

A Review of the Status and Development Strategies of Computer Science and Technology Under the Background of Big Data

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Abstract: This article discusses the current status and development strategies of computer science and technology in the context of big data. Firstly, it explains the relationship between big data and computer science and technology, focusing on analyzing the current application status of computer science and technology in big data, including data storage, data processing, and data analysis. Then, it proposes development strategies for big data processing. Computer science and technology play a vital role in big data processing by providing strong technical support.

Keywords: Big data; Computer science and technology; Data storage; Data processing; Data visualization

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1. Introduction

In recent years, Chinese computer technology has advanced rapidly, and Internet information technology has become widely used. In the era of big data, computer science, and technology have been utilized in all aspects of life, resulting in a new round of reform and development. This requires a new understanding of computer science and technology. Computer science and technology are comprehensive subjects that significantly impact our daily lives. Big data is the collection of vast amounts of data with diverse types and complex processing. In big data, data has become a new resource offering unprecedented insights for decision-making in many industries^[1]. As the key to realizing these functions, computer science and technology provide the infrastructure and technical means for the processing, storage, analysis, and visualization of big data^[2].

2. Current application status of computer science and technology in the context of big data

2.1. Data storage

In the era of big data, traditional data storage methods are no longer sufficient to meet the extensive data needs. The significance of data storage as the foundation for big data processing and analysis is apparent.

Distributed storage systems are a crucial application of computer science and technology in storing data. It uses a distributed approach to store data across multiple nodes, providing data redundancy, load balancing, and fault tolerance features. Computer science and technology support distributed storage systems such as HDFS in Hadoop and Resilient Distributed Dataset (RDD) in Spark. These technologies enable the storage and processing of large-scale data ^[3]. Distributed storage systems are advantageous for meeting data storage needs in the big data era due to their scalability, high availability, and high performance.

Cloud storage is a modern data storage method that uses computer science and technology. It pools storage resources and makes them online through virtualization technology. Users can access these resources from anywhere and anytime using the Internet. Cloud storage has many benefits, such as elasticity, scalability, high security, and availability, making it a popular option for storing data in the era of big data ^[4].

2.2. Data processing

Big data processing involves several steps, including data cleaning, integration, and conversion. Data processing is divided into two modes: batch processing and stream processing. Batch processing is primarily used for large-scale data sets and processes data in blocks. This method is suitable for offline analysis of historical data. Hadoop's MapReduce is a typical batch-processing framework. On the other hand, stream processing is designed for real-time data flow. It can process the data generated immediately, and the results can be outputted in real-time ^[5]. This processing method is ideal for scenarios such as real-time monitoring and early warning systems and stream processing frameworks like Apache Kafka and Storm. MapReduce and Spark, data processing frameworks powered by computer science and technology, can efficiently complete these tasks, significantly enhancing the speed and effectiveness of data processing ^[6]. The technology for processing data is constantly evolving and innovating. In the future, data processing technology will focus more on real-time intelligence and interpretability. Real-time data processing will enhance the speed and efficiency of data processing, catering to more real-time application needs. At the same time, with the continuous advancement of artificial intelligence technology, machine learning-based data processing technology will become more popular. It will be capable of automatically performing tasks such as data feature extraction and anomaly detection.

2.3. Data analysis

Data analysis plays a vital role in big data applications. With the help of computer science and technology, valuable information can be obtained through various data analysis algorithms and tools, such as machine learning and data mining ^[7]. Statistical analysis is the foundation of traditional data analysis, which helps reveal patterns and trends behind the data. On the other hand, machine learning involves learning and improving through computers to perform tasks like classification, prediction, and clustering of large-scale data. Data mining is the process of extracting valuable information and knowledge from massive data, including correlation analysis, sequence analysis, anomaly detection, etc.

2.4. Data visualization

Data visualization is the process of presenting complex data in an intuitive way that facilitates understanding and decision-making. This is made possible through computer science and technology. Data visualization has three main components: data preprocessing, visual design, and interactive technology. Data preprocessing is the foundation of data visualization and includes steps such as data cleaning, integration, and conversion. These steps ensure that the data is accurate and consistent. Visual design is how the data is presented, which can be in graphics, images, animations, and other visual elements such as color, shape, and size. These elements convey

information in a way that is easy to understand. Interactive technology allows users to interact with the data visualization results. This means users can explore and deeply understand the data through interaction^[8]. There are currently many excellent visualization tools on the market, such as Tableau, PowerBI, and D3.js. These tools provide numerous visual templates and customization functions, allowing users to create charts and dashboards easily to better understand the data and analyze the results. Data visualization is widely used in various fields. In the business field, data visualization can help companies analyze sales data, market trends, user behavior, etc., to provide support for decision-making^[9]; in the scientific field, data visualization can help scientific researchers analyze experimental data, meteorological data, geographical information, etc., to elucidate patterns and trends; in the field of public services, data visualization can help government agencies analyze urban planning, traffic flow, public health, and other data to improve service levels and governance capabilities. Data visualization technology will become more efficient, intelligent, and reliable in the future, providing better support for the development of big data.

3. Strategies for the development of computer science and technology in the context of big data

3.1. Utilizing computer technology to achieve intelligent control

With the continuous development of computer technology, intelligent control has become an important research direction in computer science and technology. Computer technology has been widely used in intelligent control and achieved good results. Through intelligent control, automatic detection of the system can be realized, and system operating parameters can be automatically adjusted to achieve the optimal operating state of the system. Two main methods of intelligent control exist: expert systems and neural networks. Expert system refers to handling problems based on human experts' experience, knowledge, and wisdom. It can formulate solutions to problems based on known information. In artificial intelligence technology, expert systems mainly refer to systems used to solve complex computer technology problems^[10]. Neural network refers to data processing and information analysis through computer technology. In the era of big data, neural networks have become one of the important tools in information processing. Intelligent control provides more possibilities for intelligent control. Data can be effectively processed and analyzed through computer technology, providing more basis for intelligent control.

3.2. Realizing automated operations and improve work efficiency

In the era of big data, computer science and technology development have made computer-automated operations possible. Computer-automated operations provide enterprises with more convenience. In the era of big data, enterprises need to improve work efficiency continuously if they want to obtain greater development space. Therefore, enterprises need to use computer technology to process data. If enterprises want greater economic benefits, they must use computer technology rationally^[11]. With the continuous advancement of science and technology, people's ideas and concepts have also undergone great changes. Enterprises cannot be limited to traditional operating methods when applying computer science and technology. Instead, they must upgrade their technology to adapt to the new era. Development needs and computer automation operations can improve work efficiency. Through effective data processing and analysis, automated operations can be improved, resulting in increased economic benefits.

3.3. Building a data security system

With the rise of big data and the advancement of network information technology, the number of internet users

has increased significantly. However, this increase has also led to several risks and challenges for computer systems. Malware, viruses, and hacker attacks pose a significant threat to the security of users' information. Therefore, measures must be taken to protect data and ensure the security of users' information ^[12]. Firstly, a network security management system should be established; secondly, the firewalls of databases should be strengthened. Computer users should update their anti-virus software and firewalls and check for system loopholes regularly. Thirdly, data security and stability of computer systems should be prioritized. Lastly, the management of computer network information systems should be strengthened, and unnecessary data and system loopholes should be eliminated.

3.4. Increasing research efforts and developing new technologies

With the advent of the big data era, the government should develop new technologies to meet the latest development needs. Measures that can be taken include increasing investment in computer science and technology, cultivating more high-quality talents, and continuously improving computer science and technology. For example, computer science and technology-related courses can be established in colleges and universities to train relevant professionals ^[13]. In addition, it is also necessary to train and educate existing talents to improve the overall quality and capabilities. Research institutions should also be established for the research and development of computer science and technology.

3.5. Strengthening talent training and improving work standards

The key to the development of computer science and technology lies in talent training and work standards. Therefore, the cultivation and training of computer science and technology professionals should be strengthened ^[14]. Secondly, computer science and technology-related courses should be strengthened by providing more practical learning opportunities. Lastly, it is imperative to strengthen the recruitment and training of professionals in computer science and technology. A comprehensive and standardized training system should be established to improve the quality of the talents.

3.6. Update ideas and achieve innovative development

Computer science and technology professionals must enhance their innovation skills by integrating new ideas, technologies, and methodologies into their field to better serve the people. Secondly, we must update our ideological concepts and actively accept new things, concepts, and methods ^[15]. The arrival of the big data era has brought huge challenges and opportunities to computer science and technology in China. Therefore, computer science and technology professionals should always keep themselves updated with the latest information in the industry and improve their and strive to improve their comprehensive capabilities.

4. Conclusion

Computer science and technology is a field that requires continuous research. The emergence of big data has opened up new development opportunities for computer science and technology. Therefore, it is crucial to make the most of these opportunities, face the challenges, and utilize computer science and technology in all industries. On the other hand, the big data era also demands constant improvement of one's comprehensive skills. Despite the challenges and obstacles, there is a necessity to persist in learning, researching, and exploring. It is certain that as computer science and technology progress, they will assume a more substantial role in China's modernization endeavors.

Disclosure statement

The authors declare no conflicts of interest.

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