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**| RESEARCH ARTICLE**

## **Blockchain Technology in the Protection and Inheritance of Non-traditional Heritage**

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**| ABSTRACT**

Intangible cultural heritage is an important part of the excellent Chinese traditional culture. Protecting, passing on, and utilizing intangible cultural heritage is of great significance in continuing the historical lineage, strengthening cultural confidence, promoting civilization exchange and mutual understanding, and building a socialist cultural power. This paper provides a blockchain technology-based method for digital deposition of cultural relics and artworks by digitizing the information of the artwork or the owner of the cultural relic and the artwork itself, and then the digitized file is recorded on a blockchain that cannot be tampered with artificially by deriving a unique fixed digital fingerprint with a hashing algorithm. Through such a method, a complete set of data relationship chain is established between the inheritor (owner), the cultural carrier (cultural relics and artworks), and the physical data (high-definition scanned photos, three-dimensional data models, etc.), which is permanently stored and cannot be tampered with, in order to solve and improve the problems of ownership confirmation, theft prevention, identification and damage prevention in the custody of cultural relics and artworks collection.

**| KEYWORDS**

Intangible cultural heritage; blockchain; digital fingerprint

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**1. Introduction**

In the new era, the protection and inheritance of intangible cultural heritage face many challenges, not only in the external environment interference, but also in its own content, the external environment interference lies in the large-scale mechanical production, resulting in inferior intangible cultural heritage products flooding the market, while the internal content has not followed the characteristics of the times to make innovation, it is difficult to meet the spiritual needs of people, and in the development of globalization, countries are becoming more and more closely linked. In this regard, many regions have increased the commercial development and utilization of intangible cultural heritage, turning culture into commercial value to promote the further development of the local economy, but some regions are too eager for quick success and profit, resulting in the combination of commercial development and intangible cultural heritage is not perfect, and commercial development and cultural. However, in some regions, commercial development and intangible cultural heritage have not been combined well due to the over-eagerness to make profits, and the conflict between commercial development and cultural preservation has been serious. Therefore, only by deeply analyzing the possibilities of intangible cultural heritage discovery in the new era and combining them with modern technologies can we develop effective measures to pass down intangible cultural heritage (Wang, 2022).

Blockchain technology was initially developed to support cryptocurrencies such as Bitcoin, but with the embedding of more technologies such as programming applications and smart contracts, the development potential of blockchain technology has far surpassed the distributed bookkeeping system represented by Bitcoin and has applications in many socio-economic fields with broad prospects (Lu et al., 2021).

Blockchain is a kind of database with a data hash verification function, which is a combination of p2p transmission, distributed data storage, encryption algorithm, and consensus mechanism; it connects and protects data content by cryptography and confirms the accuracy of encrypted data by timestamp and Merkle tree algorithm, each block contains the encrypted hash of the previous block so that the two blocks before and after the same chain can be compared against each other to ensure that the data stored in the block is not tampered with. Using the features of decentralization, non-tamperability, data security, and low cost of blockchain technology, this method interconnects the inheritor, the cultural relics and artworks and their data (such as high-definition scanned photos, work profiles, three-dimensional data models, etc.), and uses the special values formed by big data to identify the relationship between the cultural relics and people, the authenticity of the cultural relics and other issues, using Blockchain technology is used to protect the effectiveness of intangible cultural heritage transmission.

## **2 Analysis of the Current Situation of NRM Protection and Transmission**

### ***2.1 Problems Arising in the Current NRM Conservation***

The preservation and display of NRM cultural vehicles and the collection, appreciation, and circulation of their artworks is a complex process with a long history (Li, 2019). Whether it is artwork or other forms of NRM culture, the high value brought by scarcity makes falsification of physical objects and plagiarism follow all aspects of NRM conservation and artwork collection. At the same time, the ownership of NRMs is mainly determined by the possession of physical objects. When ownership is transferred, it mainly relies on the experience of experts or professional institutions to identify the authenticity of the objects before the physical handover occurs. And in the event of loss, theft, or destruction of the physical objects, it is difficult to take effective means to prove the ownership relationship.

In view of this, there is an urgent need for a preservation method that can permanently store and not be tampered with the associated information of cultural relics or artworks to solve the problems and risks of existing technologies in order to solve and improve the problems of ownership confirmation, theft prevention, identification, and damage prevention in the conservation of non-heritage and artwork collection. However, previous digital conservation may have the possibility of being copied at low cost, easily tampered with, or even lost, so the author has conducted an exploration of how blockchain technology can be applied in the conservation and inheritance of non-heritage.

### ***2.2 Dilemmas in Non-genetic Heritage***

First, some local governments lack knowledge and understanding of NRM and do not pay enough attention to NRM, resulting in NRM becoming cold and unattractive. And non-heritage is often regional and local in nature, making it more difficult to spread on a large scale.

Secondly, in non-genetic heritage, the cost paid is not proportional to the return for the most part. The threshold for learning non-traditional skills is high and does not happen overnight but requires time to learn slowly. But nowadays, with the rapid development of the times, the tolerance for "slow work" has become very low, and "quick gain" is demanded. After learning, the benefits of non-genetic heritage are slower than in other industries, so most people prefer to work, work or start a business to maintain their own lives.

Again, there is a lack of publicity in terms of non-genetic heritage. Being in an information-based society, one needs to use information-based methods to promote it. Through the attitude of people towards programs with traditional cultural themes in the past two years, it can be seen that non-heritage is loved by people, but it is rare to see advertisements and propaganda about non-heritage in daily life. It is not often seen in front of people's eyes, and people rarely take the initiative to learn about it.

Finally, some people are too high-minded and lack cultural self-confidence and self-awareness, not bothering to learn about their own non-heritage culture but more eager to learn about the culture of other countries. Therefore, there is a greater need for the state and government to find ways to build up the cultural confidence and self-awareness of our people.

### ***2.3 Feasibility of Applying Blockchain Technology to the Protection and Heritage of NRM***

Blockchain technology has the advantages of polycentricity, time-series data, immutability, and open consensus, which greatly meets the needs of solving the problems of ownership confirmation, theft prevention, identification, and damage prevention in the protection of non-heritage and art collection (Mou & Xu, 2022). It also has the characteristics of polycentricity, that is, decentralization, which replaces the trust relationship constructed by monocentricity through a purely mathematical method, and distributed central nodes make the failure rate of this system greatly reduced, thus achieving high stability. What's more, the temporal data technology used in blockchain allows each block of the blockchain to carry a unique timestamp so that the blockchain is endowed with the traceability of data information. And NFT, as a kind of digital asset ownership recorded on the blockchain, is manifested as a set of time-stamped metadata on the blockchain with a unique mapping relationship with a certain

file stored in the network, providing a digital circulation channel for real-world assets, unique and indivisible, which has been widely used in games, sports, arts, and collections, so we can include it in the available range.

### **3 Innovative Paths for the Protection and Inheritance of NRM Based on Blockchain Technology**

In order to make the purpose, technical solutions, and beneficial effects of using blockchain technology clearer and more understandable, they are described in further detail below. It should be understood that what is described herein is for explanation only and is not intended to limit the scope of protection. The present method provides a method for digital deposition of non-heritage cultural carriers and artworks based on blockchain technology, said method comprising the steps of.

The digital information and identity proof corresponding to the non-heritage relics or artworks are provided by the non-heritage bearer, and the basic information is filled in and registered, and then the digital fingerprint is formed after analyzing and processing with high-definition scanned images, three data models and other data. The generated digital fingerprints are then registered on the blockchain. After successful registration, the block information is recorded, including block height, time stamp, etc. And the basic information is stored separately from the digital information of the registrant and the digital file of the identity proof. The basic information is stored in a high-security database, and the digital information of the registered goods and the digital files of the identity proof is stored in third-party cloud storage.

If verification is required, the original saved information and file are read, and the digital fingerprint is generated again (Zhao, 2022). Compare the digital fingerprint stored in the blockchain with the newly generated digital fingerprint, and if it matches, prove the owner of the artifact or artwork.

In the intangible cultural heritage of music and opera, smart contracts can provide services to detect infringement. In the blockchain platform, the data information is unique, permanent, and tamper-evident, making it easier to identify the original creator of a music or opera work once an infringement is detected. For example, once a non-heritage work of similar music or opera is uploaded to the blockchain system, the smart contract will automatically compare the copyright information before uploading to the blockchain system, and if the uploaded content is found to be involved in copyright infringement with the non-heritage work of that music or opera, the music work will not be able to pass the audit, not to mention uploading to various platforms. In addition, smart contracts can effectively manage a large amount of data to track the copyright of music, opera, and other ICH works and distributes royalties to copyright owners according to the rules of multi-clause enforcement and obedience to jurisdiction. It secures the digital assets of music ICH and opera ICH works by issuing copyright registration and multiple signatures, which both reduces the piracy rate and enables copyright protection.

It is also possible to use distributed record-keeping to confirm the value of the heirloom. Blockchain's distributed record-keeping method is independent and is not bound by any single entity or platform, and the inheritor does not need an intellectual property company to register the copyright of the work. The copyright owner chooses the blockchain platform to encourage users to publish and disseminate their works on the blockchain platform by rewarding them, establishing a link between the inheritor and the consumer, and ensuring that the inheritor can receive payment for his works in a timely and convenient manner. At the same time, the inheritors who publish their works can also become "distributors" and earn income from them.

### **4 Conclusion**

In conclusion, by analyzing the current situation and feasibility, we get a simple vision of the application of blockchain technology in the conservation and inheritance of NRMs. While the previous digital conservation may have the possibility of being copied at low cost, easily tampered with, or even lost, blockchain as a representative of security technology is expected to solve the problems of forgery, plagiarism, and ownership of non-heritage relics that arise in the conservation and transmission of non-heritage. Compared with digitization, blockchain has better scalability and better performance, which meets the present needs of NRM protection and inheritance.

Based on the existing technology, the inter-domain access control model (ID-RBAC) can also be applied. Further consideration can be given to expanding the scale of the experiment and optimizing the consensus algorithm of the blockchain to create a telecom-grade service environment with higher performance, lower latency, and higher bandwidth for the blockchain network than the existing technology. Meanwhile, to further improve the access control efficiency, we can try to combine privacy computing and other technologies to optimize the cross-domain access control model, which can develop its security, exclusivity, and operation speed to a new level (Huang et al., 2022).

Besides, this paper does not conduct a field survey and data analysis due to the condition. In view of this, we hope to conduct further and deeper analysis in the future when we are able to do so.

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