

Opportunity and Challenge of Surveying and Mapping Geographic Information Service in Big Data Era

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Abstract: In the era of big data, the technology of surveying and mapping geographic information service has developed rapidly. In the background of the new era, surveying and mapping geographic information service should face both opportunities and challenges. The development of surveying and mapping geographic information service in big data era has changed from the storage and transmission of data to the application and mining field. More advanced technology is adopted to deal with all kinds of geographic data information, which not only improves the utilization value of surveying and mapping geographic information itself. By analyzing the input information of surveying and mapping geographic information system, all kinds of data information are integrated and analyzed. In order to ensure the security of geographic information of surveying and mapping, it is necessary to study the feasible encryption technology and storage technology of geographic information security, improve the security of storage of geographic information of surveying and mapping, combine cloud storage and network technology, In the era of big data, surveying and mapping geographic information service needs to meet all kinds of information security challenges, establish a perfect information management system, and improve the level of information geography technology, so as to promote the sustainable development of surveying and mapping geographic information services.

Keywords: big data era; surveying and mapping; geographic information; security; challenge

1. Introduction

With the rapid development of information and communication technology and Internet technology, surveying and mapping geographic information service system is facing new opportunities and challenges in the big data era, but it is also undergoing earth-shaking changes. It has gradually become an indispensable part of people's daily life and office, which has laid a solid foundation for the sustainable development of surveying and mapping industry in China^[1]. Chinese surveying and mapping geography information service has obtained the obvious improvement. However, according to the current situation of surveying and mapping geographic information service in China, there are still many shortcomings. Driven by the big data era, people can quickly access the resources and tools needed for cartography by using the Internet, and now the cartographic work is no longer equipped with specialized technicians and equipment^[2]. Thus, the efficiency and quality of surveying and mapping geographic information service are improved. This paper studies the opportunity of surveying and mapping geographic information service in big data era, analyzes the problems existing in surveying and mapping geographic information service, and analyzes the information security problem of surveying and mapping geo-

graphic information service^[3]. The problem of data optimization and query seriously restricts the sustainable and stable development of surveying and mapping geographic information industry, especially at present people have higher and higher requirements for surveying and mapping geographic information service, and all kinds of problems are gradually exposed, under the environment of big data, this paper studies the optimized data query model and information security storage model of surveying and mapping geographic information service, and analyzes the development opportunities and challenges of surveying and mapping geographic information service. This paper discusses the opportunities and challenges faced by surveying and mapping geographic information service in the big data era, and relevant conclusions are obtained.

2. Opportunity and Challenge of Surveying and Mapping Geographic Information Service

2.1. Opportunity of surveying and mapping geographic information service in big data era

In the era of big data, there are strict requirements for information integration, information sharing and so on. As a result, the scope of people's lives gradually ex-

panded and become an essential tool in life. Big data era plays a significant role in promoting the geographic information service of surveying and mapping. In the era of big data, the opportunities of surveying and mapping geographic information service are described as follows: First, the government, as the correct guide, must truly realize the importance of surveying and mapping geographic information services in the big data era from a fundamental point of view, and according to the characteristics of economic and social development, we can work out a perfect and reasonable strategy to improve the level of information consumption and further strengthen the overall competitive strength of our country.

Second, with the gradual improvement of people's living standards, the demand for surveying and mapping geographic information services in the big data era is also increasing, which indirectly promotes its development opportunities. In this case, both the needs of the relevant government work in China and the needs of the daily life of the social masses will promote the vigorous development of surveying and mapping geographic information services in the big data era.

Third, with the rapid development of science and technology, more and more high-tech, advanced science and technology appear in the development of the modern market, which has also brought new opportunities for surveying and mapping geographic information services in the big data era. Especially in recent years, through the unremitting efforts of technicians, the original structure of surveying and mapping geographic information service has been innovated and reformed constantly, so that it can meet the development needs of the society in the future. In this way, we can not only establish a more perfect system of surveying and mapping geographic information service, but also further improve the level of surveying and mapping geographic information service in China.

Fourth, as the opportunity of development of surveying and mapping geographic information service in the big data era presents a diverse state, it is not only closely related to people's life and work, but also closely related to enterprise production and government management. The sustainable development of surveying and mapping geographic information service in big data era has also effectively driven the rapid rise of other surveying and mapping geographic information services. Surveying and mapping geographic information service in our big data era has a very broad development prospect, which is bound to become the main development trend in the field of surveying and mapping geography in China in the future.

2.2. Challenge of surveying and mapping geographic information service in big data era

The challenges are reflected in the following areas:

First, the security of information management Under the background of big data era, the surveying and mapping geographic information service industry can share a large amount of data information to the public effectively by using the database with its own strong storage capability. It brings a lot of conveniences to daily life and relieves people's pressure in work and life. However, the sharing of data causes the user's own rights and interests to be infringed to a certain extent, and it is easy to produce information security problem. Second, the problem of information storage. In the era of big data, the data scale of surveying and mapping geographic information service is expanding constantly^[4].

Secondly, the optimization storage of surveying and mapping geographic information service becomes an important challenge to information management. This paper studies the big data optimization storage problem of surveying and mapping geographic information service. To improve the security and capacity of data storage, under the big data era, the big data management of surveying and mapping information services has become an important challenge to the industry. In view of the problems and challenges faced by surveying and mapping geographic information service in the era of big data, combining with the problem of information security storage and encryption, the security storage and optimized transmission ability of surveying and mapping geographic information is improved.

3. Data Storage Model Construction for Surveying and Mapping Geographic Information Service

In the era of large data, for the service application of Surveying and mapping geographic information, the results of data query are generally classified according to a certain standard and then displayed to the user, that is, the query field is diverse, but the fields have a common characteristic. The mapping geographic information service is a query condition in the client. The query mode is relatively fixed, but the query parameters need to be changed^[5]. Therefore, a static and dynamic data query template set can be established, which can be expressed as:

$$Q_{set} = \{q_1, q_2, q_3, \dots, q_n\} \quad (1)$$

$$q_i = \{i, \{p_{i1}, p_{i2}, \dots, p_{im}\}, level\}, 0 < i \leq n, q_i \in Q_{set} \quad (2)$$

Where, Q_{set} is the surveying and mapping geographic information query template set, q_i is the i mapping geographic information query template, n is the R mapping geographic information query template and m is the total number of mapping geographic information service templates, m is the number of parameters required for each data query template, $level$ is the type i of the data query

template, taking 0 or 1, respectively, indicating whether or not mapping geographic information service is required to transfer parameter values.

4. Information Security Model of Surveying and Mapping Geographic Information Service

The input information of surveying and mapping GIS is analyzed, which integrates and analyzes all kinds of data information. In order to ensure the security of geographic information of surveying and mapping, it is necessary to study the feasible encryption technology and storage technology of geographic information. In this paper, we use block chaotic encryption technology to design the secure encryption and storage of geographic information in surveying and mapping. With grouping encryption technology, the regional key of mapping geographic information is initialized, input an identity certificate and secret key of message m , and construct a message level table by the authority administrator (group administrator) of surveying and mapping geographic information service. Perform key initialization, set the sent codeword, and the first cycle key as $c = (c_{n-1}, c_{n-2}, \dots, c_0)$, and perform a cyclic encoding of the mapping geographic information is obtained as follows:

$$\begin{cases} m_0 = (P_{01} + P_{02}) / 2 \\ m_1 = (P_{11} + P_{12}) / 2 \\ m_2 = (P_{21} + P_{22}) / 2 \\ \dots \\ m_L = (P_{L1} + P_{L2}) / 2 \end{cases} \quad (3)$$

$$m = 3.57 + \frac{1}{L} \sum_{i=0}^L m_i \quad (4)$$

The public key $h(x)$ generator of digital encryption of surveying and mapping geographic information is $\gcd(h(x), x^n - 1)$, and the key updating method of surveying and mapping geographic information is:

$$\begin{cases} KC_1 = KC_1 \oplus \{t_j, t_{j+1}, t_{j+2}, \dots, t_{j+m-2}\} \\ KS_1 = KS_1 \oplus \{t_{j+m-2}\} \end{cases} \quad (5)$$

Where $j = r \bmod 128$, different message authentication codes are generated in the data monitoring office and sent to each other to perform key update. Password authentication is carried out in the link layer of surveying and mapping geographic information service^[6]. The authentication process of mapping geographic information service encryption is expressed as follows:

$$\begin{aligned} &1: U_{1J} \rightarrow S_1: E_{K_1} \left(\text{leave} \| ID_{U_{1J}} \right) \\ &2: S_1 \rightarrow U_{1J}: ID_{S_1} \| \left(x_{S1} ID_{S_1} \cdot y_{S1} R_{S1} \right) \\ &3: U_{1J} \rightarrow S_1: ID_{U_{1J}} \| R_{1J} \| E_{KS} \left(R_{S1} \| ID_{S_1} \| dsGy_{S2} \| \left(x_{S2} ID_{U_{1J}} \cdot y_{S2} R_{1J} \right) \right) \\ &4: S_1 \rightarrow U_{1J}: DeleteID_{U_{1J}} \| Time \end{aligned} \quad (6)$$

According to the above model design, the security storage and encryption design of surveying and mapping geographic information service in big data era is realized, and the security of surveying and mapping geographic information service is ensured^[7].

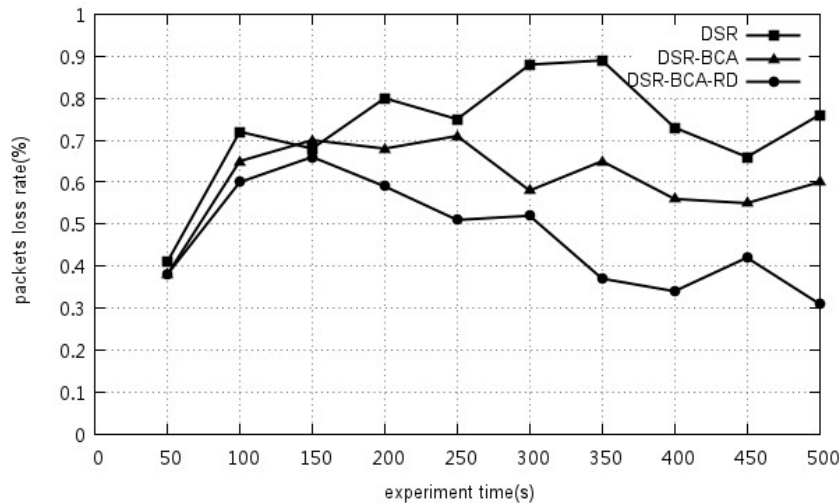


Figure 1. Packet loss rate test

5. Experimental Test

According to the above algorithm design, the security storage and encryption performance of surveying and

mapping geographic information service in big data era is tested, and the data packet loss rate is analyzed. The test results are shown in figure 1. The result of the analysis figure 1 shows that the method of this paper is used to

encrypt and store the geographic information of surveying and mapping, which reduces the data packet loss rate and improves the information security.

6. Conclusions

Under the background of big data era, surveying and mapping geographic information service has created a lot of opportunities for data integration, which indicates that the future development of the industry will be improved. With the development of information processing technology, the problems of information storage security and information transmission security appear in the surveying and mapping geographic information service industry. The development of surveying and mapping geographic information service in the large number times seize the opportunity. To make use of the advantages of the times to promote the long-term and healthy development of our country's economy and society, to face up to the challenges, to continuously strengthen the security construction of surveying and mapping geographic information services, and to ensure information security while enjoying convenient services. In order to ensure the security of all kinds of data information and meet the challenge of information security in the era of big data, the paper improves the value of information utilization by designing

the security encryption and data storage of surveying and mapping geographic information.

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