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Research Article

Perspectives of Collaborative Governance: Integration of Social and Cognitive Computing with Complex Networks

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In the current era, big data play a very important role in various government organizations. Therefore, it is necessary to connect government big data with the national modern governance system since it is a crucial resource, asset, technology, and service support facility for government departments. The government information system requires complex system engineering. The collaborative governance of government data by integrating cognitive computing and complex networks is conducive to eliminating the contradiction and tension between policies and policy subjects. It can reduce the cross and overlap of functions between different departments and form a collaborative mechanism of other governance subjects. The suggested mechanism enhanced the government governance content integrity and system synergy. The modernization of the system is also boosted by governance capacity.

1. Introduction

Government information construction has developed rapidly. Big data have become an important national development strategy, an important asset, an infrastructure, and a service mode [1]. Many scholars and experts call for adjusting government's organizational structure in academic research and practice. To progressively create a big data-driven governance paradigm, social governance should prioritize maximizing collaboration and sharing. With the participation and integration of various social subjects, the intelligent government develops continuously [2–4]. However, the breadth and depth of government big data applications are insufficient in the specific application process. There are still problems in data opening, data sharing, big data centers, and big data service platform construction. Lack of big data application mechanism and legal protection, the government is facing the problem of big data talent shortage, managers backward ideas, and so on [5, 6]. Government big data as a service has been put out in the big data environment, therefore its features and value are covered by those of big data as well. Government big data application services are experiencing challenging service issues and inadequate service quality. Government big data network security and privacy protection are also encountering obstacles. The next generation social network system for smart cities is examined by [7] using a model for software reconfiguration and cognitive computing. In order to provide effective representation and increase robustness, the software reconstruction model is combined with improved versions of traditional social networks in the design of the model. In addition, it is also faced with the imbalance of the government's big data ecosystem. The government big data application system increasingly involves many people, machines, and things, showing the characteristics of complexity, relevance, dynamics, openness, diversity, and hierarchy.

IoT is becoming more sophisticated, interactive, and intelligent than cognitive computing, which is emerging as the third computer era. As time passes, cognitive computing

has the capacity to continuously learn through its interactions with data, people, and circumstances. Through self-improvement and learning, it grows better over time. In order to explore prospects for coinnovation, Chen et al. [8] manipulated customer data and the application of cognitive computing technologies to dynamic capability theory. They also looked at how this improvement enabled complexity theory approaches. The situations in which data mining can be used to address significant issues in complex network theory applications are illustrated [9]. These situations show how the proper integration of complex network metrics can lead to improved classification rates when compared to conventional data mining algorithms. AI is necessary for the Internet of Things. Cognitive IoT (CIoT) is the name given to intelligent IoT. The cognitive IoT employs cognitive computer, a novel computing paradigm that is frequently referred to as the third computing era. IoT will become more sophisticated, intelligent, and engaging thanks to cognitive computing [10].

2. Government Big Data Classification Organization from the Perspective of Super Network

In this section, we discuss government big data classification organization and government open data resources in detail.

2.1. Government Big Data Classification Organization. The external big data generated within the government and collected by the government for work development and management service needs are important to the government's decision. This definition mainly defines government big data from the attribute of big data resources and the dimension of resources [11]. Therefore, it can also be called government big data resources. Accordingly, industry departments pay more attention to data disaster recovery. Still, due to the lack of top-level design and overall planning, there are some phenomena, such as follow-up construction and repeated construction in some local data disaster recovery centers. In addition, the structure of data disaster recovery requires high capital and technology, and the one-time investment is huge. Therefore, the classification of government data should be based on the natural attributes of data, such as scientificity, stability, practicability, and scalability.

Government big data classification has diversity according to different methods. This is because government big data classification must meet the needs of users. Still, in fact, the needs of users are diverse, so a single classification method is bound to be difficult to meet the personalized needs of users. In addition, the classification of government big data is uncertain. For example, if divided by subject, these data may not have a suitable subject, or they belong to one subject and conform to another; if it is divided according to institutions, these data sources may not be just a single department. If the division is unreasonable, it will affect the sharing and utilization of data. In addition, some data resources can be distinguished only from the perspective of the level and degree, so we should pay attention to the flexibility of classification.

The flow of data flow in the process of government big data classification and organization roughly presents three structures. The first is the central radiation type, where the data collection, processing, retrieval, and transmission are concentrated in the organization's data center. The data center provides and publishes data according to the data request required by each department. The second is horizontal, where there is spontaneous regular or irregular organizational data exchange within the organization. The third type is crisscross. Each department manages part of its data independently and establishes interdepartmental links. Finally, the data will be concentrated in the data center. The flow structures of these three data streams are realized under organizational power. The differences in the organizational power of these three structures are analyzed from the perspective of a super network.

2.2. Classification and Organization System of Government Open Data Resources from the Perspective of Hypernetwork. From the users' perspective, the problems existing in the data resource classification of China's government open data websites can be summarized as the following two points: first, the depth and accuracy of open data resource classification are not enough; second, the classification method is single. First, the depth is not enough. According to the observation results of the data disclosure directory of domestic government data open websites, the categories are only level 1 and level 2 in-depth. Furthermore, some have only level 1 directory without level 2 and level 3 directories. Therefore, in terms of resource coverage, the resources currently provided are difficult to meet the main needs of the public. Secondly, the accuracy is not enough. For example, the first-level category covers major fields such as politics, economy, culture, science and technology, and ecological environment. However, the content resources listed under the second-level category are not complete. The first-level directory and content do not have a strong division or matching degree. Furthermore, there is a problem with the lower-level category being next to the upper-level category, which causes issues with data retrieval and low precision. In addition, the metadata description is not detailed enough, and most of them only contain some simple data attributes. These attributes seriously restrict the open serviceability of government big data resources and cannot effectively meet the public's demand for value-added development and reuse of data resources.

Government managers coordinate the classification of government open data resources, catalog classification experts, and data open resource users. Big data resources are transformed from chaos to order through the process of categorizing resources using various categorization dimensions, examining the relationships between data, filtering, sorting, and adding labels to data. Its goal is to create a sensitive, organized, natural, understandable, concise, lively, harmonic, and unified classification system structure.

With such a system, consumers may easily find, browse, and use government open data resources.

3. Government Big Data Management from the Perspective of Super Network

3.1. Key Issues of Traditional Government Big Data Management. This paper roughly divides government information sharing into three stages and summarizes its characteristics. In the first stage, the focus of China's government information resource sharing is vertical information sharing, which is characterized by information sharing among fields, levels, and specialties. Its application is mainly to facilitate government management. In the second stage, China's government information resource sharing began to emphasize horizontal information sharing, but it has an obvious trend of data center, which is characterized by centralized cross-domain, cross-department, and cross-platform information sharing. Its application is to better help government decision-making, which is decision-making sharing. In the third stage, the focus of sharing is still horizontal sharing, but more attention is paid to distributed sharing. Its feature is centralized distributed, that is, to ensure the depth and breadth of sharing, its application is to better help government decision-making and public services, the need of building an intelligent government, and service decision-making sharing.

In specific practice, the government information resource sharing mode can be generally divided into the following two types: one is the point-to-point (P2P) information sharing mode; the other is the information sharing and exchange mode of the information resource management center, as shown in Table 1. These two modes have different characteristics, advantages, and disadvantages and also have their own applicable scenarios.

The data disaster recovery center aims at "soft" disasters such as network hacker attacks, computer viruses, illegal intrusion, human operation errors, or malicious destruction, as well as "hard" disasters such as natural disasters such as fire and flood or hardware failures. It is an emergency remedy for data recovery and business continuity caused by network paralysis, data loss, and business interruption. It is an important infrastructure and service application center in the national information security system. The value of data is higher and higher. The loss of data will bring great harm to social and economic development and public life. Therefore, various industry departments pay more and more attention to data disaster recovery, but due to the lack of top-level design and overall planning, there are some phenomena such as follow-up construction and repeated construction in some local data disaster recovery centers. The construction of data disaster recovery requires high capital and technology, and the one-time investment is huge. The self-built model will consume a lot of energy for the organization, and the outsourcing model also has the risks of the system being out of control, key data loss, and so on. Local disaster recovery cannot cope with regional disaster risks. Remote disaster recovery can deal with a wide range of disaster risks, but the investment cost is high.

3.2. Government Big Data Super Network Management Based on Blockchain. Blockchain is a public ledger based on computer programs. It is a widely participated distributed accounting method. Its essence is to jointly maintain the reliability of the database through decentralization and distrust. It is a tool to help people cooperate in complex and multifields that are not familiar with each other. The main logical entities involved in the blockchain system can be abstracted into department business centers, alliance nodes, other nodes, department data centers, and information databases. Among them, the alliance node is mainly composed of the data centers of civil affairs, health, education, public security, finance, and other government administrative departments or service institutions. Each data center is the information generated and managed by each business field. Alliance nodes include two functions: information transmission and information processing. Each alliance node can provide point-to-point and point-to-multipoint information routing, information transmission, and other functions to store and share data through the consensus mechanism and smart contract function automatically operated by the blockchain system. The imported information is encrypted by the cryptographic algorithm and cannot be tampered with. All alliance nodes jointly maintain and supervise the information. Only when the information of this node is consistent with that of other nodes, that is, to ensure that the information is reliable and nonrepetitive, it can be imported into the blockchain storage system and stored and backed up in the information database. Other nodes are mainly ordinary users such as the public, enterprises, institutions, and nonprofit organizations. After being authorized by the government administrative department, they can search the basic information of individuals in the database and cooperate with the entry of node information.

The method of government information collaborative sharing and data disaster recovery based on blockchain draws on the advantages of traditional data sharing and disaster recovery methods. It can not only realize point-to-point information sharing and exchange among multiple departments but also realize decentralization and distrust. At the same time, it can be backed up, shared, and used many times, and information traceability management, which greatly increases the scope and efficiency of information sharing. Generally speaking, it has the core characteristics and advantages of good credibility, high security, strong transparency, expandability, economy, real-time, and so on.

4. Government Big Data Service from the Perspective of Super Network

4.1. Government Big Data as a Service Approach from the Perspective of Hypernetwork. The definition given in this paper is that government big data as a service are a process of providing services on demand based on the data as a service model and supported by modern information and communication technology, using the perspective of government big data super network and taking users as the center, including data discovery, data fusion, and data interaction. Government big data as a service are an infrastructure and

Table 1: Characteristics, advantages, and disadvantages of two traditional information resource sharing modes.

Pattern	Features	Advantage	Shortcoming
Point-to point (P2P) information sharing mode	Each department needs to establish a connection independently to share the corresponding data information	Decentralized, independent of a third party, two points can be shared and exchanged, with simple structure and convenient implementation	Do not use many to many sharing, poor scalability; poor manageability
Information-sharing mode of information resource management center	A unified information resource management center needs to be established. The data of all departments are centralized in the information resource management center, which is responsible for storing, configuring and exchanging data	Network utilization is relatively high; the information resource management center can backup and notarize the shared content and conduct centralized supervision; high manageability	High requirements for capacity and performance of information resource management center; poor safety

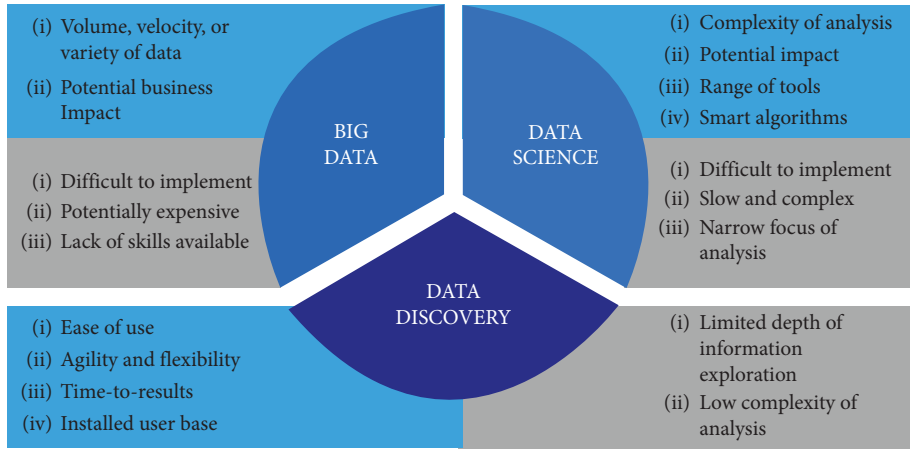

Figure 1: Government big data as a service conceptual model.

a necessary condition for the intelligent construction of the government, with obvious hierarchy. The conceptual model of government big data as a service is shown in Figure 1, which is mainly composed of resources, technology, services, and environment.

Government big data as a service are proposed in the big data environment, so the characteristics of government big data as a service also cover the characteristics and value of big data. Its main characteristics are integration, rapidity of resource allocation, and interaction of public participation:

(i) *Fusion*. Integration is the guarantee of good and quality data as a service, which is first reflected in integration, including cross-platform, cross-department, cross-level, and cross-field data integration, system integration, and equipment integration, which is conducive to solving the information gap and information island, promoting data integration and sharing, and realizing interconnection and interoperability. Secondly, it is multidimensional. Services are diverse in form and content, service channels, and data visualization analysis.

(ii) *The Rapidity of Resource Allocation*. Big data is large in scale and quantity. How to obtain the data required by users from massive data and provide it to users accurately and timely is one of the difficulties faced by big data application services. Data is a service. Through cloud computing, it can realize rapid configuration and rapid calculation in time and space through the accumulation and flow of data resources to ensure on-demand services.

(iii) *Public Participation and Interaction*. The data as a service model change the passive state of receiving government data services in the past by building a public demand expression mechanism and change the passive state into action through the active application. The form, state, and quantity of data can be controlled according to their own needs. In the service process, it can also communicate and interact with government service personnel, clarify or change their own requests, and obtain personalized services through participation and interaction.

4.2. Government Big Data for Public Service Is the Service Guarantee System. The government's big data capability evolved from the big data capability, emerged from the application of big data technology to government work, and the government's ability to obtain, process, and apply data to ensure scientific decision-making and efficient operation. Specifically, the connotation of government big data capability includes three aspects: data acquisition capability, data processing capability, and data application capability. The development of a data resource catalog classification system and the capacity of the government's big data centers for collaborative sharing and data disaster recovery should both benefit from the expansion of big data services. Strengthening the supervision and guarantee capacity of data security, data privacy, and data fraud, improve the development and reuse capacity of data and convert more dormant data into available data.

The value of data is mainly reflected in the matching degree between data association, sharing, and demand. The operation of data association and sharing can be understood as the process of the data resource configuration. Therefore, according to the degree of resource development and actual demand, the utilization of data value can be divided into four types: inefficient, deficient, wasteful, and efficient. In the era of big data, data are widely dispersed in different carriers. Therefore, it is necessary to change the data from disorder to order to form a complex but rule-based data cyberspace. The whole network organization is to connect each node on the network, realize the self-flow of data on the whole network, effectively schedule each node on the network, coordinate the connection between nodes, and completely solve the problem of data island.

The government's public service must thoroughly implement the purpose of serving the people wholeheartedly, and change the negative impression that it was difficult for the public to enter, do things, and look ugly in the past. The

implementation of government policies and the promotion of services need the cooperation of the general public. Therefore, government services must also establish a good reputation, form network communication, and unite the hearts of the people. The capability and manner of public service of a local government department in particular frequently influence the regional economy and social growth. It can effectively entice investment, talent, and other things. As a result, the management division of the public sector of government needs to learn from the practice of keeping up relationships between businesses and other organizations as well as users. Organizations and users place a high value on sustaining users, providing excellent user service, encouraging strong user commitment, and maintaining active user communication.

5. Conclusions

Government informatization construction is a complex system of engineering. As an important resource, asset, technology, and service support facility of government departments, how to deeply integrate government big data with the national modern governance system is a hot issue widely concerned by academia and practice. The government big data application system is a complex system of engineering. Through the research from the perspective of a super network, we have a further understanding of the characteristics of government big data. We suggested solutions to the problems in government big data classification organization and government big data management. We also provided countermeasures for integrating government big data and government service modes. The suggested mechanism enhanced the government governance content integrity and system synergy. The modernization of the system is also boosted by governance capacity.

Data Availability

The data used to support the findings of this study are included within the article.

Conflicts of Interest

The authors declare that they have no conflicts of interest.

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