A Practical Study of Big Data Technology in Computer Network Information Security Processing

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Abstract: In recent years, China has witnessed continuous development and progress in its scientific and technological landscape, with widespread utilization of computer networks. Concurrently, issues related to computer network information security, such as information leakage and virus invasions, have become increasingly prominent. Consequently, there is a pressing need for the implementation of effective network security measures. This paper aims to provide a comprehensive summary and analysis of the challenges associated with computer network information security processing. It delves into the core concepts and characteristics of big data technology, exploring its potential as a solution. The study further scrutinizes the application strategy of big data technology in addressing the aforementioned security issues within computer networks. The insights presented in this paper are intended to serve as a valuable reference for individuals involved in the relevant fields, offering guidance on effective approaches to enhance computer network information security through the application of big data technology.

Keywords: Big data technology; Computer network; Information security

1. Introduction

At the present stage, big data technology is maturing and evolving, with its application fields gradually expanding. This technology enables the analysis of vast amounts of data, facilitating accurate processing and the prediction of development trends in related areas. Substantial research has affirmed that employing big data technology can optimize the adjustment of methods in processing computer network information security. This optimization serves to safeguard individuals' information and enhance the efficiency of daily work.

Consequently, relevant organizations need to pragmatically assess the situation, determine a well-founded application program for big data technology, and foster a deep integration between big data technology and computer networks. This integration aims to maximize the protection of network information security.

2. Problems in computer network information security

2.1. Virus invasion

The application of information technology in computer networks provides users with convenient conditions for obtaining, processing and applying information. However, it also brings about challenges such as Trojan horses, computer virus invasion, and information leakage. Computer virus invasions, for instance, can result in the loss of crucial internal information, jeopardizing the safe and stable operation of computer systems. In severe cases, it can lead to the paralysis of computer systems and networks, significantly impacting user information security [1]. Furthermore, Trojan horses and computer viruses often operate covertly in the initial stages of invasion, making detection challenging. As the security level of computer network systems decreases, the instances of Trojan horses and computer viruses increase, rendering the computer system non-functional.

2.2. Computer software vulnerability

With the widespread use of information and Internet technology, the diversity of computer software has increased. Unfortunately, some developers lack the necessary design skills, resulting in numerous vulnerabilities in the software. These vulnerabilities create favorable conditions for computer virus invasions and hackers to execute network attacks, elevating the risk of network information theft and posing a serious threat to user information and property security.

2.3. Information loss

The computer network system holds an immense volume of information, and spam is often disseminated through news, emails, pop-up windows, etc. Users' computer systems continuously receive this spam, leading to a reduction in storage space [2]. Simultaneously, spam adversely affects the information security of the computer network, disrupting normal computer system operation and causing the loss of essential information, resulting in immeasurable economic losses for users.

2.4. Operation process and security risks

In the practical application of computer network systems, ensuring information security requires the use of system authority facilities, firewall technology, and other measures. Some users, however, lack security awareness and understanding of computer network security technology. Failure to implement computer password protection, firewall technology, and antivirus software configuration increases the risk of computer network information security. Additionally, users with limited computer operation skills may not grasp the processing and maintenance procedures for computer network information security. Frequent operational errors in this context create security vulnerabilities, significantly amplifying the risk to information security [3].

3. Concepts and characteristics of big data technology

Big data, when appropriately harnessed, transforms into a vast repository of valuable information. Big data technology encompasses the methods of acquiring, processing, managing, and organizing this extensive data, offering indispensable reference information for individuals and enterprises in decision-making processes. The key features of big data technology are outlined as follows: Firstly, big data technology excels in enhancing the speed of data acquisition while simultaneously ensuring effective data management; Secondly, it can judiciously utilize various types of data, generating higher value at a reduced cost; Thirdly, big data technology elevates the quality of data and unlocks its latent potential value. This, in turn, maximizes the security of vital data resources.

4. Strategies for the application of big data technology in computer network information security processing

4.1. Application of cloud computing technology in computer network information security processing

Cloud computing technology, an integral component of big data technology, holds significant application value in computer network information security processing. In the practical realm of computer network information security processing, users can leverage cloud computing technology to scale up the processing of massive data, analyze data values, and swiftly complete the flow of data processing. It is evident that judicious application of cloud computing technology can notably elevate the level of information security processing in computer networks, thereby minimizing the risk of important user information loss.

Currently, various mature cloud computing user service models exist. For instance, Zimory adopts the basic user mode of cloud computing, facilitating the storage and computation of information and data, along with the virtualization processing of data and information. Google Docs, adopting the software service mode of cloud computing, offers users commercial software and diverse application services while ensuring information security. Windows Azure, employing the cloud computing platform service mode, establishes a high-quality operating environment for the system [4].

Simultaneously, personal or enterprise computer systems face limitations in storage space, making it impractical to store various data and information indefinitely. The use of cloud computing technology effectively addresses the issue of insufficient storage space within computers. Users can upload relevant information to cloud storage, thereby enhancing the storage capacity of computer network information and preventing the loss of crucial information. In addition, cloud computing technology significantly improves the accuracy and effectiveness of computer network information processing, contributing to the enhanced application value of big data technology in network information security processing.

In the current stage, cloud computing technology is predominantly distributed or side-by-side in composition. Both approaches effectively integrate network information resources, utilizing grid computing to optimize relevant data and ensure secure processing of network information. As cloud computing technology continues to mature, an invisible data transmission path for remote computer networks is gradually established. This enables the safe, stable, and efficient transmission of data and information stored in the cloud and their corresponding models through wireless networks, thereby ensuring the utmost security of data and information [5].

4.2. Construction of a cybersecurity system platform

Within the realm of big data technology, the functionality of the computing network information security platform has progressively evolved, and its stability has seen significant enhancements. This platform now can centralize the management of computer network information, offering users high-quality security services. The primary functions of the currently widely used big data network security system platform encompass data risk assessment, log analysis, security checks, authentication and authorization, and traffic analysis. Notably, the security review is intricately linked to self-learning technology, and log analysis targets information resources, closely aligning with checking tools, management tools, and basic services.

In the practical application of the network security system platform, its internal risk assessment function can be utilized to ascertain the security status of computer network information. For instance, if assessment results reveal security risks within the computer network information, timely warning information can be issued to users [6]. Concurrently, the big data network security system platform boosts an automatic learning function. Through continuous learning, the platform's capabilities are progressively refined. During the process

of network information security processing and protection, the platform utilizes security operations to ensure information security, mitigating issues such as information theft.

The application of big data technology optimizes the processing of diverse types of computer network information, identifying data that poses a threat to the network. Effective measures can then be implemented to address these threats, ensuring information security. Moreover, big data technology facilitates the establishment of a network security system platform service background. This background, through the security defense system, efficiently processes massive data, guaranteeing information security. Additionally, the background offers users intelligent services and information technology services. Leveraging security checks, traffic analysis, log information, and other basic functions, it achieves effective management of various data types, ultimately enhancing the overall effectiveness of network information security processing.

4.3. Big data collection technology

Big data collection technology encompasses various components, including big data pre-processing technology, big data storage technology, big data analysis technology, big data cleaning technology, big data integration and transformation technology, and big data statute technology, among others. The judicious application of these technologies enables the high-quality collection and processing of raw data from computer networks. Additionally, it facilitates the integration and organization of data under specific protocols, allowing for the storage and analysis of various data information. This comprehensive approach ensures the information security of computer networks.

Concurrently, the thoughtful application of big data collection technology establishes favorable conditions for the development of cloud computing technology. By engaging in pre-processing and storage of data, it provides essential data support for the advancement of cloud computing technology [7].

4.4. Big data storage technology

Big data storage technology plays a pivotal role in encrypting and storing information transmitted through computer networks, ensuring the security of stored data. In contrast to traditional modes of computer network information storage, big data storage technology boasts characteristics of being unstructured and real-time. This ensures the timeliness and security of data storage, alongside an expanded storage range, significantly enhancing the security of big data storage.

Furthermore, big data storage technology relies on the support of data backup technology. The collaborative application of these two technologies allows for the storage of essential data resources on backup servers. This proactive approach helps prevent Trojan horse or computer virus attacks on computer systems resulting from data loss, thereby ensuring data security.

4.5. Data key technology

Data key technology encompasses asymmetric key technology and symmetric key technology, both of which contribute to computer network information security processing through distinct methods. Serving as an effective privacy protection measure, data key technology encrypts key data information within the computer system. This technology facilitates the encryption of big data keys, enabling information retrieval and repair after data loss. Consequently, data key technology enhances the information security protection level of computer networks.

In addition, the application of data key technology alleviates the pressure on computer network information security processing. Integrated systems streamline the data encryption process, efficiently overseeing computer network information security, preventing unauthorized intrusion, and ensuring the security of computer network databases.

4.6. Hadoop technology

Hadoop technology presents clear advantages in the realm of computer network information security processing. With its integrated capabilities and data management functions, Hadoop technology can address diverse requirements for the storage and security processing of different types of computer network data. It effectively controls the data management process, reducing the likelihood of errors.

Simultaneously, Hadoop technology allows for the prioritization of processing based on actual needs. By aligning with the specific type of network data information, it determines priority levels. Through effective linkages, Hadoop technology maximizes the protection of network information security [8].

5. Conclusion

Currently, computer networks are ubiquitous in China, and the challenges associated with network information security are increasingly pronounced. Therefore, there is a pressing need to continuously optimize and enhance security protection technologies to ensure high-quality processing of network information security.

Big data technology, with its capability to process massive amounts of information and manage data storage and analysis, holds exceptional value in the realm of computer network information security processing. It is recommended that relevant organizations align their strategies with the current situation to formulate a well-considered application plan for big data technology. Additionally, summarizing pertinent experiences gained in the practical application of this technology can contribute to the ongoing efforts to safeguard the security of data information.

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References

[1]   Wang Y, 2023, Research on Computer Network Information Security and Protection Strategy in the Context of Big Data. Software, 44(4): 178–180.

[2]   Yang M, Han X, Song W, et al., 2023, Research on Information Security Protection of Computer Network Based on Big Data. Information Record Material, 24(3): 74–76.

[3]   Liu Y, 2023, The Use of Computer Information Technology in Network Security Under the Background of "Big Data". Information Record Material, 24(4): 113–115.

[4]   Liu H, 2023, Information Security and Protection Measures of Computer Network Under the Background of Big Data. China Science & Technology Overview, 2023(15): 56–58.

[5]   Li K, 2023, Information Security and Protection Strategy of Computer Network in the Era of Big Data. China Broadband, 19(5): 18–20.

[6]   Yu J, Song Q, Li W, 2023, Information Security Protection of Computer Network in the Era of Big Data. Electronic

Components and Information Technology, 7(2): 213–216.

[7] Huang X, 2023, Application Analysis of Big Data Technology in Computer Network Information Management. Digital Design, 2023(3): 53–55.

[8] Wang B, 2023, Application of Computer Information Technology in Network Security Under the Background of Big Data. China New Communications, 25(12): 119–121 + 223.