A Social Governance Scheme Based on Blockchain

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Abstract. Blockchain technology has the characteristics of distributedness, transparency, traceability, and openness. It is suitable for promoting the flatness of social governance structure and the transparency of governance and service processes, thereby improving the security of government social governance data, and promoting intelligent governance and Trustworthy government building. Blockchain combined with big data and artificial intelligence, cutting-edge technology, based on the principles of security, reliability, tamper-resistance, anti-counterfeiting, and traceability, a new model of “blockchain + social governance” will be established. This article constructs a social governance scheme based on blockchain, the purpose of which is to solve problems in various areas of existing social governance with the help of the technical advantages of blockchain.

Keywords. Blockchain; social governance; traceability tamper proof; distributed ledger.

1. Introduction
Blockchain technology is regarded as one of the next-generation global credit authentication and value Internet basic protocols, and countries are actively deploying to compete for standard-setting rights. However, any technology has two sides. When blockchain technology is applied to social governance, it brings the opportunity to upgrade the social governance model and quickly define governance rules. It also brings the hidden danger of harmful information spreading in the blockchain. Therefore, when developing blockchain technology and promoting its service to social governance, full consideration should be given to the possible negative impacts and hidden dangers of the technology [1-2]. Through measures such as optimizing the design of the mechanism in advance and strengthening technical supervision, we should prevent harmful information from happening in the future. The spread in the blockchain system makes the blockchain technology better serve the improvement of social governance [3].

Relying on the advantages of blockchain technology, the latest scientific and technological achievements are applied to social governance, a social governance system in which the government is responsible, democratic consultation, social coordination, public participation, legal protection, and technological support. The application of blockchain technology has extended to many fields such as digital finance, the Internet of Things, intelligent manufacturing, supply chain management, and digital asset trading. At present, major countries in the world are accelerating the development of blockchain technology. China has a good foundation in the field of blockchain [4]. We must accelerate the development of blockchain technology and industrial innovation, and actively promote the development of the integration of blockchain and economic society. Government data sharing, citizen integrity management, digital certificate, digital identity, health care, electronic bills, precision poverty alleviation, voting, property rights registration, bidding, public welfare charity, and people’s livelihood services can all be considered in combination with blockchain Based on blockchain technology.
2. Industry Pain Points
The implementation of block technology can solve the following pain points in various fields [5]:

Copyright and intellectual property: Notarization and certification rely on the centralized authority of the government;

Education sector: Incomplete student credit system, limited data dimensions, lack of verification methods, etc.

Tax department: The threshold for authenticity of electronic tax vouchers, and banks ‘weak ability to evaluate small and micro enterprises’ loans;

Health sector: Electronic case systemization needs to be upgraded;

Civil affairs department: Information related to public welfare projects is complex and inconvenient for unified management and public social supervision;

Food and Drug Regulatory Department: Counterfeit and shoddy issues exist in the circulation of goods in the supply chain, and food safety issues;

Finance and taxation department: Digital bill model needs to be optimized.

3. Blockchain Advantages
The characteristics of blockchain technology can change many key areas in social governance such as data storage, sharing and traceability, which is highly consistent with the increasingly open and transparent government goals. Based on the various characteristics of the blockchain, it can be applied to a variety of industry fields and public affairs service scenarios such as information, finance, compliance, culture, and medical care [6]. Compared with the traditional Internet and database, blockchain has the following data security advantages:

(1) Form a trusted environment based on consensus mechanism
There are data barriers between different organizations, different institutions, and different units. Using blockchain technology can break such barriers, form multi-party data interactions in a trusted environment, and solve the problem of data islands. The data on the blockchain is securely traceable and cannot be tampered with, which better meets the needs of certificate-based applications and traceability applications.

(2) Embedded incentive mechanism to form a benign ecology
Participants can enjoy the benefits brought about by the incentive mechanism. Through an effective incentive design mechanism, participants’ subjective initiative and participation mode can be brought into play, thereby changing the existing mode.

(3) Open and transparent, can achieve penetrating supervision
In a decentralized way, collective maintenance and shared platforms allow supervisors to easily capture the required data and achieve penetrating supervision.

(4) Smart contracts, efficient and automated collaboration
Use blockchain smart contracts to execute automatically according to the agreed mechanism to reduce the risk of default and improve work efficiency.

4. Blockchain Solutions in Various Fields of Social Governance
Application of time stamp: notarization and authentication. The use of blockchain can establish a digital certificate that cannot be tampered with, and can establish a new authentication mechanism in the fields of digital copyright, intellectual property, certificates and public welfare to improve public service and management.

Immutable applications: credit assetization and regulatory convenience. Blockchain guarantees that information cannot be tampered with and can be applied to departments such as education, human resources, social security, and archives.

Traceability application: traceability anti-counterfeiting. Data is tamper-resistant and traceable. Blockchain technology is used for anti-counterfeiting traceability of products.

Distributed ledger application: precise management across domains. The government financial supervision department can provide more complete and reliable data analysis products for the majority
of Internet finance companies by introducing a blockchain-based point-to-point data authorization sharing mechanism, and can access Internet financial services through the blockchain certificate system interface Platform to effectively implement the pre-regulation of the Internet financial industry on the premise of protecting business privacy.

5. Social Governance Scheme Based on Blockchain

Based on the above background and the advantages of blockchain technology, we have designed the overall functional architecture of the blockchain-based social governance solution platform into four levels like figure 1: the base layer, the blockchain core layer, the platform service layer, and the application service layer.

![Figure 1. Platform functional architecture.](image)

The base layer includes three modules: storage, computing, and peer-to-peer networking.

The core layer of the blockchain provides the functions of basic blockchain services for upper-layer application scenarios through API interfaces.

5.1. Smart Contract

This plan is responsible for the registration of the contract, the execution of the contract, and the management of the contract template. The contract logic is defined by the user through the contract language. After publishing to the blockchain, according to the logic of the contract terms, the user’s signature or other events trigger the execution to complete the contract logic such as transaction settlement. Quickly discover the security and privacy of smart contracts through formal verification; provide a secure IDE to implement templated smart contracts, making it easy for users to quickly implement safe and available smart contracts based on different business scenarios.

5.2. Privacy Protection

This plan adopts multi-channel-based privacy protection and provide cryptography-based privacy protection tools, such as ring signatures, homomorphic encryption and zero-knowledge proof to solve user privacy issues in blockchain transactions and provide multiple privacy protection mechanisms. It not only provides a mechanism for sharing private data between different institutions, but also provides the privacy protection function of upper-layer services based on password technology.

5.3. Consensus Mechanism

This plan provides pluggable consensus mechanisms, including Kafka-based distributed consensus mechanism and a two-layer consensus mechanism based on fragmentation technology, which can be applied to various application scenarios and greatly improve consensus efficiency.
5.4. Mass Data Storage
This plan supports local-database storage, file-system storage, and third-party cloud storage. Condition-based fast retrieval mechanism ensures a complete, fast, and secure storage of massive data.

5.5. Regulatory Mechanism
This plan is responsible for real-time supervision of business transaction behavior in the blockchain. Regulatory Mechanism supports definable regulatory rules, analyzes and captures the deep relationship between massive data to achieve real-time feedback of analysis results. It can adaptively adjust monitoring rules, timely discover and manage risks and control risks to achieve effective supervision before and after.

5.6. Authority Management
The method based on the combination of attribute certificate and blockchain is used to implement the access control model based on attribute certificate. The access policy can be flexibly configured and can be applied to various business scenarios.

Platform service layer buildings high-availability and scalable data services on the bottom layer, including real-time data update, electronic certificate security, traceability anti-counterfeiting, fairness and authentication, cross-domain management, real-time monitoring, electronic certificate storage, data sharing service. Integrate basic product requirements in related fields to help build upper-level application scenarios.

The application service layer provides trusted, secure, and fast blockchain applications to grassroots managers, upper-level leaders, and the public. Table 1 gives the application interface list.

Table 1. Application interface list.

| Serial number | Application interface          |
|---------------|--------------------------------|
| 1             | Write plaintext                |
| 2             | Query plaintext                |
| 3             | Write ciphertext               |
| 4             | Query ciphertext               |
| 5             | Write file summary             |
| 6             | Upload file and write file summary |
| 7             | Query file summary             |
| 8             | Check data                     |
| 9             | Call chaincode                 |
| 10            | Query Chain Code               |
| 11            | Query transaction              |
| 12            | Query block                    |

6. Conclusion
The blockchain-based social governance scheme is practical and feasible, and it is a solution that meets current actual business needs. It can achieve the main goals of business process optimization, real-time sharing of data resources, and promotion of public participation. It also improves the ability of government departments to assist in supervision and scientific decision-making.

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