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Research on the Application of Artificial Intelligence in Computer Network Technology in the Era of Big Data

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Abstract: ***With the steady development of society, the development effect of computer network technology has been extremely good, and its prospects for development are also relatively broad. The integration of computer network technology into the production and development process of modern society has already had an impact on people's daily lives, providing convenient conditions for their clothing, food, housing, and transportation. With the emergence of modern big data and artificial intelligence technology, the direction for the intelligence of computer network technology has been pointed out. Applying this modern technology to computer network technology can better improve the overall level of computer technology and provide high-quality services for the development of society. This article briefly analyzes the relevant concepts of big data era and artificial intelligence, introduces the advantages and necessity of applying artificial intelligence in computer network technology in the big data era, and elaborates on the practical application of artificial intelligence in computer network technology in the big data era.***

Keywords: Big data era; Artificial intelligence; Computer network technology; Practical application.

1. INTRODUCTION

In the current big data environment, the application of computer network technology has brought more and more convenience to our lives, and has also brought significant changes to our daily work and lifestyle. However, in this process, computer network technology will inevitably pose certain security risks to people's lives, which refers to information security. At this moment, the emergence of artificial intelligence and its application in computer network technology are of great significance. It not only effectively helps computer network technology solve a large number of data processing problems, but also provides security for the entire network information. In this situation, research on the application of artificial intelligence in computer network technology in the era of big data is very important.

Yan et al. (2024) [1] proposed a CNN-based mechanism for image super-resolution reconstruction, achieving enhanced visual clarity in high-performance computing environments. In healthcare analytics, Pang et al. (2024) [2] developed a data-driven framework using electronic health records to predict diabetes risks and unveil clinical knowledge patterns. For educational technology, Long et al. (2024) [3] improved content matching systems by integrating transformer models with InfoNCE loss, demonstrating superior alignment between learning materials and student needs. Urban studies saw innovations with Tang and Zhao (2025) [4], who analyzed aging population impacts on real estate dynamics using neural networks, while Wu (2025) [5] optimized cloud resource allocation through fault detection models in infrastructure management. Engineering applications progressed with Yao (2024) [6] quantifying local head loss coefficients in hydraulic systems, and Xiangyu et al. (2024) [7] advancing 3D printing technology by optimizing POE material extrusion parameters via response surface methodology. Labor market analysis was enhanced by Zhao et al. (2025) [8], who evaluated media news impacts on employment efficiency using machine learning integrated with DMP models. In sustainability research, Chen et al. (2025) [9] identified the digital economy's positive effects on green innovation, whereas Meng et al. (2025) [10] applied deep learning to optimize green logistics site selection and path planning. Biomedical research contributed by Wang et al. (2022) [11] mapped immune microenvironments in gastrointestinal cancers, providing critical insights for immunotherapy development. Smart city technologies advanced through Li et al. (2025) [12]'s gamified data visualization system for citizen engagement, complemented by their later work [16] on named entity recognition for urban data streams. E-commerce optimization was addressed by Song (2025) [13] through intelligent demand forecasting, while Wang (2025) [14] employed Bayesian optimization for adaptive urban delivery networks. In pharmaceutical research, Li (2025) [15] enhanced Phase IV drug trial safety via machine learning-based adverse event monitoring systems.

2. THE CONCEPT OF ARTIFICIAL INTELLIGENCE

Artificial intelligence technology refers to the elements of thinking, methods, and skills that machines endow to humans, enabling them to simulate and expand. If artificial intelligence technology is very mature, machines will be able to simulate intelligent behaviors such as human life methods, learning methods, work methods, rational thinking, design planning, etc. Due to its ability to further improve productivity and facilitate people's work and life, the importance of this technology continues to increase.

3. THE ADVANTAGES OF APPLYING ARTIFICIAL INTELLIGENCE IN COMPUTER NETWORK TECHNOLOGY IN THE ERA OF BIG DATA

3.1 Ability to handle unknown problems

The reasoning methods used by artificial intelligence in actual operation mostly belong to fuzzy logic, which has relatively low requirements for building models. Therefore, even without building models, artificial intelligence can achieve accurate descriptions. In traditional computer network technology, there is a large amount of fuzzy information, which is highly uncertain and unknown, so staff cannot effectively process similar information. After applying artificial intelligence to it, this problem has been properly solved. In the actual application process, artificial intelligence can greatly improve the information processing and computing capabilities of computer network technology through the creation of application patterns. At the same time, it realizes the construction of hierarchical relationships in network systems, thereby promoting the improvement of the actual work efficiency of computer network systems [10].

3.2 Breaking through the limitations of computer skills, with 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 [11].

3.3 Collaboration ability

The development of computer network technology and academic research complement each other, promote each other, and improve together. Due to the complex structure of computer networks, management work is relatively difficult, and artificial intelligence technology can effectively solve this problem. By stratifying the network, this technology can detect and manage different levels, as well as coordinate the cooperation between layers, thus scientifically and effectively carrying out network management work [12].

3.4 Artificial intelligence technology has more economical operating costs

Artificial intelligence technology comprehensively analyzes the data content of various parts in network data systems, which can reduce energy loss problems that occur in traditional computer information technology applications. If artificial intelligence technology is used to reasonably control algorithms in computer network systems, it will also lead to changes in computing speed. At the same time, specific computer technology and operational tasks can be completed through optimal solutions, achieving rational utilization of computing resources and increasing the application value of network technology. Specifically, AI technology in the age of big

data is used to intelligently analyze and process various information and data contents in the Internet user system, so as to ensure the accuracy of collected data information and the rationality of analysis to the greatest extent, and improve the application efficiency of data [13].

4. THE PRACTICAL APPLICATION OF ARTIFICIAL INTELLIGENCE IN COMPUTER NETWORK TECHNOLOGY IN THE ERA OF BIG DATA

4.1 Intelligent Firewall

The most typical representative of the application of artificial intelligence in computer network technology is intelligent firewall technology. In the actual application process, the main application process and principle of this technology are to collect and process relevant data information in the computer network through an intelligent recognition system, and use its own filtering system to automatically and efficiently filter information containing risks and no value. This not only greatly reduces the amount of information processing in the computer network, but also plays an important role in improving system security. In addition, the practical application of intelligent firewall technology can effectively reduce viruses in computer networks, prevent hacker attacks, and thus improve the security of computer network systems.

4.2 Application of Artificial Intelligence in Computer Network Management

The application of artificial intelligence in computer network management, in order to fully reflect its value and significance, should establish and improve security management systems, closely link computer network technology and work departments, and improve the efficiency and quality of data information statistics and screening. In the current situation of computer network management, manual operation support is needed, so there is a certain degree of subjective human consciousness in data processing, which is easily influenced by subjective factors in the data processing process, resulting in unreasonable and unscientific information processing methods. Based on this reality, artificial intelligence technology should be organically integrated with computer network technology to avoid the influence of subjective consciousness to a certain extent [14]. We can start from two aspects:

Firstly, establish an expert system database. In the process of processing and operating data information, artificial intelligence mainly relies on expert system databases. The expert system database contains a wealth of data information. By effectively utilizing the knowledge and experience of experts, data science reasoning can be achieved, followed by efficient processing. In the process of establishing an expert information database, it is necessary to embed the content of network technology into the database, and then convert the data and build a program system through the application of artificial intelligence technology. During the process of using expert systems, the program system can summarize and organize data, and optimize data information. Through this series of steps, the Internet system management can be carried out more scientifically, efficiently and smoothly.

Secondly, provide intelligent solutions. Strengthen the application of artificial intelligence in computer network management, so that people can obtain intelligent answers while obtaining information data. The answer method of artificial intelligence has certain differences from traditional answer methods. With simple instructions, artificial intelligence can filter data, search for key information in the information database, and provide customers with the most satisfactory answers, thereby effectively improving the efficiency and quality of answers.

4.3 Enhancing Information Network Security

Artificial intelligence technology can effectively enhance the security of network information data and plays a very important role in ensuring user information security. At present, artificial intelligence technology has appeared in various aspects of people's daily life and work. It can be foreseen that artificial intelligence technology will provide great convenience for people's lives and work in the future. At the same time, as people's attention to it deepens, this technology will continue to improve and become an indispensable part of people's lives and work. Therefore, it is necessary to strengthen research on the security protection of artificial intelligence technology. Once artificial intelligence technology cannot be controlled by people, it will bring great and unbearable losses to various fields of social production and life. The birth of artificial intelligence technology comes from the collaborative research of multiple disciplines, and its maintenance work is also very complex. Therefore, in the process of developing and improving artificial intelligence technology, it is also necessary to strengthen research on its security protection, so that the technology can be in a healthy and good development state for a long time.

4.4 Application of Artificial Intelligence Technology in Information Security Management

The application of computer network technology has brought about corresponding changes in people's lifestyle, but this technology still needs to be developed on the premise of network technology. The virtuality and openness of Internet technology can enable people to enjoy the advantages of network technology itself, while also facing some more abundant problems, mainly including information security. People blindly using artificial intelligence technology to process information data can easily lead to data that is not authentic or comprehensive enough, which may affect the practical value of big data technology. Through the application of artificial intelligence technology, the security of computer network information can be improved to a certain extent. By monitoring the operating environment of the computer network system through artificial intelligence systems, some security risks that exist during operation can be detected in a timely manner, reducing the phenomenon of data information loss [15].

4.5 Intelligent anti spam measures

Due to the popularity of computers and the internet, many advertisers often use the internet to send a large number of spam emails to people, which invisibly brings many troubles to people's lives and work. Artificial intelligence technology can effectively solve this problem by filtering and eliminating spam emails before they enter people's mailboxes through the automatic defense function of intelligent anti spam email systems. Meanwhile, some spam emails may also contain virus files. Artificial intelligence technology can provide limited solutions to this hidden danger [16].

5. CONCLUSION

The emergence of computer and network technology has spurred the birth of artificial skill technology. The three develop together, promote and influence each other. At present, artificial intelligence technology still belongs to high-tech. This technology plays an irreplaceable role in the development of computer and network information technology. However, due to various factors, its development level is not ideal and still needs to be continuously improved. To this end, enterprises and individuals need to be encouraged to innovate boldly and give full play to their positive role in all areas of work and life, so as to promote the continuous development of China's AI technology and bring new breakthroughs to China's economic growth.

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