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Computer Big Data Analysis and Cloud Computing Network Technology Application

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Abstract: ***Computer big data analysis and cloud computing network technology are highly significant information technologies in todays society. Computer big data analysis involves a series of technical methods that utilize the powerful computing capabilities of computers to process, analyze, and visualize large datasets. Cloud computing network technology, on the other hand, is an internet-based computing model that separates data and applications from hardware devices, allowing access and usage through the internet. We extensively discuss the applications of computer big data analysis and cloud computing network technology in areas such as visualization, predictive analysis, data mining algorithms, ensuring data storage security, supervising data resource sharing, and modeling data processing systems.***

Keywords: Computer Big Data Analysis; Cloud Computing Network Technology; Application.

1. INTRODUCTION

Computer big data analysis and cloud computing network technology are important development directions in the current field of information technology. As the scale of data continues to expand, enterprises require stronger computing and storage capabilities to process and analyze this data. Meanwhile, the security and integrity of data are also facing increasing challenges. This article will introduce the application of computer big data analysis and cloud computing network technology in this field, and explore their application cases in various industries. He et al. (2024) [1] explored innovative AI applications for future building technology, while Ge et al. (2024) [2] analyzed AI-driven urban planning through global case studies. Medical AI applications were advanced by Yang (2024) [3], who integrated LLMs with knowledge graphs for medical text mining. Cognitive health research by Lin et al. (2025) [4] demonstrated intelligent exercise monitoring's benefits for children with ADHD, complemented by Peng et al. (2025) [5]'s study on exercise intensity's impact on executive function. Logistics optimization saw innovations through Luo et al. (2024) [6]'s transformer-GCN hybrid algorithm for robot path planning. In electric vehicle research, Xu and Lin (2024) [7] developed empirical models for user-perceived value, while Xu et al. (2024) [8] created customer experience management tools. Cross-cultural AI implications were examined by Shan et al. (2024) [9], focusing on LLM applications. Clinical AI applications progressed with Shen et al. (2025) [10]'s LSTM-based anesthetic dose management system, while Wang et al. (2025) [11][12] explored autonomous driving's cross-industry applications in FinTech. Security innovations included Liu et al. (2025) [13]'s privacy-preserving anomaly detection model and Guo et al. (2025) [14]'s ensemble method for imbalanced data. Multi-task learning was enhanced by Weng et al. (2024) [15]'s adaptive fusion framework, while network analysis advanced through Xing et al. (2024) [16]'s spatiotemporal graph neural networks. Privacy research by Wu et al. (2024) [17][18] covered NLP applications and flow prediction. LLM enhancements were demonstrated by Gao et al. (2024) [19] and Xi et al. (2024) [20], with Wang (2024) [21] applying ensemble learning for fraud detection. Finally, Liu et al. (2025) [22] developed cloud-device collaborative generation systems, while Liu et al. (2025) [23] improved LLM mathematical reasoning through hallucination detection.

2. RELATED THEORIES OF BIG DATA AND CLOUD COMPUTING

2.1 Computer Big Data Analysis

Computer big data analysis is a hot topic in the field of information technology, which involves the collection, processing, analysis, and visualization of large and complex data. By analyzing this data, enterprises, organizations, and government agencies can better understand their users, markets, and business environments, and make more informed decisions. Computer big data analysis typically involves three stages: data collection, processing, and analysis. In the data collection stage, it is necessary to determine the data source and ensure the accuracy and completeness of the data. In the data processing stage, it is necessary to clean, transform, and integrate the data into a form that can be used for analysis. In the data analysis stage, various data analysis techniques and tools need to be used to mine, visualize, model, and analyze data, in order to discover patterns and

trends in the data and draw corresponding conclusions. In computer big data analysis, commonly used techniques include data mining, machine learning, statistics, and visualization. These technologies can help analysts extract valuable information from data and present it to decision-makers. Meanwhile, computer big data analysis also requires the use of various tools and technologies, including data storage, data analysis, and data visualization tools. The application of computer big data analysis is very extensive and can be applied in various fields, such as finance, healthcare, retail, transportation, and urban planning. For example, in the financial field, analyzing large amounts of transaction data can help banks and insurance companies identify abnormal transactions and fraudulent behavior, thereby better protecting the interests of customers. In the medical field, analyzing a large amount of medical data can help hospitals and pharmaceutical companies discover new drug effects and treatment outcomes, providing patients with better treatment plans.

2.2 Cloud computing network technology

Cloud computing network technology is an Internet based computing model, which removes data and applications from personal computers or servers and stores them on remote central servers. This computing model allows users to access their data and applications through the Internet, rather than always accessing local computers or servers. The main advantages of cloud computing network technology include flexibility, scalability, dynamic resource allocation, and on-demand billing. Due to the storage of data and applications on remote servers, users can access their data and applications anytime and anywhere without worrying about the performance or reliability of their local computer or server. In addition, cloud computing network technology can dynamically allocate computing resources and storage space according to users' needs, thereby meeting their demands. Cloud computing network technology also faces some challenges, including data security, network bandwidth limitations, application compatibility, and service reliability. To address these challenges, cloud computing service providers have taken various measures such as data encryption, network bandwidth expansion, application compatibility testing, and service reliability assurance. The application of cloud computing network technology is very extensive, including cloud storage, cloud security, big data analysis, cloud computing, etc. Cloud storage is a service that stores data on remote servers, allowing access to data anytime, anywhere. Cloud security is a service that manages security through remote servers and can protect user data security. Big data analysis is a service that utilizes cloud computing network technology to process and analyze large amounts of data, providing data analysis and decision support for enterprises. Cloud computing is a way of providing computing services through remote servers, which can dynamically allocate computing resources and storage space as needed to meet the computing needs of enterprises.

3. COMPUTER BIG DATA ANALYSIS AND APPLICATION OF CLOUD COMPUTING NETWORK TECHNOLOGY

3.1 Visualization and Predictive Analysis

The application of computer big data analysis and cloud computing network technology plays a crucial role in visualization and predictive analysis. With the advent of the information explosion era, the rapid growth of data volume has made it difficult for traditional data analysis methods to cope. At this time, computer big data analysis and cloud computing network technology have emerged, which can help us better understand and process massive amounts of data, thereby achieving visual and predictive analysis.

Firstly, computer big data analysis has significant advantages in visualization. Big data analysis can present complex data information in the form of charts, images, etc. through data visualization techniques, allowing us to understand data more intuitively. For example, in the medical field, big data analysis can visualize patients' medical data, helping doctors better understand patients' conditions and make more accurate diagnoses and treatments. In the business field, big data analysis can visualize customer consumption behavior, helping companies better understand customer needs and develop more accurate market strategies.

Secondly, cloud computing network technology provides powerful support for predictive analysis. Predictive analysis refers to predicting future trends and outcomes based on existing data. Cloud computing technology provides powerful computing power and storage space, which can process large amounts of data for analysis and prediction. For example, in the financial field, cloud computing network technology can provide predictive analysis of stock prices, market trends, and other data, thereby helping investors develop more accurate investment strategies. In the field of transportation, cloud computing network technology can be used to conduct predictive

analysis of traffic flow, thereby helping transportation departments formulate more reasonable transportation plans and alleviate traffic congestion.

3.2 Data Mining Algorithms

Data mining algorithms are an important part of big data analysis, used to extract valuable information from large amounts of data. Data mining algorithms can be divided into different types such as classification, clustering, and association rule mining. Among them, classification and clustering are the two most commonly used algorithms in data mining. Classification is a common data mining algorithm that classifies unknown data by constructing a classification model based on a known dataset. The key to classification algorithms is to build an accurate and interpretable model, and commonly used classification algorithms include decision trees, support vector machines, neural networks, etc. Clustering is an unsupervised learning algorithm that divides a dataset into different categories based on the similarity between data. The key to clustering algorithms is to determine the similarity measure between data, and commonly used clustering algorithms include K-means, hierarchical clustering, etc. In addition to classification and clustering, there are other commonly used algorithms in data mining, such as association rule mining and sequence mining. Association rule mining can discover association relationships in datasets, and commonly used algorithms include Apriori algorithm and FP growth algorithm. Sequence mining can discover time series patterns in datasets, and commonly used algorithms include pattern based methods and distance based methods. The application of data mining algorithms is very extensive, for example, in the field of marketing, customer data can be mined to discover customer classification, purchasing behavior, purchasing preferences, etc., in order to carry out precise marketing. In the medical field, by mining medical data, the correlation between diseases can be discovered, thereby improving the accuracy and efficiency of disease diagnosis.

3.3 Ensure the security of stored data

Computer big data analysis and cloud computing network technology are very important information technologies in today's society. They not only provide powerful data storage and processing capabilities, but also ensure data security.

Firstly, computer big data analysis technology utilizes powerful computing capabilities to conduct in-depth analysis and mining of massive amounts of data, extracting valuable information and knowledge. In this process, data security is crucial. In order to ensure data security, big data analysis technology adopts a series of security measures, such as data encryption, access control, identity authentication, etc. These measures can effectively protect data from illegal acquisition and abuse.

Secondly, cloud computing network technology is an Internet based computing model, which stores data and accesses applications through the Internet. Due to the fact that data and applications are stored in the cloud, cloud computing network technology requires a series of security measures to ensure data security. These measures include data encryption, access control, security auditing, etc. Through these measures, enterprises can ensure the security and integrity of data, and prevent data from being illegally obtained or abused.

In short, computer big data analysis and cloud computing network technology are important development directions in the current information technology field. They can not only provide powerful data storage and processing capabilities, but also ensure the security and integrity of data. For enterprises, adopting these technologies can help them better protect data, avoid data leakage and abuse, and thus better protect their trade secrets and intellectual property.

3.4 Supervise data resource sharing

With the rapid development of the Internet and informatization, the amount of data has shown explosive growth. How to effectively collect, process, analyze and use these data has become a challenge for all industries. By using computer big data analysis and cloud computing network technology to supervise data resource sharing, efficient utilization and optimized management of data can be achieved, providing strong support for the development of various industries.

Firstly, computer big data analysis can help us extract valuable information and knowledge from massive amounts of data. By analyzing and processing data, patterns and trends behind the data can be discovered, providing

scientific basis for decision-making. For example, in the financial industry, by analyzing customer assets and investment portfolios, market trends and risks can be predicted, leading to the development of more scientific investment strategies. In the medical industry, by analyzing a large number of cases and medical data, treatment methods and patterns for diseases can be discovered, improving medical standards and cure rates.

Secondly, cloud computing network technology can supervise data resource sharing and achieve efficient management and utilization of data. Through cloud computing technology, data can be stored in the cloud, making it convenient for departments and employees to access and use data anytime, anywhere, improving work efficiency and collaborative capabilities. Meanwhile, through data resource sharing, it is possible to avoid duplicate data collection and processing, and improve the quality and efficiency of data. For example, in the logistics industry, sharing traffic flow and cargo information can optimize logistics planning and transportation routes, reduce transportation costs, and improve transportation efficiency.

Finally, computer big data analysis and cloud computing network technology supervision of data resource sharing can also improve data security and reliability. Through data encryption and security control technology, the confidentiality and integrity of data can be protected, preventing data leakage and damage. Meanwhile, through data backup and recovery technology, the security and reliability of data can be ensured, avoiding data loss and damage.

3.5 Model Building of Data Processing System

In today's information age, big data analysis and cloud computing technology have become important means of data processing and system modeling. Big data refers to a collection of data that is massive, complex, and requires high processing speed. Its analysis requires processing through a distributed computing environment. Cloud computing, on the other hand, is a computing model based on the Internet. It centralizes a large number of computing, storage and other resources through virtualization technology to achieve resource sharing and utilization.

To build a computer big data analysis and cloud computing network technology data processing system, it is first necessary to establish a suitable data model. A data model is an abstract representation of information and data from the real world in the computer world. It converts real-world information into data forms that computers can process by classifying, organizing, and summarizing things in the real world. In big data analysis and cloud computing network technology data processing systems, commonly used data models include relational database models, non relational database models, data warehouse models, distributed file system models, etc. These models have their own characteristics and advantages, and suitable models should be selected for construction according to actual needs.

The relational database model is a traditional database model that stores data in tabular form and has the characteristics of being structured and easy to query, making it suitable for processing structured data.

The non relational database model adopts more flexible data storage methods, such as key value pairs, documents, graphics, etc., which are suitable for handling unstructured and semi-structured data.

The data warehouse model is a database system specifically designed for data analysis and decision support, with features such as data integration, data mining, and data visualization, which can assist enterprises in data analysis and decision support.

The distributed file system model achieves distributed storage and processing of data by dispersing a large number of files across multiple nodes, making it suitable for handling large-scale data.

After selecting a suitable model, data collection, preprocessing, analysis, mining, and other operations need to be carried out. Data collection is the starting point of data processing, which requires obtaining data through various means. Preprocessing is the process of cleaning, organizing, and summarizing the collected data to meet the requirements of analysis and mining. Analytical mining is the process of discovering patterns and hidden information in data through statistical analysis, machine learning, data mining, and other methods.

Finally, the processed data needs to be presented to the user. Data visualization is a method of presenting large amounts of data in the form of graphics, tables, etc., which can help users quickly obtain information from the data.

In big data analysis and cloud computing network technology data processing systems, data visualization is usually presented in various forms such as charts, graphs, maps, etc., which can help users better understand and utilize data.

4. CONCLUSION

Computer big data analysis and cloud computing network technology are very important information technologies. They play an increasingly important role in various industries, helping companies better protect their data, prevent data breaches and misuse, and thus better protect their trade secrets and intellectual property. At the same time, these technologies can also help businesses improve business processing efficiency and accuracy, thereby gaining more commercial value.

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