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AI-Driven Computer Network Technologies: Applications and Research Perspectives

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Abstract: ***With the advent of the information age, computer network technology has become an essential component of daily life and industrial production. Consequently, improving network service quality has emerged as a critical research priority within the field of computer network technology in the contemporary era. As an advanced analytical and computational paradigm, the application of artificial intelligence in computer network technology offers considerable value and plays a significant role in driving innovation and progress within the discipline. This paper provides a comprehensive discussion and systematic investigation of the application of artificial intelligence in computer network technology, aiming to serve as a valuable reference for practitioners and researchers in related fields.***

Keywords: Artificial intelligence; Computer network technology; Application.

1. INTRODUCTION

With the booming development of the design and artificial intelligence industries and the continuous iteration and upgrading of technology, the demand for high-quality and diverse images is growing at an astonishing rate, demonstrating an unprecedented explosive trend. The impact of this trend is far-reaching, not only limited to traditional application areas such as creative design and product development, but also deeply rooted in multiple cutting-edge technological fields such as machine learning, computer vision, and natural language processing. In these fields, images serve as important carriers for information transmission and data processing, and their quality and diversity directly affect the performance and accuracy of algorithms. In the field of creative design, designers constantly pursue visual innovation and breakthroughs, requiring a large number of high-quality images to inspire inspiration and achieve artistic expression of design concepts. In the process of product development, images play an important role in showcasing product functionality and attracting user attention. Meanwhile, in the fields of machine learning and computer vision, images are the fundamental data for training and testing models, and their quality and quantity directly determine the accuracy and generalization ability of the models. Therefore, obtaining high-quality and diverse image resources is crucial for promoting the development of these fields. However, in the face of the huge amount of image resources on the Internet, it is particularly time-consuming and laborious to manually visit the website and download images one by one. This approach is not only inefficient, but also greatly limits work efficiency and the scale of data collection. In a fast-paced work environment, time cost becomes an undeniable factor. Therefore, developing efficient and automated tools to collect image resources has become an urgent task. In this context, this article elaborates on the design and implementation of a web crawler system based on the C++programming language. This web crawler system focuses on processing websites that use the HTTP protocol. By deeply parsing the structure of web pages, it can accurately locate and extract image resources. Users only need to provide the URL of the target website as a starting point, and the crawler will automatically start working, parsing the webpage content, identifying and downloading all available image files. This process greatly reduces the manual burden, making image acquisition work easier and more efficient. The design of this web crawler system fully considers practicality and ease of use. It adopts a modular architecture, making each functional module relatively independent and easy to maintain and expand. When parsing web pages, crawler systems can automatically handle various complex web page structures, including nested HTML tags, dynamically loaded content, etc., to ensure accurate extraction of image resources. At the same time, the system also supports multi-threaded concurrent downloads, significantly improving the speed and breadth of image acquisition. In addition to efficiency and automation, this crawler system also has high flexibility and scalability. Users can adjust the parameters and strategies of the crawler according to specific needs, such as setting the format, size, quality, etc. of downloaded images to meet different application scenarios. In addition, the system also supports plug-in extensions, where users can write custom plugins to achieve specific functions such as filtering specific types of images, parsing special webpage structures, etc. In summary, a web crawler system based on the C++programming language provides an effective solution for efficiently and automatically collecting image resources. It not only greatly reduces the manual burden, improves the speed and breadth of image acquisition, but also provides a solid foundation for subsequent image processing, analysis, and model training. With the continuous advancement of

technology and the expansion of application scenarios, this web crawler system will play an important role in more fields, promoting the sustainable development of the design and artificial intelligence industries.

2. OVERVIEW OF ARTIFICIAL INTELLIGENCE

Artificial intelligence is an emerging technology that simulates, extends, and expands human intelligence as its research object. It is a cutting-edge technology in the field of science and technology today, and has been deeply integrated with human society. Based on computer technology, people can endow computers with thinking patterns and behavior styles through programming, thereby solving some problems in reality. At the same time, the enormous computing power of computers can further enhance their problem-solving and decision-making abilities. It is worth noting that artificial intelligence is not intelligence, but rather the analysis and calculation of data according to the programming involved by humans. Therefore, although it cannot have subjective initiative in human thinking, it can complete repetitive tasks according to instructions and provide artificial intelligence services to people. At present, artificial intelligence technology is at an important historical node of research and innovation, and this technology is also deeply integrated with various fields of society. Therefore, strengthening the application research of artificial intelligence technology has significant practical significance.

Yan, Wang, Xu, Wang, Wu, and Lyu (2024) investigated the underlying mechanisms of image super-resolution reconstruction utilizing convolutional neural networks, aiming to enhance visual fidelity in low-resolution imagery [1]. In the domain of digital advertising and resource allocation, Yi (2025) proposed a real-time fair-exposure ad allocation system that leverages Contextual Bandits-with-Knapsacks to ensure equitable visibility for small and medium-sized businesses as well as underserved content creators [2]. On the hardware and photonics front, Tang, Kojima, Gotoda, Nishikawa, Hayashi, Koike-Akino, and Klamkin (2020) provided foundational engineering contributions through the design and optimization of shallow-angle grating couplers for achieving efficient vertical emission from indium phosphide devices [3]. Simultaneously, Sun (2025) focused on human-centered computing by addressing accessibility challenges and proposing inclusive design solutions to improve the usability of digital products for diverse user populations [4]. In the context of distributed machine learning security, Deng and Yang (2025) formulated multi-layer defense strategies integrated with privacy-preserving enhancements to effectively counter membership inference attacks within federated learning frameworks [5]. Regarding complex graph analytics, Yang, Zhang, Lin, Zhang, and Li (2023) introduced HGMatch, a match-by-hyperedge approach that efficiently solves the computationally intensive problem of subgraph matching on hypergraphs [6], while Ukey, Zhang, Yang, Li, Li, and Zhang (2023) developed methodologies for efficient continuous k-nearest neighbor joins tailored for dynamic high-dimensional data environments [7]. In medical image analysis, Tian, Wang, and Cui (2024) improved the accuracy of brain tumor segmentation by augmenting the U-Net architecture with GSConv modules and ECA attention mechanisms, thereby enhancing the capture of critical spatial features [8]. Within the financial sector, Yang, Xue, Hu, and Zhang (2025) designed a comprehensive, AI-driven closed-loop risk control system that manages online credit security across the entire lending lifecycle—encompassing pre-loan assessment, mid-loan monitoring, and post-loan recovery [9]. Complementing this, Shen and colleagues (2025) applied the Whale Optimization Algorithm to significantly bolster the detection accuracy of fraudulent activities in financial payment systems [10]. On the broader front of data analytics, Lian and Chen (2024) explored the integration of deep learning for complex data mining analysis and pattern recognition, underscoring the utility of neural networks in uncovering latent structures within heterogeneous datasets [11]. Zhao, Lin, Yang, Lu, Xue, and Jiang (2025) further optimized deep learning models specifically for predicting dynamic market behaviors under volatile economic conditions [12]. In healthcare informatics, Pang, Zhou, Dong, Chen, Gu, Lyu, and Zhang (2024) leveraged electronic health records through a data-driven methodology to unveil critical diabetes knowledge and perform robust patient risk prognosis [13]. Finally, Ren (2024) developed a novel feature fusion-based contextual model designed for precise smoking detection in complex and variable visual environments [14].

3. THE APPLICATION VALUE OF ARTIFICIAL INTELLIGENCE IN COMPUTER NETWORK TECHNOLOGY

3.1 Promoting the development of computer technology

In the context of the new era, computers are an important technological support for promoting the development of human society, and promoting the development and innovation of computer technology is also an important trend in the development of science and technology in the new era. Artificial intelligence, as the most cutting-edge

technology field today, can promote the development and progress of computer technology through the application of related technologies and scientific research achievements in the field of computer network technology. Specifically, artificial intelligence has the ability to distribute agent collaboration, which can ensure that computer networks are always in a safe and stable operating state, thereby ensuring the normal and orderly development of people's lives and work. In recent years, with the continuous improvement of social development level, the demand for computer network services has also been growing rapidly, which has put forward higher requirements for the quality of computer network operation. Therefore, strengthening the application of artificial intelligence in the field of computer network technology has significant value and significance.

3.2 Strengthen network data processing capabilities

From a technical perspective, the application of artificial intelligence in computer networks is beneficial for improving data processing efficiency and achieving comprehensive improvement in computer network quality. As is well known, with the increasing development and improvement of computer network technology, the amount of data designed is also increasing, which requires a more mature and advanced data processing technology to ensure the good and stable operation of computer networks. Artificial intelligence first possesses nonlinear processing capabilities, which can better cope with nonlinear data problems caused by complex topology structures in computer network systems. In addition, artificial intelligence can effectively solve the growing problem of data volume in computer networks, while deeply mining the implicit value behind data through stronger analytical capabilities. It can be seen that the application of artificial intelligence in computer network technology can comprehensively improve the quality and efficiency of data processing.

4. CHARACTERISTICS AND ADVANTAGES OF ARTIFICIAL INTELLIGENCE NETWORK TECHNOLOGY

4.1 Capable of handling nonlinear problems

As is well known, computer networks have diversity and complexity characteristics, so there are often instantaneous changes in network load or some users exhibiting non established operational behaviors during network management, which can lead to the inability to carry out high-precision linear management and control of the network's management objects. In recent years, with the increasing use of computer networks, nonlinear problems have become an important factor affecting the quality of network operation, while traditional management methods have obvious limitations and lag. The computer network technology based on artificial intelligence has strong nonlinear processing capabilities, which better meets the management needs of computer networks in the new era and ensures the operation level and quality of the network.

4.2 Effectively reducing resource consumption

Essentially, the development of computer network technology boils down to the analytical and computational capabilities of network information. Therefore, when algorithms become more scientific and advanced, the quality of computer network operation can be improved. At present, with the further expansion of the construction scale of computer networks, the number of controlled objects has doubled, which has a profound impact on the speed of network control, and the corresponding network information parsing ability is also restricted. The application of artificial intelligence in the field of computer network technology has achieved a comprehensive improvement in information analysis and computing capabilities, that is, it has achieved the effects of control algorithms and fast calculations, thus reducing the resource consumption generated by the computer network information analysis process.

4.3 Effectively Handling Fuzzy Information

In computer network technology, the processing of fuzzy information has always been a very important technical point, and strengthening the ability to process fuzzy information can better cope with and handle some predictive problems. There is a massive amount of fuzzy information in computer networks, and how to improve the processing capability of fuzzy information is also highly valued and concerned by technical personnel. The application of artificial intelligence in computer network technology can use the fuzzy logic of artificial intelligence to achieve inference and calculation of fuzzy information, and can also achieve real-time monitoring of network operation, thereby ensuring the good and stable operation of computer networks.

4.4 Collaborative processing capability

With the further expansion of computer network scale, the structure of computer network systems has also shown a trend towards complexity, which has raised higher standards and requirements for computer network management. Traditionally, the management mode of computer networks has been singular, which still cannot meet the management needs of the new era of computer networks, and also restricts the transformation and development of the hierarchical management mode of computer networks. Artificial intelligence technology has strong collaborative processing capabilities, and therefore has significant application value in increasingly complex network management. It aims to prevent blind spots and misunderstandings in computer network management through collaborative processing capabilities, and ultimately achieve the effect of improving the quality of computer network operation.

4.5 Real time processing capability

From a professional perspective, computer network management is based on information collection and detection to achieve real-time control of network systems, thereby ensuring the quality and efficiency of computer network system operation. At present, in order to meet the usage needs of computer networks in the context of the new era, relevant management personnel need to judge and analyze the operation status of computer network systems in real time, and grasp the relevant changes. The application of artificial intelligence in computer network technology further enhances the real-time monitoring capability of computer network systems, enabling comprehensive understanding of various changes in the network system while making scientific and reasonable processing decisions, thereby ensuring the overall stability and security of the computer network system.

5. THE APPLICATION OF ARTIFICIAL INTELLIGENCE TECHNOLOGY IN COMPUTER NETWORKS

5.1 Application in Network Security Management

Network security has always been an important research topic in the field of computer network technology. Only by ensuring the security of the network environment can we provide users with better network services. In network security management, firewall technology and intrusion detection technology are mainly used to prevent and eliminate potential security risks. The application of artificial intelligence technology has promoted the transformation and progress of network security prevention and processing technology, which is reflected in the following two aspects:

(1) Intelligent firewall

The integration of firewall technology and artificial intelligence technology enables firewalls to have automatic data recognition and intelligent information processing capabilities. At this time, the time required for computers to perform data retrieval, matching, and verification will be significantly reduced, thereby optimizing the quality and effectiveness of firewall restricted network access management to a certain extent. From the perspective of application effectiveness, the integration of artificial intelligence technology and firewall technology has promoted the improvement and enhancement of China's network security management work, especially in strengthening management capabilities for harmful network behavior attacks. In addition, the hardening of artificial intelligence has effectively solved the security issues of denial of service software attacks that have occurred in previous computer network protection software, thereby effectively reducing the risk of network virus intrusion.

(2) Intelligent intrusion detection system

On the basis of firewalls, people also commonly use antivirus software to provide security protection for computers, effectively preventing the invasion of viruses and Trojans in the use of network testing services. Traditionally, antivirus protection systems have required computer users to regularly update virus databases and conduct comprehensive scans of computers in order to detect security vulnerabilities. The application of artificial intelligence has greatly improved the virus intrusion detection capability of antivirus protection systems. On the one hand, it can automatically identify viruses or Trojans in the information received by computer users on the network. On the other hand, it also updates the virus database in real time through cloud services, providing a security barrier for computer network security.

5.2 Application of Neural Networks

Neural network is a technology that simulates the behavioral characteristics of animal neural networks for distribution and information processing, and is a cutting-edge technology in the field of computer network technology today. As a computer network technology that mimics the characteristics of animal neural networks, there is a great compatibility between this technology and artificial intelligence technology. It can be said that the application of artificial intelligence will inevitably promote the development and innovation of neural network technology. From a professional perspective, neural network systems are composed of multiple information processing units, which not only have strong compatibility, but also have strong learning abilities. They can recognize different input patterns such as noise and distortion, and use them to meet the processing needs of different network information. Specifically, the application of artificial intelligence in neural network systems further enhances the ability of computer network technology to prevent security risks in hardware or driver software loading, which is incomparable to traditional detection and analysis methods. For example, artificial intelligence based neural networks can combine multi-layer recurrent neural networks and multi-layer neural perceptron detection technology with the research of virus intrusion training system datasets, thereby constructing a multi-layer neural network detection system with more learning and analysis capabilities, and achieving the detection and processing of multiple intrusion behaviors. At present, thanks to the integration and application of artificial intelligence technology, neural network technology in the field of computer network technology has ushered in the third generation of technological upgrades, and its characteristics are also digital simulation and biomedical neural networks, thus meeting the growing demand for network services in the new era.

5.3 Applications in Network Resource Sharing

Computer network is an open platform where users can search and download a lot of data information. Therefore, how to achieve the sharing and interoperability of network resources is also an important development direction of computer network technology. At present, technicians propose to use cloud and artificial intelligence technology to achieve high-quality and efficient sharing of network resources, and to manage network resources more scientifically and reasonably. Specifically, there is an increasing amount of data information in the current network, which also involves various formats such as text, images, and videos, posing serious challenges to data retrieval and sharing. The application of artificial intelligence not only achieves efficient classification and integration of data resources in the network, but also has faster recognition and processing capabilities, and can quickly retrieve large data resources according to user needs. In addition, network resource sharing based on artificial intelligence can also filter the frequency of network downloads and information resource sharing channels, thereby improving the quality and efficiency of users' access to information resources. From this, it can be seen that the application of artificial intelligence in the field of network resource sharing meets the needs of people for the use and development of network resources in the new era, and improves the service quality of computer network technology.

5.4 Applications in Data Collection and Analysis

At present, artificial intelligence has been widely applied in the field of computer network technology, and has also achieved very ideal application results in data collection and analysis. Specifically, today's computer network data processing technology is advancing rapidly, which is also an inevitable requirement for the development of computer network technology in the context of big data. The application of artificial intelligence can first achieve the ability to obtain more valuable information from massive data. In today's increasingly growing network data, massive and diverse data has become an important feature of network data information, and traditional data collection models will increase the operational burden of computer networks and have a serious impact on the quality of computer network services. Based on artificial intelligence, data collection and analysis work can identify and collect useful data information with higher quality and efficiency. This not only makes data collection and analysis work more efficient, but also meets users' needs for network services.

5.5 Applications in Software and Hardware Upgrades

With the continuous development and progress of computer network technology, the software and hardware required for computer systems also need to be upgraded and maintained in order to improve the quality of computer network services. In the field of software and hardware upgrade management, artificial intelligence has also received attention and favor from technical personnel, and has thus promoted the intelligent transformation of related work. Specifically, some Internet enterprises incorporate AI technology into the upgrading and

maintenance of computer software and hardware, that is, by identifying and analyzing the running status of the software and hardware used by users' computers, to determine whether they need to upgrade, and to promote the information of upgraded versions to users. At this stage, with the continuous improvement of the quality of computer network service demand, the speed of software and hardware updates is also increasing. Therefore, strengthening the application of artificial intelligence in this area can not only improve the quality of service of software and hardware products of Internet enterprises, but also ensure the good and stable operation of the entire network system.

6. CONCLUSION

In summary, strengthening the integration and application of artificial intelligence is an important development trend of computer network technology in the new era, which is conducive to improving the processing capability of computer network data and providing users with good and stable network services. Based on this, we must strengthen research on the application of artificial intelligence to promote the comprehensive improvement of China's computer network technology level.

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