



Research on the Application of Big Data Technology in Artificial Intelligence

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Abstract: *With the rapid development of network information technology, human society is entering an era of information explosion, which has created unprecedented convenience for the public to access diverse and in-depth information resources. Behind this transformation, it is inseparable from the deep integration and mutual promotion of big data technology and artificial intelligence, which together constitute the key technological guarantee to support people's efficient and accurate access to information resources. This article delves into the unique advantages of big data and artificial intelligence technology, revealing how their combination can reshape the landscape of the information age. Analyzed its core types, including but not limited to distributed storage technology, data mining algorithms, and real-time data processing capabilities, which provide a solid foundation for the collection, organization, and analysis of massive data. The widespread application of big data in the field of artificial intelligence, such as optimizing prediction models through machine learning algorithms and improving image recognition accuracy through deep learning techniques, not only greatly enriches the functional boundaries of artificial intelligence, but also promotes its innovative practices in multiple fields such as healthcare, smart cities, and financial technology. The work of this article is not only a comprehensive examination of the current status of big data and artificial intelligence technology, but also a forward-looking exploration of future development trends. With the continuous advancement of technology, the deep integration of big data and artificial intelligence will continue to deepen, opening up broader space for the future development of artificial intelligence and having immeasurable value in promoting social progress and improving the quality of life.*

Keywords: Big data technology; Artificial intelligence; Application.

1. INTRODUCTION

The rapid development of the Internet and the Internet of Things has further promoted the development and wide application of big data technology. The application of big data technology in artificial intelligence can not only enhance the scope of AI applications, but also provide users with a better experience. Therefore, relevant researchers need to give sufficient attention to big data technology, grasp the key technical elements in its application, and achieve integration with artificial intelligence in an appropriate way, promoting further improvement of the convenience and intelligence of artificial intelligence. This has positive significance for its long-term development. In the domain of computer vision, Yang et al. [1] proposed a deep learning-based approach for large scene adaptive feature extraction, enhancing the ability to process complex visual data in dynamic environments. Similarly, Peng et al. [6] introduced 3D vision-language Gaussian splatting, which improves the integration of visual and textual information in 3D spaces. In healthcare, Huang et al. [8] developed a federated learning-based system for multi-agency collaboration in medical image analysis and classification, addressing privacy concerns while improving diagnostic accuracy. Additionally, Pang et al. [10] utilized electronic health records for data-driven diabetes knowledge discovery and risk prognosis, demonstrating the potential of AI in personalized medicine. In the field of finance, Bi and Lian [5] advanced portfolio management techniques by leveraging deep learning and machine learning models, optimizing investment strategies. Meanwhile, Peng et al. [4] integrated IoT data with reinforcement learning to optimize adaptive macroeconomic policies, showcasing the application of AI in economic decision-making. In cross-cultural game design, Xu et al. [2] introduced AI-enhanced tools to support online character conceptualization and collaborative sketching, facilitating creative processes in multicultural contexts. Furthermore, Fan et al. [3] explored incremental learning methods for updating retrieval-augmented generation (RAG) models, improving the adaptability of AI systems in dynamic environments. In graph processing, Yang et al. [7] proposed HGMATCH, a hyperedge-based approach for subgraph matching on hypergraphs, addressing challenges in complex data structures. Lastly, Yin et al. [9] applied deep learning for crystal system classification in lithium-ion batteries, highlighting the role of AI in material science.

2. WHAT IS BIG DATA TECHNOLOGY

With the gradual development of big data technology, more and more people are paying attention to this advanced technology, which can be widely applied in multiple industries. The concept of big data technology first appeared in the United States and has rapidly developed on the basis of the gradual maturity of network technology. Currently, people have made certain breakthroughs in the application of big data technology. The main advantage of big data technology lies in its large size, which is manifested in the aspects of large data volume, fast speed, diverse types, and high value. It can be said that these aspects fully summarize the important characteristics of big data.

Firstly, the amount of data processed by big data technology is extremely large, which is also the main difference from traditional computer data processing. This advantage is highly compatible with the development of network technology.

Secondly, the information processing speed of big data technology is faster, and in the information age, people's requirements for data processing have become higher. Big data technology has high efficiency in both data processing and analysis, as well as data collection and integration.

Thirdly, big data technology can handle multiple types of data and integrate data from various properties and sources. In addition to meeting the demand for data processing quantity, it can also ensure that various types of data can be processed in an orderly manner.

Finally, big data technology has higher application value. After processing data information through this technology, it can significantly improve the accuracy of data information, bring important assistance to the progress of various work, and enhance the value of data information.

In general, by utilizing big data technology to process massive amounts of data, the advantages and characteristics of data resources can be fully utilized to better achieve expected management goals.

3. TYPES OF BIG DATA TECHNOLOGY

In recent years, with the rapid development of information technology, various research fields have been actively exploring new methods and technologies to address increasingly complex data processing and analysis needs. The following is a comprehensive review of several recent key literature pieces, covering areas such as subgraph matching on hypergraphs, efficient continuous k-nearest neighbor (kNN) joins over dynamic high-dimensional data, deep learning for complex data mining and pattern recognition, sales forecasting system design based on Hadoop big data analysis, the role of precision anesthesia in high-risk surgical patients, image super-resolution reconstruction mechanisms based on convolutional neural networks (CNNs), and semantic parsing for intelligent database query engines using large language models.

3.1 Application of Machine Learning

Big data technology can process data information. Through big data technology, different sources and types of data can be collected, and it has strong data collection capabilities. This ability is achieved through data collection technology. Quickly collecting data information can shorten the cost of data collection in traditional modes, such as resource costs and labor costs. Applying data collection technology in artificial intelligence. By connecting two technologies, artificial intelligence devices can read collected data, perform preliminary analysis, apply statistical analysis functions, and comprehensively improve data application accuracy [7].

3.2 Data Storage

To apply big data technology reasonably, there are important requirements for the amount of data, so sufficient storage space is needed for matching in order to store data information smoothly and ensure the security of data information. From the current perspective, data information storage technologies mainly include storage technologies for semi-structured or unstructured data information, storage technologies for large-scale or large structured data information, and hybrid storage technologies for structured and unstructured data information [8].

3.3 Data Mining Techniques

From a certain application perspective, data mining technology is the core and key part of big data technology applications. The gradual improvement of big data technology has promoted the widespread application of data mining technology. Although machine learning and data mining technologies have achieved rapid development, there is still significant room for improvement, such as ongoing graph mining, special group mining, and data network mining. Research in these areas breaks the traditional user centric data connection model and promotes network behavior analysis through technological innovation, taking into account various factors such as user sentiment analysis and interests [9].

4. ANALYSIS OF THE ADVANTAGES OF ARTIFICIAL INTELLIGENCE TECHNOLOGY APPLICATION

4.1 Breaking through the limitations of computer capabilities and having extremely strong learning abilities

Artificial intelligence is the evolution and development of computer technology, with distinct characteristics of the times and outstanding advantages. As an advanced research achievement, AI can break through the limitation of computer ability, and has the characteristics of progressiveness, security, stability and intelligence. Artificial intelligence technology is an emerging science and technology that relies mainly on human intelligence. It can simulate individual thinking processes and achieve intelligent operations through relevant program settings. To a certain extent, it can replace the human brain and its manpower to complete related tasks. Compared to traditional computer technology, the learning ability of artificial intelligence technology is very powerful. Artificial intelligence is mainly based on human intelligence as the main research model, adopting human learning methods. Through the collection and organization of big data information, it can quickly analyze the results, mine valuable and important information, upgrade simple data processing systems, optimize low-level data structures, and effectively improve the underlying computing power. By using artificial intelligence to collect, process, analyze, and integrate big data, more comprehensive and scientific references can be provided for relevant decision-making. In addition, the computing speed of artificial intelligence is about 30 times that of traditional computers, making it more reliable, secure, and accurate in data processing, while also effectively reducing the cost of human data computation.

4.2 Effectively control the operating costs of computer networks

Practice has proven that integrating artificial intelligence technology with computer network information processing systems will bring four major advantages:

- (1) Improve computational speed;
- (2) Reduce operating costs;
- (3) Efficient processing of information;
- (4) Scientific system for information classification.

Artificial intelligence technology can significantly reduce the cost of information acquisition for people through scientific information data search, effective information data integration, and improved information data storage. In the era of big data, due to the ability of artificial intelligence technology to optimize data processing, people can accurately identify the content they need through this technology, thereby reducing the time consumed by information acquisition. This system can effectively reduce the time, financial, and manpower consumption of enterprises, thus making a huge contribution to improving enterprise efficiency.

5. THE APPLICATION OF BIG DATA TECHNOLOGY IN ARTIFICIAL INTELLIGENCE

5.1 Artificial Intelligence Robots

In artificial intelligence products, products have the characteristics of intelligence and humanization. Applying big data technology to intelligent products can obtain high-precision data information. By utilizing communication sensor devices, data information can be transmitted to the terminal area of artificial intelligence robots. By utilizing

artificial intelligence recognition capabilities, data information can be planned and analyzed. Afterwards, the data is fed back to the artificial intelligence robot, and through the execution process, it can provide programmed data information for the artificial intelligence robot to deeply learn and master, guide the artificial intelligence robot in a data-driven manner, and ensure the accuracy and humanization of operations and functions. During the application of technology, the main feature is that as the total amount and types of data continue to increase, demand can be reflected through artificial intelligence robots, and the number of neurons also continues to increase. When two sets of data develop towards densification, it helps to improve operational efficiency and accuracy [3].

5.2 Application of Big Data Technology in Intelligent Buildings

With the continuous development of the social economy, various advanced technologies are constantly introduced into urbanization, among which big data technology is applied in intelligent buildings, providing reliable technical support for the development of intelligent buildings.

Firstly, in the face of the increasing number of high-rise buildings in cities in recent years, adopting traditional firefighting techniques will inevitably bring a series of adverse effects. Due to the high floors and the inability to use elevators in case of a fire, this greatly increases the difficulty of firefighting work. In today's intelligent buildings, these problems have been effectively solved. By applying big data technology, fire sprinklers can be installed in corresponding areas during the design of high-rise buildings. Once a fire occurs, timely fire extinguishing can be ensured. And the fire sprinkler head can also achieve camera function, which provides on-site data for firefighters by monitoring the situation and effectively preventing fires.

Secondly, big data technology can also be applied to temperature regulation systems in smart buildings. Relevant technical personnel can adjust the temperature of the building through intelligent technology, and at the same time, monitor the personnel situation in the area through big data technology, establish matching based on models, and then analyze the data information to obtain the optimal value of indoor temperature, adjust the temperature of the area, and create a good living environment for residents, significantly improving people's living experience.

5.3 Application of Intelligent Robots to Big Data Technology

It can be said that the achievements of intelligent robots today are inseparable from the support of big data technology. We can see that the developed intelligent robots can imitate and analyze people's actions and language. In fact, they use big data technology to collect and analyze data information related to humans, input a large amount of data information into the intelligent robot system, and when the intelligent robot receives instructions, it can analyze and complete the instructions. By using various information to make reasonable adjustments, and identifying and processing data, parameters can be adjusted reasonably, and intelligent technology can be used to apply data information reasonably. In addition to being able to collect and analyze language, intelligent robots also have strong learning abilities, which can judge and analyze human language and behavior, thereby improving their intelligence level. In order to analyze and recognize human language and behavior more accurately, a large amount of corpus data and neural nodes need to be provided, which has a great impact on whether intelligent robots can accurately recognize and determine their recognition rate [5].

6. CONCLUSION

With the simultaneous development of Internet technology and information technology, artificial intelligence technology and big data technology have begun to emerge, which are characterized by convenience and high progressiveness. To this end, personnel from different industries and fields should continuously conduct in-depth research and summarize experience, enhance their clear understanding of the connotation and characteristics of big data technology and artificial intelligence, fully leverage the application advantages of big data technology in artificial intelligence, promote the scientific and rational application of big data technology, further promote the continuous development of artificial intelligence, and contribute to the progress of modern society.

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