the block head of each block contains the hash value of the preblock header, the information in each block changes, and the subsequent block changes accordingly. With the change of time, more and more blocks on the block chain, and the block chain data will become more and more stable [10].

Each time the data in one block is modified, all changes in the post block are caused, thus the tamper-proof of the data is increased. Blockchain using distributed storage structure, to tamper with the data, must have more than half of the entire network to calculate force. Therefore, the blockchain data structure makes the data tamper-proof and has extremely high security.

In order to ensure that the news is not tampered with in the propagation process, the blockchain data structure can be used to store the news. Once the news is tampered with, the subsequent nodes on the propagation path will change accordingly. For the tamper, it is not possible to tamper with the whole news storage system, unless it has very high computational power. In block chain traceability system, once to be modified, will respond immediately, will learn to be modified, the whole system can't fool all the people of charge to an account book, found to be false is ascertaining the facts. It greatly promotes the security and tamper-proof in the process of news communication.

IV. NEWS TRACEABILITY MODEL BASED ON BLOCKCHAIN

The preceding part of the text basing on the chain storage structure of block chain and its characteristics, has expounded the role of block chain technology in the tracing process of news transmission, and can achieve tamper-proof.

Today's news media environment is complex, many fake news and malicious tampering news emerge endlessly. In order to keep track of the news, so as to break the fake news and make the public opinion environment healthier, we can introduce the block chain technology to store the news. Establishing an effective data model is the key to the data traceability technology. According to the model, it can preliminarily determine the general steps of data traceability and the basic idea of data traceability [11]. Next, we will establish the model of block chain news storage tracing.

News transmission environment is very complex. There's a lot of news media, there's a lot of news, and there's a lot of news out there every day. To trace the source of a story, we need to design a complete information tracking system. As shown in Fig.3, it is a news traceability framework from the perspective of blockchain.

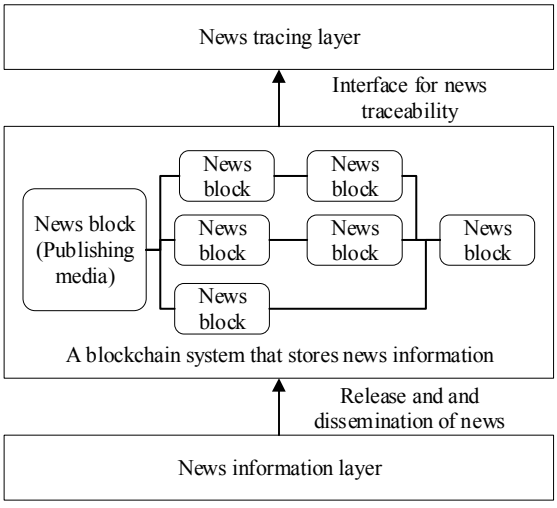

Fig. 3. A news traceability framework from the perspective of blockchain

News media plays an important role in the process of news communication. The information traceability system needs to have strong data processing and storage capacity, and can dynamically manage the accounts published by each news media. Through the accounts of the news media, the news can be released, and the path of the news transmission can be inquired. Through block chain technology to realize distributed storage, a very important basis is the consensus mechanism. The consensus mechanism requires the existing stable nodes in the block chain system to agree and verify the newly generated blocks. Each transmission of the news media as the existing node, to new media consensus and certification is required, to allow it to spread its own news, joined the chain structure of news transmission.

In simple terms, a news can go through a complex process from birth to reading. In the key link node, we set a key for that node. For news, the key is a string of encrypted addresses that carry the details of the news.

The basic framework of block chain can be divided into three basic levels: data layer, network layer and application layer. First, on the network layer, block chain is a distributed system based on IP communication protocol and peer-to-peer network. Second, in the data layer, the blockchain is a distributed database system that can only be appended and cannot be changed. Finally, at the application level, the block chain can replace the traditional registration and clearing system. On the other hand, the block chain platform can provide a programming environment for users to write smart contracts [12]. As shown in Fig.4, it is the blockchain infrastructure diagram.

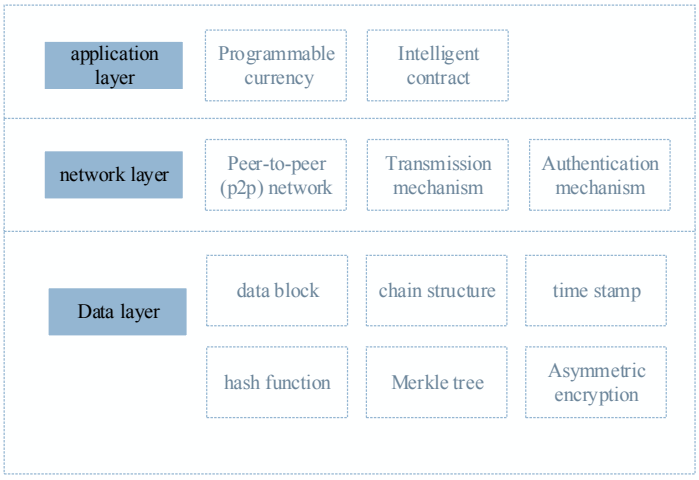

Fig. 4. Blockchain infrastructure diagram

In this paper, the traceability model of all links of the whole news propagation path chain based on the block chain technology is proposed.

The principles are as follows:

$$NT = \mathrm{f_t}(N, S, M, R, BC) \quad (1)$$

Among them, NT represents news tracing, N represents news, and S represents the producer of news, which is the source of news. M represents the media for news, R for news readers and BC for blockchain technology. $\mathrm{f_t}$ represents the news traceability function.

First, the news media rely on their own advantages to establish a source of information traceability system. Secondly, the major news media gather information about the news, including news content, release date, release media, etc., and store it in the block chain system. Subsequently, the media jointly promoted the consensus and verification process of participating in the block chain of news information. Every time every media publishes a news, it is necessary to add the source of its information to its own information, thus forming a blockchain system that can be traced back to news information. As shown in Fig.5, it is a news traceability model from the perspective of blockchain.

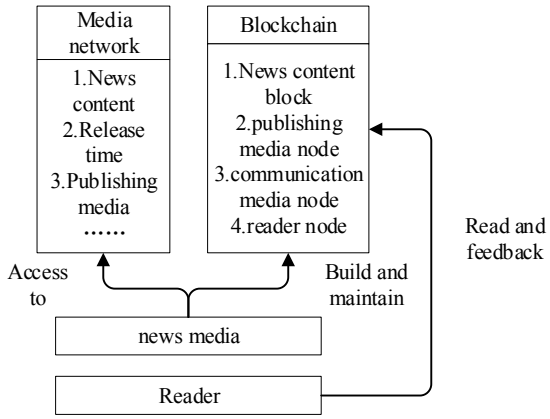

Fig. 5. A news traceability model from the perspective of blockchain

The process of the model construction and realization of the retrospective news dissemination is as follows:

1. The stage of news release. When the media is writing the news, the news content, category and other information are uploaded to the news tracking system block chain. The equivalent of distributed bookkeeping on the block chain, distributed storage and synchronous ledger, will give publishers a certain reward.

2. The stage of news communication. In the process of news communication, it is necessary to record the news release time, and the hash value and time stamp of the preblock are stored in the block head so that the chain structure can be formed.

3. The stage of news traceability. When readers read the news, they can trace the route of the news through the chain structure of the block chain and the information stored in the block head.

As shown in Fig.6, it is the news tracing process.

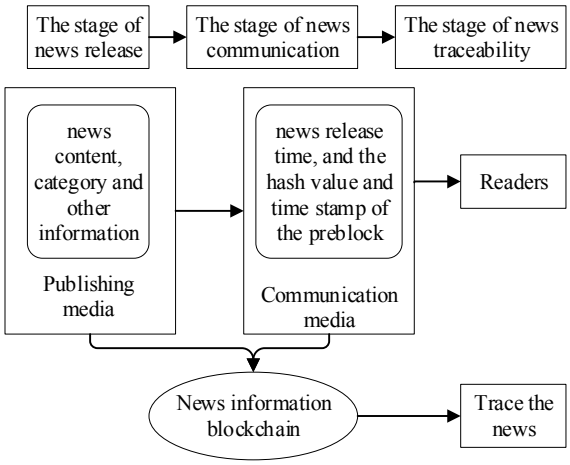

Fig. 6. News tracing process

V. CONCLUSION

Based on blockchain technology, this paper combines the features of distributed structure, consensus algorithm and intelligent contract. Based on the results of current data traceability, the traceability and tamper-proof in the process of news communication are studied.

Taking the chain structure of blockchain as the entry point, analysis the disadvantage of traditional traceability system current, this paper expounds the technology of blockchain traceability principle and the process involved in the process of tracking, blockchain of news source tracking model is put forward. The role of blockchain in data traceability is also gradually reflected.

At present, the research of block chain traceability is also in the development stage, and the construction of the whole traceability system needs to be further explored. Applying the blockchain technology to the process of news tracing, has laid a solid foundation for cracking down on fake news, tampering with the news and establishing a healthy public opinion environment. But to better realize the source of news, we must continue to study and innovate.

REFERENCES

[1] Y. Qingbo, Q. Lingyun. False News Tracing and Countermeasures [J]. Military reporter,2003(01):35-38.Z.

[2] N. hengyu. The Origin and Prevention of Fake News [J]. News knowledge,2011(07):27-28.

[3] Y. Jianli, W. zhong. System of Personal Data Traceability Management under the Big Data Environment [J]. Intelligence science,2016,34(02):139-143.

[4] Qian WN, Shao QF, Zhu YC, Jin CQ, Zhou AY. Research Problems and Methods of Blockchain and Trusted Data Management. Ruan Jian Xue Bao/Journal of Software, 2018,29(1) (in Chinese).

[5] Blockchain: Traceability, Security and Supply Chain. https://baijiahao.baidu.com/s?id=1577271712300426559&wfr=spider&for=pc

[6] Z. Xiaolong, Y. Xianfei. On Research Overview of Block-Chain Technology in Recent Years [J]. Journal of changsha university of technology (social science edition), 2013,32(06):27-32.

[7] L. Taian. The Network Public Opinion Environment of Block Chain Reconstruction [J]. Media,2017(21):87-90.

[8] NTONOPOULOS A M. Mastering bitcoin[M]. Sebastopol：O’Reilly Media，2014：137-141.

[9] X. Jie, W. Jialin. Build up the Trust of Academic Publishing : Based on the Technology of Block Chain [J]. Publishing science, 2015,25(06):19-24.

[10] DING. Qing-yang, ZHU. Jian-ming. The Product Information Traceability and Security model of B2C E-platform from the Perspective of Blockchain [J]. China circulation economy, 2017 (12) : 41-49.

[11] M. hua, Z. yong, F. xiaohui. Survey of Data Provenance [J]. Miniature microcomputer system,2012,33(09):1917-1923.

[12] Z. Yan, L. Yaodan. Research on Decentralized Digital Publishing Platform Based on Block Chain Technology [J]. Publishing science, 2015,25(06):13-18.