Modernisation of urban governance: An approach of ‘Blockchain + Big Data’

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Abstract

Mathematics is a prerequisite for the development of blockchain technology. The deeply penetrated mathematical ideas support the establishment of the trust mechanism of the whole blockchain system, which makes the blockchain technology autonomous, decentralised, not so easy to tamper, open, anonymous and also possesses other characteristics. Due to these characteristics, the introduction of blockchain will greatly solve a series of problems faced by the quality and acquisition of big data in cities, and release more data vitality. Based on the perspective of chain blocks and big data fusion, this paper puts forward that data are the foundation of modern urban governance. Data management has become the key to modern urban governance. It puts forward that the building of a big data management system based on blockchain will strengthen the construction of the intelligent city and modernisation of urban governance capabilities.

Keywords: blockchain, big data, urban governance, modernisation, data-driven

1 Introduction

Cities are the centers of economic, political, cultural and social activities. Urban governance is a kind of complex system and of great importance to the overall economic and social development. In this system, a city is no longer just a production and living space, but also gradually evolves into a place where more elements gather [1]. Various elements interweave, constantly operate and develop. Along with the development of the city
and the function ‘evolution’, urban management has become an important foothold of modern state governance. The key of modern urban governance is to achieve ‘precise regulation’ of ascension policy, which depends on the accuracy of the data, the structure, dimensions. Modern urban governance put forward the unprecedented high standard and the new requirements, which need a new innovative urban governance model and a new generation of information technology to realise modernisation of city governance. A representative of a new generation of information technology, such as 5G, blockchain technology and data center, offers a new way to solve this problem. Many scholars are also actively exploring this area. For example, some scholars take Shanghai’s urban digitalisation as an example and propose that data are the driving force of urban development. Data will drive urban governance optimisation [2]. Some scholars combined the theoretical model and characteristics of blockchain technology and proposed the social governance model of the smart city in the Greater Bay Area with blockchain as the infrastructure [3]. All these studies provide important references for improving the modernisation of urban governance through blockchain technology.

2 The internal requirements of the modernisation of urban governance capacity

As socialism with Chinese characteristics has entered a new era, further improvement of the urban governance system and capacity for urban governance is an important link in meeting the people’s ever-growing needs for a better life. After the Fourth Plenary Session of the 19th Communist Party of China (CPC) Central Committee, General Secretary Xi Jinping pointed out that ‘urban governance is an important part of promoting the modernisation of national governance system and governance capacity’ and stressed that it is the need of the hour to ‘improve the modernisation level of urban governance’ during his inspection trip to Shanghai. Urban governance is the process of guiding and considering various connections among stakeholders, local authorities and citizens. It is the concrete embodiment of national governance in urban space. At the same time, it puts forward the need to have internal requirements for the city governance capacity modernisation.

2.1 Insist on respecting scientific laws

As General Secretary Xi Jinping had pointed out that ‘To do a good job in urban work, we must first understand, respect and conform to the law of urban development.’ Urban governance must pay attention to scientific, as the famous Chinese architect Liang Sicheng once said: ‘City is a science, it has channels, pulse, the texture just like the human body, if you do not treat it scientifically, it will get sick.’ At present, there are still a lot of problems that are criticised in some urban construction. For example, with big demolition and construction in some places, there is a scramble to build tall buildings, and as a result, the whole city is almost everywhere with construction sites. Lack of characteristics, monotonous style, or greedy for foreign of some urban construction; Basic public services, such as education, health, culture and sports are not compatible in some cities, which brings great inconvenience to citizens. These constructions are neither in line with the law of urban development nor in the interests of the people. Therefore, leading cadres at all levels should strengthen their city-related knowledge, learn to understand the science of urban construction and management, grasp the law of urban development, improve the ability to lead urban work in line with the history, instill in the people highly responsible attitude and effectively improve the level of urban construction [4].

2.2 Adhere to fine management

General Secretary Xi Jinping has said that urban management should be as delicate as embroidery. The more megacities, the more delicate their management, the more they need to focus on fine governance, co-governance and rule by law. That is, fine governance is the goal. The requirements of fine management should run through the whole chain of urban work, that is, through all aspects of urban work such as urban planning, construction, management and law enforcement, covering all areas of urban space, and covering all types of people such as tourists and the employed population at all times. Co-governance and rule by law are the means to achieve fine
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2.3 Stick to the road of intelligence

The report to the 19th National Congress of the CPC stressed that ‘we should make social governance more socialised, law-based, intelligent and professional’ and ‘make good use of Internet technology and information technology in our work’. At present, urban governance still faces many problems. The vigorous development of high-tech provides new means and new opportunities to solve these problems. It is necessary to have a clear understanding of the shortcomings in China’s urban governance. We should innovate ideas, systems, mechanisms and methods, and constantly improve the intelligent level of urban governance. Now, some cities have taken the lead in solving this problem and brought tangible results to urban governance through the application of Internet technology. Taking urban traffic as an example, the scattered information can be fused and calculated through the corresponding data and connection, to develop scientific and effective urban traffic governance strategies and plans, such as the development of holiday urban expressway network traffic flow regulation plans, to carry out intelligent and flexible governance of urban traffic. It should also be noted that smart urban governance requires not only innovation in science and technology but also innovation in mechanisms and ideas. Only with an open and inclusive mind, the courage to innovate and support innovation can make our cities smarter and people’s lives better.

3 The problem of data management faced by the modernisation of urban governance

The inner requirement of modernisation of city management ability makes clear that a first-class city should have first-class management, in the sense that we should pay attention to update our scientific knowledge, refinement and to develop artificial intelligence in fracture detection. To truly achieve the internal requirements of urban governance capacity modernisation, urban data management becomes the key point and the powerpoint to improve the level of urban governance [1]. However, the credibility, explanatory power and integrity issues from the perspective of data quality, as well as the availability and privacy issues from the perspective of access methods, are the focus of current urban management [6].

3.1 Data credibility

Whether the big data can reflect the real overall situation determines whether the research conclusion is valid. First of all, big data is not all data. If the conclusion of big data is regarded as ‘whole’, it will surely lead to the wrong sample amount. Second, there may be spurious connections between the data. Big data inevitably simplify complex relationships, resulting in conclusions that may only be valid for specific time and space. Data correlation does not mean true correlation. In addition, random factors will also impact data credibility, such as storage error, data loss or artificial modification and deletion, etc.

3.2 Tool interpretative power

The information sources of big data do not meet the sampling criteria, which makes the explanatory power of tools compared with small data questionable. On the one hand, even though big data is known for its large sample size, there is still a significant portion of the population that cannot be covered. The samples collected usually have group characteristics, such as homogeneity at the age, hobby, region and cultural level, which is
different from the ‘population’ in the sense of sampling used in traditional studies. On the other hand, users have different usage habits for the data products that may be collected. Therefore, there are differences in the degree of information capture for different types of users. In addition, big data, as a way to describe the state of a city, has an impact on the explanatory power of data due to its endogenously ambiguous causality, confused signifiers and cyclic self-strengthening mechanism, and ultimately affects the research conclusions.

3.3 Information integrity

Information flattening is a prominent problem faced by urban big data, which is mainly reflected in three aspects: First, urban space flattening. If only the big data is attached to the geographic space for analysis, the complexity and diversity of urban space itself will be ignored, resulting in the deviation of research conclusions. In a specific application, due to the emphasis on data, the urban space in the study only becomes the simple location carrier of data sources, and the rich urban spatial data information is flattened into the ‘base map’ presented by big data. Second, the crowd motivation is flat. The study of urban space should be more combined with the functional nature, social characteristics, spatial elements of urban zoning, as well as the demographic attributes of samples. Third, the discipline horizon is flat. In urban research involving big data, the application of data often disconnects with other kinds of data and lacks the support of relevant disciplines.

3.4 Data availability

There are two problems in the availability of urban big data research. (1) Information asymmetry between users and service providers, that is, researchers cannot obtain user information that has not been published on the network through crawlers and other means [7]. It will lead to the Matthew effect, in which companies with vast amounts of data will monopolise and dominate the discourse, while individuals or small groups will become increasingly marginalised. Because of the direct involvement of companies, the reliability of the data interpretation of the research results is also questionable. (2) It comes from the high technical threshold and comprehensive discipline of the means of information acquisition. Due to the large amount of knowledge required by the analytical methods of big data, interdisciplinary majors in China have not yet been popularised, so there is a talent disconnection between planning majors and information technology majors. Shortcomings in technology lead to application difficulties.

3.5 User privacy

Foreign scholars use ‘data shadow’ to describe the big data information generated by individuals in their daily activities (such as email, mobile phone signaling, mobile phone applications, social media materials, credit card swiping, ATM use). The illegal tracking, trading and exploitation of user data have become a common phenomenon. In the process of obtaining user data, most commercial sectors have coercive behaviour on user licences. There is also no relevant legislation to address the breach of big data privacy. In May 2018, the EU General Data Protection Regulation came into force. The regulation of personal sensitive data, accountability mechanism, the data subject right, the data processing regulations, data breaches and notification, such as data protection officer has made the detailed provisions. The regulation proposes to protect the data subject’s right to know, access, correction, portability, deletion, restriction of disposal, right to object and the right to automate individual decision-making. Companies that break the rules face hefty fines. This has reference to the significance to the domestic relevant law formulation.

4 Blockchain: A new opportunity for the modernisation of urban governance capacity

A blockchain is a chain in which data is stored in separate blocks connected end to end. It ensures that data is not easy to be tampered with and forged through the verification method of encrypted signature. The blocks are linked in time sequence, and distributed storage and sharing are carried out in all nodes of the network. The
introduction of blockchain will greatly solve a series of problems faced by the quality and acquisition of big data in cities, and release more data vitality.

Blockchain technology has five characteristics, that is, autonomy, decentralisation, tamper-resistant, openness and anonymity. On-chain activities realise synchronous interaction among all network users through P2P mode, without disclosure of identity, transaction information cannot be traced, greatly improving the privacy of the account [8]. And because all participants on the blockchain will record the operational information received in their own ‘ledger’, which is completely public, it cannot be tampered with at will. This is a major breakthrough, which means that the social trust system will change from ‘trust in people’ to ‘trust in machines and algorithms’, and get rid of human interference factors.

The integration and application of blockchain technology and big data will greatly improve the level of authenticity, reliability and richness, and highlight the characteristics of sharing, security and subjectivity. Among them, in terms of quality, the introduction of blockchain improves the authenticity, reliability and richness of big data. In terms of operation process, blockchain will effectively reduce the problem of data loss caused by human factors or accidental factors, and ensure real and effective data. In terms of sample quality, ‘chain management’ opens the black box of big data to ensure that the information source meets the sampling standard and can better reflect the overall state of the city. In terms of data analysis, ‘chain management’ makes the sample more three-dimensional. Researchers can improve the accuracy of urban studies by integrating population information with socioeconomic and geographic information in the same system. In addition, the openness of blockchain lowers the threshold of big data acquisition and fills the data gap [9]. The anonymity of blockchain reduces the risk of user privacy disclosure, on the other hand, respects user subjectivity. Therefore, if Blockchain technology is introduced into urban big data governance and research work, it can effectively help to improve its current predicament.

5 Build a blockchain-based big data management system to strengthen the construction of smart cities

A city is a complex and comprehensive system, and all kinds of scenes gather together, which form a large amount of urban data. However, the unavoidable endogenous defects in the use of urban big data constantly trouble urban governance. Therefore, it is a systematic project to strengthen the modernisation of urban governance with the help of various existing technologies. With the help of the latest technical means, the urban big data management system based on blockchain should be built. It is of great significance to introduce blockchain into
urban big data and improve the quality of urban big data to solve the dilemma of big data in urban governance.

5.1 The complete and comprehensive plan based on big data and regional chain construction should be developed

Blockchain-based big data management systems should be built in areas such as health, education, agriculture, energy, public safety and civil administration. It is necessary to analyse the different status quo and actual situation of each province and city according to big data, design plans with different emphases, and reverse adjust the allocation and utilisation of urban data and material resources. Smart cities with local characteristics should be built according to the local economy, culture and geographical location of the city.

5.2 The application of big data and blockchain technology in urban governance should be expanded

Through the big data management system based on the blockchain, information resources and data are constantly integrated. It is necessary to break through the data sharing channel and build a convenience service information database. We should actively promote the digitalisation, refinement and wisdom of urban management, provide more convenient and rapid feedback platforms and information services for citizens, and realise that ‘data is used to speak, manage, make decisions and innovate’.

5.3 The research, development and implementation of blockchain technology should be promoted to solve the problems and challenges faced by the implementation of technology

The fusion of blockchain technology and big data is based on the existing Internet, cloud computing and other technologies to reshape the trust mechanism. It is also a technology that enables the network to realise the transfer of value while realising the dissemination of information. The Blockchain-based big data management system constructed by this technology divides the whole society into four main bodies: Customer (C-end), Business (B-end), Public (P-end) and Research (R-end). A blockchain-based big data management system will greatly improve urban governance. It builds a user-centred personal information management network. It will improve urban research and guarantee personal ownership of data. It will implement the right to know, the right to access, the right to correct, the right to portability, the right to delete, the right to limit disposal, the right to object. It will realise the digitisation of physical assets, improve the circulation speed of assets, shorten the cycle and reduce transaction costs. It will break the information island, promote the upstream and downstream interaction of the supply chain, reduce the time and economic cost, and strengthen the construction of smart cities. Therefore, to accelerate the construction of digital government, improve the level of data governance, and realise the modernisation of urban governance, it is necessary to accelerate the technological development of blockchain and big data.

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