The Application of Artificial Intelligence in Computer Network Technology

Mr. Pradeep Nayak[1], Vaishnavi[2], Varsha V[3], Vivek K Das[4], Yash[5], Yashwanth H[6]

Department of Computer Science and Engineering(IoT, Cybersecurity including Blockchain Technology)[1-6]

Alva's Institute of Engineering and Technology, Mijar, Karnataka, India

Abstract: *Computer network technology has become an integral aspect of social life in various fields and industries in this information age. Artificial intelligence is one of the advanced technologies that have rapidly been improving and are now playing a more significant role in the changes of computer network systems. This article goes into the concept of AI technology, examines the challenges faced by computer networks, and explores the inherent advantages and necessity of AI's integration into network technology. In addition, it investigates practical applications of AI in enhancing computer network functionality and security.*

Keywords: Artificial Intelligence (AI), Computer, Network Security, Network Technology

I. INTRODUCTION

Presently, Today, the social economy develops rapidly, which causes a great transformation of the industry, and the market economy has continued to develop on this basis, which has put more demands for the production and operation of enterprises. The development of the Internet not only provides conditions for information dissemination, but also affects people's work and life, such as improved lifestyles and travelling modes. More and more, people rely on the Internet. For many people, computers and AI are not separable Therefore, how to connect computers and AI in a way of being more scientific and more functions exerted with the development of times is a question which a lot of enterprises must face up to. With AI makes the computer networking much safer and more powerful in functions, companies will enter into a new development period.

II. OVERVIEW OF AI TECHNOLOGY

Artificial Intelligence (AI) refers to the process of replicating human operational methods in production and mechanizing these operations to enable simulated control and decision-making, as illustrated in Figure 1. AI is designed to emulate and extend human intelligence, offering immense potential for further research and development. Within the domain of computer science, AI occupies a prominent role, with researchers aiming to create machines capable of replicating human thought processes, liberating humans from repetitive tasks, or accomplishing tasks that are beyond human capability.

Despite significant progress, AI research remains in its infancy. While current AI systems can mimic human thinking patterns, achieving independent thought beyond human abilities remains a distant goal. Ongoing research faces numerous challenges but holds promise for transformative advancements. Notable successes have been observed in fields like human-computer gaming and automated engineering, with human-computer game outcomes particularly garnering widespread attention. The progression of AI is expected to have profound economic and societal impacts.

AI technology can be introduced into practical applications incrementally. Initially, it can handle simple data processing tasks and gradually advance to solving complex problems. This approach helps streamline resource organization and improve data timeliness. Moreover, AI facilitates the creation of shared platforms where customers can access and share data efficiently. As systems evolve, AI enhances the efficiency of critical data processing tasks and optimizes network management quality, paving the way for robust advancements in technology.
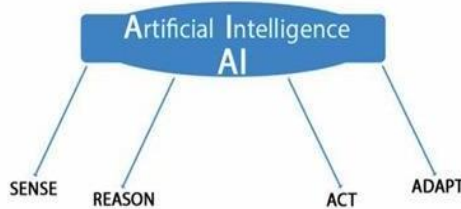
Figure 1 The composition of artificial intelligence

III. MAIN ISSUES OF THE COMPUTER NETWORK

A. Computer Viruses Harm and Propagation

A computer virus is one kind of program that reproduces itself by duplicating a sequence of computer instructions or program codes. This virus, no matter how tiny it is, can heavily affect a system. In general, computer viruses' main characteristics are the following: Procedural Nature: A virus is not a self executing program; it needs another for execution.

Infectivity: Viruses can get into other programs by infection from an already infected program whereby the infection spreads.

Latency: Some viruses enter files or programs and live there dormant, never actually detected as they quietly begin infecting the system. These latent viruses can spring to life at the most inconvenient time, keeping the threat alive.

B. Hackers' Assaults and Infiltration of Computers

The term "hacker" is well known in the computer industry, which refers to people who take advantage of loopholes in computer systems by using advanced techniques for criminal activities.

Hackers breach computer systems, which can result in loss of crucial files, data corruption, computer program breakdown, and even financial losses amounting to millions of dollars. These breaches may cause serious and severe effects for businesses and individuals.

C. Junk Files Build-up

These are some of the junk files, which can be accumulated overtime when using a computer. Though these files do not attack the system like a computer virus, they present security threats.

Junk files can slow down the performance of a system, and in case they attach themselves to secure files, they will be giving a way to further attacks. As more files increase, they enhance the risks, therefore contributing to system degradation.

D. Weak Security Awareness of Computer Users

The increased wide use of computers has seen a significant improvement in efficiency in offices, especially as far as the contexts such as paperless offices and e-government are concerned where time is saved and hence manual service dependency is minimal. However, most computer users lack formal training in computer science and are not cognizant with enough details about computer security. This sets them up to vulnerabilities that hackers and all other malicious elements take to exploit.

E. The Need for Improved Supervision by Relevant Authorities

Although public security departments have set up specific departments for the detection and response of cybercrimes, besides setting up cybersecurity departments by a few of them, laws and regulations fail to remain at par with the evolving rate of technology. Consequently, the sophistication of crimes through cyber is on a growing scale, and more than that, the oversight and enforcement levels should be intensified. Improvement should also be done in respect to surveillance and control measure towards cybercriminals as they are doing evil tasks.

IV. ANALYSIS OF THE ADVANTAGES OF AI TECHNOLOGY

A. Fuzzy Information Ability and Collaboration Ability

AI uses fuzzy logic to make predictions and work with uncertain or incomplete data. The capability to work with fuzzy information allows AI to operate in environments where clear information is not available. Such adaptability makes AI very useful in predicting future trends and working in complex, dynamic environments where certainty can never be guaranteed.

B. Learning Ability and Capability to Deal with Nonlinearities

AI systems work well in learning from very large amounts of data. Much of this data is often in raw or lower levels. The processing of data allows AI to uncover some high-level insights that otherwise would be difficult to be detected. AI also handles nonlinear relationships well, which is a problem when using traditional problem-solving. In machine learning and deep learning, AI can model complex nonlinear problems, similar to human intelligence but more so in efficiency and scale.

C. The Computational Cost of AI Is Small

AI optimizes resource usage through recycling of data and minimizing the costs associated with computation. The algorithmic processing of large data sets with minimal resource usage by AI is possible through sophisticated algorithms. The capability of choosing optimal strategies for solving problems further enhances the efficiency of AI, which has made it a preferable choice for many industries. In saving time, AI also helps in saving energy and contributing to more sustainable technology operation.

V. A NECESSITY OF APPLYING AI IN COMPUTER NETWORK TECHNOLOGY

As awareness about network operation security increases, so do the demands for better network security management. AI has an important role in the protection of personal information to prevent it from being compromised. Moreover, AI improves the agility and responsiveness of computer systems, which is the backbone of effective cybercrime prevention and control. It helps in identifying and controlling criminal activities while offering timely and proactive solutions.

With AI-driven optimization management systems, AI can automatically collect data and analyze the possibility of risks to computer networks. Based on this information, AI can identify faults or problems in the network operation and alert users or administrators in real-time so that problems can be identified promptly and resolved. This is a timely fault detection which improves network reliability and performance.

Computers have introduced revolutionary technological changes, and this is part of the development of AI. Today, computers and AI are inseparable, as they work together to process data and enhance algorithms. AI provides intelligent technical support by managing uncertainty and tracking dynamic changes in information. This enables AI to provide accurate and timely insights that help users navigate complex network environments and optimize management practices. Therefore, the development of AI significantly contributes to improving the efficiency and capability of computer network management systems.

VI. AI APPLICATION ANALYSIS IN NETWORK TECHNOLOGY

A. AI Enhances Computer Network Security Management

Although advancements have been made, current network security systems are still inefficient, allowing hackers to breach users' personal data. AI has the potential to solve this problem by making intelligent systems protect personal information. Among the applications are intelligent firewalls, anti-spam tools, and intrusion detection systems.

Intelligent Firewalls: AI-based firewalls use advanced identification techniques to analyze data and detect network threats without heavy computational demands. These systems effectively intercept malicious activities, such as preventing hacker attacks, detecting viruses, and stopping the spread of malware in real-time. This proactive defense significantly improves network security [8].

B. AI Agent Technology

AI agent technology is the software entities which integrate a knowledge domain database, reasoning capabilities, and communication systems between agents. This technology enables efficient information processing and decision-making.

Communication Between Agents: Each agent communicates using its knowledge base, processing new data to complete tasks and share insights.

Improved Information Retrieval: AI agents can search through large datasets and deliver relevant information to users, streamlining the data retrieval process.

Proxy Technology: AI agents can apply proxy technology to provide better services. For instance, when searching for information, the AI can filter the results and present only those that are most relevant, therefore increasing work efficiency by making it easier for users to choose the best information regarding their needs [9].

C. Application in Network System Management and Evaluation

AI has advanced network management systems significantly, which makes more intelligent and adaptive solutions possible. In integrating expert knowledge with problem-solving techniques, AI improves network environments in terms of operation and evaluation.

Complete Network Management: A complete network management system includes using an expert knowledge base that addresses the problems existing within a network. Such AI also reintegrates knowledge to create intelligent programs to respond to new challenges.

Expert knowledge integration: AI systems can compare real-time network issues with expert opinions and solutions from databases, providing authoritative guidance to solve problems across fields. AI also continuously updates its knowledge base to reflect the latest industry needs and advancement.

The use of AI in the evaluation of the network optimizes network paths and minimizes resource wastage. AI will help manage network resources in an efficient manner, leading to improvement in their quality and performance. AI's ability to simulate human reasoning, based on the human nervous system, enhances its ability to process data and provide accurate results. For example, AI can mimic human thinking patterns to correct errors in speech input or simulate natural language, making it highly effective in applications like intelligent speech processing. These capabilities enable AI to handle noise and errors efficiently, ensuring a seamless user experience.
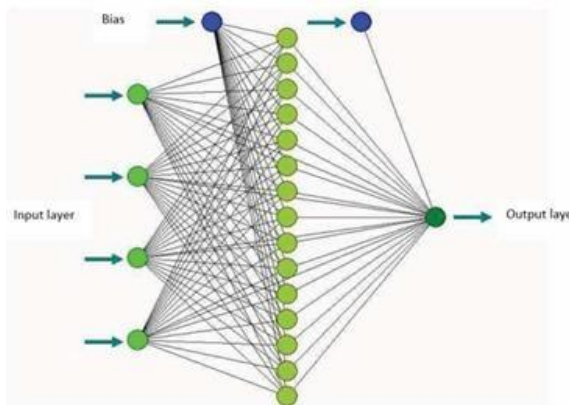
VII. CONCLUSION

As the technology in information continues to improve and advance with artificial intelligence, computer network technology and artificial intelligence are seen to transform both professional and personal aspects of life for good.

Evolving society means that greater needs for stronger, efficient computer networks in areas related to data security and problem-solving capabilities are demanded. A better ability to protect privacy while quickly resolving challenges is urgently needed.

As a result, AI is becoming an integral part of modern network technology. Its ability to enhance security, improve operational efficiency, and provide intelligent problem- solving makes it an indispensable tool for the future of computing. To fully harness its potential, we must continue to explore AI's capabilities and further integrate it into network systems. In doing so, we can significantly contribute to the development of computer technology to be more sensitive and adaptable to the needs of society.

Conclusion The integration of AI and network technology is thus one of the key research areas where there are vast potential opportunities to solve complex issues and make a more secure, efficient, and intelligent digital future

REFERENCES

[1]. Y.T. Xiong, "Artificial Intelligence and Its Application in Computer Network Technology," Technology and Market, vol. 2, pp. 22-25, 2017.

[2]. C.Q. Wang, "Application of Artificial Intelligence in Computer Network Technology," Information and Computer, vol. 14, pp. 74-75, 2015.

[3]. Q.T. Li, "On the Application of Computer Network Technology in Artificial Intelligence," Journal of Jiamusi Vocational College,, vol. 4, pp. 436-438, 2018.

[4]. Y.F. Ma, "Discussing the Application of Artificial Intelligence in Computer Network Technology," Computer Disc Software and Applications, vol. 22, pp. 43-44, 2018.

[5]. Zh.Y. Wu, "Try to Analyse the Application of Artificial Intelligence in Computer Network Technology," Network Security Technology and Application, vol. 11, pp. 70-74, 2017.

[6]. Y.H. Ma, "Analysis of the Application of Artificial Intelligence in Computer Network Technology," Contemporary Education Science, vol. 20, pp. 75-77, 2015.

[7]. Sh.G. Xu, "Artificial Intelligence and Its Application in Computer Network Technology," Communication World, vol. 6, pp. 85-87, 2016.

[8]. Y.F. Zhou, "Analysis of the Application of Artificial Intelligence in Computer Network Technology," Science and Technology*, vol. 15, pp. 127-130, 2015.

[9]. W.F. Qi, "Application of Artificial Intelligence in Computer Network Technology," Electronic Technology and Software Engineering,, vol. 16, pp. 15-17, 2017.

[10]. Ch.L. Lu, "Artificial Intelligence and Its Application in Computer Network Technology," Electronic Production, vol. 5, pp. 87-88, 2015