Research on Computer Network Application Based on Artificial Intelligence

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Abstract: Artificial Intelligence (AI), as a cutting-edge technology that imitates human intelligence and learning ability, has a wide application prospect in the field of computer network. The purpose of this paper is to deeply discuss the application research of computer network based on artificial intelligence, especially its improvement of network performance and security. Through the analysis and discussion of the application of network operation and maintenance, intelligent network security system, network intrusion monitoring, network performance improvement and so on, the paper reveals the innovation and improvement of artificial intelligence technology to computer network technology. At the same time, this paper puts forward some relevant suggestions, aiming at promoting the deep integration of artificial intelligence and computer network technology, and providing new ideas and solutions for building a safe and efficient network environment.

1. Introduction

With the rapid development of the digital age, computer network technology has become an important infrastructure in modern society. However, with the expansion of the scale of the network and the increase of the amount of data, the traditional way of network management and maintenance gradually shows its limitations, and can not fully meet the needs of modern network environment. In this case, artificial intelligence technology began to emerge and play an increasingly critical role in the field of computer networks.

By learning and analyzing a large amount of network data, AI can find network faults and abnormal behaviors, and provide refined network management and optimization strategies. At the same time, it can also improve the security and reliability of the network, improve the quality and efficiency of the network service. This technology trend has made artificial intelligence one of the most concerned frontier technologies in the field of computer networks.

In the context of the current "Internet +" era, governments have increasingly attached importance to artificial intelligence technology, artificial intelligence has gradually become the main battlefield of competition among countries, and the formulation and support of various policy documents have been strengthened. The integration of the development of artificial intelligence and computer network technology is not only a technical issue, but also a key factor that has a major impact on social, economic and cultural development. Therefore, in-depth analysis and research of the

collaborative integration of computer network technology and artificial intelligence has important practical and strategic significance for promoting the innovation and development of network environment. The purpose of this paper is to explore the impact of this convergence, and to propose implications and suggestions for future network development.

2. Related Research

In recent years, WLv's research focuses on the network monitoring and control system of substation automation based on artificial intelligence [1], and uses browser/server to build a web-based intelligent network communication system, which makes real-time monitoring and data transmission of wireless mobile channels possible. With the extensive application of computer and information technology, the demand for intelligent service of computer network is increasing, and artificial intelligence has become a trend that cannot be ignored in this field, and has aroused sufficient discussion and exploration [2]. In the field of education, CHe's research explores the computer-aided instruction system based on artificial intelligence, which provides personalized teaching and collaborative learning functions, creating a good virtual learning environment for students, thus promoting the understanding of knowledge [3].

At the same time, with the increase in the number of applications, users must face the challenge of remembering a large number of user ids and passwords [4], and RADIUS technology is of great significance in the application research of computer networks, especially in the authentication of wired and wireless network environments.

However, network security faces the challenge of adversarial attacks, especially the transferability of attacks in convolutional neural network (CNN) models has a certain impact. E Nowroozi evaluated the robustness of adversarial transferability of computer network models based on CNN, and discussed the shielding strategies that hinder the transferability of attacks [5].

In order to maintain the service quality of companies and institutions, information and communication technology is widely used to support the optimization and maintenance of computer networks, thereby providing a better service experience. A Purwanto adopted Cisco's PPDIOO method as a framework to help build and optimize computer network systems to achieve effective management and monitoring of quality of service [6]. The development of SDN technology is of great significance for computer network applications, which brings network programmability, elasticity and flexibility, and also arouses the attention and research on information security[7].

3. Application of Artificial Intelligence in Network Technology

3.1 Information Retrieval

In the current "Internet + era", the rapid progress of information technology and the sharp increase in the amount of information, so that people's requirements for information retrieval become more stringent. Traditional information retrieval methods, especially those represented by search engines such as Baidu and Google, seem to be inadequate in meeting this challenge. Therefore, to achieve efficient and accurate information retrieval and retrieval in a short time is a key goal of the development of computer networks.

With the continuous progress of artificial intelligence technology, the field of information retrieval has ushered in a broader space for development. The application of artificial intelligence technology makes information retrieval more intelligent and personalized, and can meet the needs of users more accurately. The development of this technology not only improves the efficiency and accuracy of information retrieval, but also brings more innovation and development possibilities to the field of information retrieval.

3.2 Image, Multimedia Information Retrieval and Cross-Language Retrieval

Artificial intelligence technology also involves the technology of indexing, storing and retrieving multimedia data such as images, video and audio. The development of technology enables users to obtain relevant text or other multi-media data through multimedia information such as images, audio or video, which can be more convenient to obtain the required information. When using the search engine, only need to search the picture directly stick to the search bar, the system can use the file recognition technology to analyze the picture, provide relevant parameters and source information. Intelligent AI technology can also be used for various intelligent processing of images, such as removing watermarks, so as to meet personalized search needs.

Cross language retrieval is information retrieval conducted in different language environments. Global information exchange is becoming increasingly frequent, and cross language retrieval technology is also receiving more and more attention. Promote cross-cultural communication and information sharing by helping users retrieve relevant information in different language environments.

4. The Application of Artificial Intelligence in Network Security

AI technology can be used to monitor and analyze network traffic in real-time, and timely detect and respond to network intrusion behavior. This can identify known intrusion patterns, detect unknown forms of attacks, and achieve the goal of improving network security protection. We use machine learning algorithms and deep learning models to train and analyze network traffic data. We found that this can enable more intelligent detection of network traffic, and the system can also identify different patterns between abnormal network data flows and normal data flows. The system will take immediate action to defend and respond to abnormal data flows, in order to prevent the spread of malicious software and attacks on network services. This can effectively protect the user's network system from malicious attacks.

We detect abnormal activity by monitoring network data flows, system records, and other data sources to detect unusual behavior. Intelligent firewalls, supported by AI technology, can identify and block various network attacks, including DDoS attacks and malicious code injection. They can also analyze network traffic and abnormal behavior in real-time, improving the level of network security protection.

With the development of society and the improvement of economic level, the emergence of computer networks has changed lifestyles [8], but information security issues still need to be strengthened in protection and management. There are some important key measures in network security measures, such as intrusion detection and response. People can use artificial intelligence technology to monitor and analyze network traffic in real-time, detect and respond to network intrusion behaviors in a timely manner, to ensure the security of their own network data and user privacy. Research has also found that AI technology can identify various types of intrusion behaviors, including but not limited to malware attacks, packet spoofing, unauthorized access, etc. Research has shown that establishing an intelligent model for network behavior can more quickly and accurately distinguish the difference between normal and abnormal traffic, thus taking targeted defense measures in a timely manner. This intelligent intrusion detection and response system is of great significance in protecting network security, enabling people to effectively respond to evolving network threats and improve the security and stability of network usage.

5. Application Analysis of Artificial Intelligence in Network Performance Optimization

5.1 Network Fault Detection and Recovery Technologies

During network operation, people often encounter network failures caused by hardware failures, network setup issues, or network card drivers. If people do not detect and handle these faults in a timely manner, these problems may cause serious economic losses to users. Researchers have addressed these challenges by using artificial intelligence technology to quickly identify network failures and take timely recovery measures to protect the interests of users. The artificial intelligence studied by researchers mainly combines deep learning methods. They analyze and model network traffic data through deep neural networks, so that the system can learn and master the rules and patterns of network traffic. The system can also independently and timely detect abnormal situations and faults in the network by monitoring and analyzing data flow and network status, and try to provide solutions for users on its own.

5.2 Network Traffic Control and Performance Optimization

In people's understanding, traffic management and quality of service (QoS) are crucial in modern network environments. Usually, human traffic management involves monitoring, controlling, and optimizing the data flow in the network. Traffic management can ensure the effective utilization of network resources and smooth data transmission. Service quality focuses on how people can obtain stable, reliable, and efficient services in the network, and its goal is to meet the needs of users for network performance and experience.

The support of artificial intelligence technology also promotes the improvement of service quality. AI can dynamically adjust service priorities and ensure the transmission quality and timeliness of critical business data based on user needs and network conditions. For example, in the field of video streaming, once network congestion or increased latency is detected, AI can automatically adjust the clarity and loading speed of the video stream based on user devices, network bandwidth, and other information, providing a better viewing experience.

6. Development Trend and Prospect

The role of artificial intelligence in computer network technology is constantly increasing, and network architecture is developing more intelligently; Intelligent network management will become the mainstream trend. People use AI technology to automate, optimize, and troubleshoot network configurations; Improve network operational efficiency and reliability. Through the continuous development of researchers, network management systems will be able to quickly respond to network changes, achieve real-time monitoring of network performance, and provide more intelligent solutions for network operations. With the development of people, AI technology can also be used for automatic detection, identification, and response to various network security threats, such as intelligent firewalls, intrusion detection systems, etc. Network service providers can achieve intelligent management and optimization of service quality, actively and dynamically adjust resource allocation based on user needs and network load, thereby improving the availability and performance of network services. The future user experience will be even better, and new technologies will continue to promote the sustained and stable operation of the network.

Computer technology has entered a new stage of development, marked by the arrival of the cloud intelligence era. This stage will be characterized by intelligence, automation, and efficiency, profoundly changing people's understanding and application of computing resources and data processing. The era of cloud intelligence will accelerate the application of intelligent technology in

the field of cloud computing, achieving intelligent management and scheduling of computing, storage, and network resources. This means that cloud platforms can automatically allocate resources based on real-time data and user needs, optimize workloads, improve resource utilization, and thus improve service quality and performance.

The era of cloud intelligence will also promote digital transformation and innovative development, promote cross-border integration and information upgrading of various industries. Enterprises and organizations can optimize and intelligently manage business processes through cloud intelligence technology, improving production efficiency and competitiveness. At the same time, cloud intelligence will also provide strong support for the development of emerging technologies such as the Internet of Things, big data analysis, artificial intelligence, etc., promoting the rapid development and popularization of the digital economy.

7. Conclusion

Artificial intelligence technology has a wide range of application prospects in the field of computer networks, which can significantly improve the efficiency and accuracy of network search, enhance the defense capability of network security, optimize the overall performance of the network, promote the arrival of the era of cloud intelligence, and promote the intelligent development of network and network architecture. However, at the same time of technological development, we must also pay attention to ethical and legal norms to enhance the transparency and interpretability of algorithms, strengthen privacy security and data protection, so that artificial intelligence can become a perfect and efficient work tool, reduce human work pressure, and promote the continuous progress of social civilization. Through sustained attention and in-depth research on artificial intelligence applications in networking, alongside continuous innovation and exploration, the objective is to propel computer network technology towards a smarter and more efficient future. This endeavor aims to furnish stronger support for digital transformation and information infrastructure construction.

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