

# Research on computer application technology supported by big data

Zixuan Wang

Wenzhou-kean University, Wenzhou 325060, China

**Abstract:** In today's digital age, the rapid development of big data technology is completely changing the way we live and work. Big data is not only a technology, but also a resource, which provides us with unprecedented amount and diversity of data. The emergence of such large-scale data has brought unprecedented opportunities and challenges to the field of computer application technology. With the popularization of the Internet, mobile devices and sensor technology, big data has become the norm in all walks of life. In this context, how to collect, store, process and analyze these massive data efficiently has become the core issue that needs to be solved urgently in the field of computer application technology. The introduction of big data technology can not only improve the speed and accuracy of data processing, but also help enterprises and organizations make more intelligent decisions, improve efficiency, reduce costs and increase competitiveness. Therefore, it is of great theoretical and practical significance to study the computer application technology supported by big data. The purpose of this paper is to deeply explore the computer application technology supported by big data, and analyze its application status and development trend in different fields.

**Key words:** Big data; Computer; Applied technology

## I. Overview of big data

### 1. Definition and characteristics of big Data

The concept of big data covers several key aspects. First of all, big data is not only the Volume of data, but also the rapid growth of data Velocity and the Variety of data types, which is the so-called three V characteristics. This feature means that big data is large in scale, highly dynamic, and contains all kinds of structured and unstructured data, such as text, images, audio, and so on. Big data is a rich mine, containing rich information and potential value. Through the analysis of big data, hidden patterns, trends and correlations can be revealed to provide powerful support and insight for decision making. In addition, the sources of big data are extremely broad, covering data streams from multiple channels such as the Internet, sensors, social media, and mobile devices. In addition, big data can originate from a variety of systems within a company, including customer relationship management, supply chain management, and human resource management. This diverse data source enables big data to have more comprehensive and multi-angle information, which can better understand problems and explore opportunities. Due to the wide range of data sources, there may be problems such as uneven data quality, duplication or incomplete data in big data sets, so it needs to be cleaned and pre-processed to ensure the accuracy and availability of data. Finally, big data processing needs to have immediacy and must be able to quickly acquire, analyze and generate results in order to cope with the rapid growth of data and real-time requirements. Therefore, big data processing usually relies on efficient computing and storage technologies, such as distributed computing, cloud computing and high-performance databases, to ensure timely processing and analysis of data.

The definition and characteristics of big data make it an indispensable and important resource in the development and decision-making of modern society, but it also needs to overcome a series of challenges, including those in data quality, privacy protection and technical infrastructure. As a result, big data management and analytics have become a key focus for many organizations and industries.

### 2. The development history of big data

The development history of big data can be traced back to the 1990s, when the popularity of the Internet and the advancement of technology gave birth to the rise of big data. This period marked the beginning of a rapid increase in the amount of data generated and stored, and traditional data management tools were no longer competent to handle such large, diverse and fast-growing data. Over time, big data technology has matured, with innovations emerging in distributed computing, cloud computing, big data storage and processing frameworks. The application fields of big data are also expanding, from the initial data analysis of Internet companies to gradually covering various industries such as finance, healthcare, manufacturing, retail and government. The development of big data has facilitated advances in fields such as artificial intelligence and machine learning, providing a strong foundation for more precise predictions, decision support and insight. Over time, big data has become a hot topic in the fields of computer science and information technology, which has played a positive role in promoting scientific research, business innovation and social development. Today, Big data continues to shape our world and holds great potential for solving complex problems and enabling more efficient use of resources.

### 3. Application areas of Big Data

The wide application of big data technology is not limited to the fields of business, healthcare, finance and social media, it also plays an important role in many other fields. In urban planning and sustainability, big data analytics can be used in urban traffic management, resource allocation and environmental monitoring, helping to improve the quality of life of urban residents and the sustainability of cities. In addition, in the field of education, big data analytics helps to understand students' learning needs and performance, thereby supporting personalized education and providing more effective educational resources. In the transportation sector, big data can be used for traffic flow management and optimization to improve road safety and traffic efficiency. In the energy sector, big data technology can help optimize

energy use, improve energy efficiency and promote sustainable development. In agriculture, big data analytics can be used to monitor and predict the growth of crops to improve crop yields and agricultural sustainability. In the government and public services sector, big data can help governments better allocate resources and provide more efficient public services and urban management. In short, the wide application of big data technology is driving innovation and improvement in various fields, bringing positive changes and upgrades to our lives and society.

## II. Big data technology basis

In today's information age, big data has become a hot topic. The emergence of big data technology has brought many new opportunities and challenges for computer application technology.

### 1. Data acquisition and storage technology

In the era of big data, data collection and storage is an important part of computer application technology. Data collection is an important link in big data technology. First of all, we need to choose the right data source. The collection of large-scale data requires effective technical means and methods, and the collection of data can be achieved in various ways, including sensors, social media, Internet of things and so on. Secondly, we need to adopt appropriate collection methods and tools to obtain data. Common data acquisition methods include crawler technology, packet analysis technology and so on. In addition, storing massive amounts of data efficiently is also a challenge. The storage of the data is a key issue. The storage of large amounts of data requires powerful storage devices and database systems. Common storage devices are hard disks, solid state drives, etc. Database systems such as Hadoop and NoSQL provide the ability to efficiently store and manage large-scale data.

### 2. Data processing and analysis technology

Raw data often contains noise, duplicates, and error values, which can interfere with subsequent data analysis and mining. Data preprocessing and cleaning techniques are designed to remove these problems from the raw data. Data processing and analysis is one of the key aspects of big data technology. Data analysis and mining technology is the core of computer application technology supported by big data. By applying various statistical and machine learning methods, valuable information can be extracted from big data and hidden patterns and correlations can be discovered. In big data scenarios, massive amounts of data need to be processed and analyzed effectively in order to unearth valuable information. Data processing technology includes data cleaning, data integration, data transformation, etc. Data cleaning refers to the processing of the original data, such as denoising, removing weight and filling gaps, in order to ensure the quality and consistency of the data. Data integration is the integration of data from multiple data sources in order to conduct comprehensive analysis. Data transformation is the format conversion, normalization and other processing of data to meet the needs of analysis. Data analysis techniques include statistical analysis, machine learning, data mining and so on. These techniques can help us discover hidden patterns, patterns and trends in massive amounts of data.

### 3. Data visualization and presentation technology

Intuitive display of analysis results to users is the key to improve the effectiveness of data analysis and user experience. Visualization and interaction techniques can help users understand and explore data. Data visualization and presentation technology is a way to present and communicate data to users in a visual form. Through data visualization, we can understand and analyze data more intuitively. Data visualization techniques include charts, maps, dashboards, etc. It can not only be used for static data presentation, but also for dynamic interaction, allowing users to freely explore the data. Data visualization technology is used in a wide range of applications, including business analysis, scientific research, visual analysis, etc.

## III. Future trends and challenges

### 1. The future development trend of computer application technology supported by big data

With the advent of the era of big data, computer application technology is facing a series of development trends. First of all, artificial intelligence and machine learning technology will usher in rapid development in the big data environment, which can provide more intelligent solutions for all walks of life by analyzing and mining massive data. Second, the rise of cloud computing and edge computing enables computer application technologies to make better use of distributed computing power and storage resources, accelerating the speed of data processing and application. In addition, the Internet of Things technology will also be combined with big data technology to promote the gradual development of computer application technology in the direction of intelligence, automation and unmanned.

### 2. Technical challenges and problems faced

With the continuous emergence of big data, computer application technology is also facing some challenges and problems. First, the scale and complexity of data has led to higher requirements for data storage, processing and analysis. How to achieve efficient data management and processing has become an urgent problem to be solved. Secondly, with the growth of big data, the privacy and security of data are also facing serious challenges. How to protect the security of user data during the collection, transmission and storage of data has become an important task. In addition, ethical and legal issues related to big data also need to be reasonably addressed.

### 3. Possible solutions and suggestions

In order to overcome the above-mentioned technical challenges and problems, we may consider the following solutions and suggestions. First, we should strengthen the research and development of data management and processing technology to improve the efficiency and reliability of data storage, processing and analysis. Secondly, protection measures for data privacy and security should be

strengthened, relevant regulations and policies should be formulated, and advanced encryption and identity verification technologies should be adopted to protect the security of user data. In addition, attention should be paid to the ethical and legal issues of big data, reasonable data use and sharing mechanisms should be advocated, and relevant regulatory bodies and mechanisms should be established.

#### **IV. Conclusions**

In the era of big data, computer application technology plays a pivotal role. The purpose of this paper is to study the computer application technology supported by big data, and find that big data has a profound impact on computer application technology. Although the current computer application technology supported by big data has achieved remarkable results, there are still some challenges and needs to be solved. To this end, we propose the following future research directions. First, the efficiency and performance of big data processing should be further improved to meet the growing volume of data and rapidly changing needs. Second, the issues of big data security and privacy protection should be deeply studied to build reliable data processing and storage systems. In addition, attention should be paid to the application of big data in different fields, such as medical care, finance, transportation, etc., to provide better solutions and services.

To sum up, the research on computer application technology supported by big data is a subject of great significance. Through the research of this paper, we get the importance of big data in computer application technology, and put forward the future research direction. It is expected that these findings and suggestions can provide useful guidance and reference for the development of computer application technology in the era of big data.

#### **References:**

- [1] Jinghui Chen. Research on Analysis and Development of computer Application Technology in Big Data Environment [J]. Materials for Information Recording,2023,24(07):211-213.
- [2] Danmei Chen. Analysis on Innovative Teaching of Basic Computer Application Course in the Era of Big Data [C]// Institute of Education Science, Chinese Academy of Management Science. Guangzhou Vocational College of Urban Construction; , 2022:
- [3] Xiaoluo Zhang,Qianqian Liang. Analysis and development of Computer application technology in Big Data environment [J]. Information and Computer (Theoretical Edition),2023,35(06):43-45.
- [4] Si Zeng. Analysis and Research of Computer Application Technology supported by Big Data [J]. Information Recording Materials,2023,24(02):91-93.