

Application and discussion of computer communication technology in artificial intelligence field

Rao Yi*, Wang Xiangyu

China Mobile Communications Group Hubei Co., Ltd, Wuhan, Hubei, China

**Corresponding author: 13476828815@139.com*

Keywords: Computer communication technology; Artificial intelligence; Application and discussion

Abstract: Since the beginning of the 21st century, the rapid advancement of computer communication technology and artificial intelligence has propelled modern society's transition from informatization to intelligence. With the progress of the Internet, Internet of Things, and big data technology, the speed and efficiency of data transmission have significantly improved, providing ample support for artificial intelligence algorithms. Through distributed computing and cloud computing, the smooth processing and transmission of massive data are achievable, laying a solid foundation for the training and reasoning of artificial intelligence algorithms. Simultaneously, continuous enhancements in real-time responsiveness, stability, and security of computer communication technology have opened up endless possibilities for the diversification and widespread adoption of artificial intelligence applications. In various fields such as industry, healthcare, transportation, and education, intelligent networking systems are gradually becoming widespread, and the integration of edge computing with IoT allows artificial intelligence to serve society's development more precisely and efficiently.

1. Introduction

Computer communication technology serves as the cornerstone of the modern information society, while artificial intelligence technology acts as the engine shaping the future intelligent society. The convergence of these two not only gives birth to numerous innovative applications but also triggers extensive contemplation on their profound interactive relationship. Transitioning from traditional single system data exchange to real-time communication within complex networks, computer communication technology offers a reliable transmission channel and processing capability for the rapid advancement of artificial intelligence. Conversely, artificial intelligence continuously propels communication protocols and technologies towards a more intelligent and efficient direction. Exploring the specific applications of computer communication technology in data transmission, edge computing, intelligent networking systems, and real-time communication elucidates the comprehensive panorama of their fusion, revealing their pivotal influence on the construction of an intelligent society. Data transmission and processing stand as the core elements for the operation of artificial intelligence, relying on high-speed and stable communication technology to enable efficient processing of vast amounts of data. The integration of edge

computing with the Internet of Things not only expands the application scenarios of artificial intelligence but also enhances its real-time response capability. The widespread adoption of intelligent networking systems elevates the level of intelligence across various industries, while the deployment of real-time communication allows artificial intelligence applications to excel in time-sensitive scenarios. All this indicates that computer communication technology is no longer just a tool for the development of artificial intelligence but also a catalyst propelling new technologies to ascend continuously.

2. Fundamentals of computer communication technology

The field of artificial intelligence relies heavily on the cornerstone of computer communication technology, providing robust support for the widespread application of artificial intelligence. When examining the application of computer communication technology in the realm of artificial intelligence, a profound understanding of the foundational aspects of computer communication technology is essential. These foundational aspects encompass data transmission, network protocols, information security, and communication infrastructure, among others. Data transmission stands at the core of communication technology, involving processes such as data encoding, modulation, transmission, and reception. Network protocols, on the other hand, constitute a set of rules that ensure effective transmission and exchange of data between different devices and systems. Information security, meanwhile, encompasses measures to safeguard data from unauthorized access, tampering, or loss during transmission. Communication infrastructure enables the physical and logical networks for data transmission, encompassing elements such as fiber optics, wireless networks, and satellite communication. In the realm of artificial intelligence, the foundational role of computer communication technology is particularly pronounced. Artificial intelligence systems require the processing and analysis of vast amounts of data, with the collection, storage, transmission, and processing of this data relying on efficient communication technology. For instance, in intelligent transportation systems, vehicles, traffic lights, surveillance cameras, and other devices need to exchange data in real-time to optimize traffic flow and prevent accidents. This real-time data exchange places high demands on the reliability and speed of communication technology. Furthermore, distributed computing and cloud computing in artificial intelligence also rely on robust communication technology support. Distributed computing involves dispersing computing tasks across multiple processing units, necessitating efficient communication mechanisms between these units to coordinate their work. Cloud computing, on the other hand, delivers computing resources and data storage services over the internet, allowing users to access cloud services from any device, which in turn relies on stable and fast communication networks. In conclusion, computer communication technology constitutes an indispensable foundation for the applications of artificial intelligence. Not only does it provide the channels for data transmission in artificial intelligence, but it also supports the computation and storage aspects of artificial intelligence. With technological advancements, computer communication technology will continue to drive the progress of artificial intelligence, bringing more convenience and innovation to human society [1].

3. Application of computer communication technology in artificial intelligence

3.1. Data transmission and processing

One of the key applications of computer communication technology in the field of artificial intelligence is data transmission and processing. The essence of artificial intelligence systems lies in their efficient handling and precise analysis of enormous data, which inherently requires robust

capabilities for data transmission and processing. Data transmission plays a crucial role in artificial intelligence. Whether it is collecting environmental data from sensors or exchanging information between distributed computing nodes, a high-speed and stable data transmission network is indispensable. The rapid transmission of large amounts of data not only enhances system response rates, but also significantly improves the efficiency of data processing and decision-making. For instance, in autonomous vehicles, data collected by various sensors must be transmitted in real-time to the central processing unit for analysis and decision-making, ensuring safe driving and timely responses. Any delay or instability in data transmission may lead to serious consequences. In terms of data processing, computer communication technology has facilitated the widespread use of distributed computing and cloud computing. Distributed computing allows massive computational tasks to be divided into smaller ones and allocated to different processing units, thus substantially reducing processing time and enhancing system capabilities. Cloud computing, on the other hand, provides computing resources and storage services to users over the internet, enabling the efficient storage and processing of substantial amounts of data. AI applications based on cloud computing, such as recommendation systems and intelligent voice assistants, achieve real-time processing of complex algorithms and rapid response to user demands through powerful cloud-based computing capabilities. Furthermore, the emergence of edge computing has introduced new possibilities for data processing. By distributing data processing tasks to devices closer to data sources, edge computing reduces data transmission latency, thereby improving real-time and response speed. This is particularly vital for AI applications requiring instantaneous decision-making, such as industrial robots and IoT devices. In conclusion, computer communication technology not only ensures efficient data transmission but also provides a solid foundation for distributed data processing and cloud computing. With continuous advancements in communication technology, the data processing capabilities of artificial intelligence systems will further improve, driving the application and development of AI technology in various fields. Throughout this progression, computer communication technology serves not only as a behind-the-scenes hero but also as a key force leading the transformation of artificial intelligence.

3.2. Edge Computing and Internet of Things (IoT)

The application of edge computing and Internet of Things (IoT) in artificial intelligence highlights the importance and innovative potential of computer communication technology. Edge computing distributes computing tasks to the network's edge, closer to the data source, making data processing more efficient and rapid. This approach significantly reduces data transfer latency, meeting the needs of certain artificial intelligence applications that require real-time response. IoT technology connects billions of devices, which require the support of communication technology to efficiently collaborate within the edge computing framework. The application of edge computing in IoT demonstrates its significant impact on processing speed and efficiency. For instance, in smart factories, production data collected by sensors is directly analyzed and processed on local devices, enabling immediate identification and resolution of production issues, thereby enhancing production efficiency and reducing downtime. While traditional cloud computing is powerful, uploading all data to the cloud for processing can lead to significant network latency and bandwidth pressure. Edge computing, on the other hand, places many computing tasks locally, ensuring prompt responsiveness and reducing bandwidth consumption. In the construction of smart cities, the combination of edge computing and IoT plays an equally important role. Smart traffic systems collect data through cameras and sensors, which is processed on local edge devices to dynamically adjust traffic signals and vehicle dispatch [2]. This not only improves traffic flow but also enhances public safety. For example, smart cameras can immediately identify emergency situations and take

prompt action without the need to wait for data to be transmitted to remote servers for processing. The medical field is also a prime example of edge computing and IoT applications. In smart medical devices, sensors monitor patients' physiological data in real-time, which is rapidly analyzed by edge devices to issue alarms or adjust treatment plans immediately when needed. This real-time processing capability is crucial for saving lives in emergency situations and significantly alleviates the pressure on remote medical systems. The development of computer communication technology has made the combination of edge computing and IoT possible, not only enhancing the efficiency and speed of data processing but also paving the way for the application of artificial intelligence in various fields. With the advancement of new generation communication technologies such as 5G, the potential of edge computing and IoT will be further unleashed, propelling artificial intelligence to new heights. Computer communication technology plays an irreplaceable key role in this process, continuously driving the innovation and progress of artificial intelligence.

3.3. Intelligent networking system

The implementation of smart interconnected systems within the realm of artificial intelligence exemplifies the potency and extensive prospects of computer communication technology. These systems facilitate the interconnection of disparate hardware devices and software systems via the internet, enabling them to communicate, share information, and collaborate, thereby achieving more intelligent and efficient operations. This technological breakthrough has propelled the advancement of artificial intelligence, granting it a plethora of practical applications. The application of smart interconnected systems is ubiquitous in smart homes. Devices such as smart light bulbs, thermostats, and security cameras are interconnected and managed through a centralized control system. These devices not only learn from the users' living habits autonomously via AI algorithms but also adapt in real-time to environmental conditions. For instance, upon the user's approach to their door, the system automatically illuminates the lights and adjusts the indoor temperature, significantly enhancing the convenience and comfort of daily life. This seamless connectivity and intelligent response are underpinned by the robust support of computer communication technology. Smart interconnected systems also excel in the industrial sector. Within smart factories, a network system composed of various production machinery and sensors operates with a high degree of collaboration, achieving a highly automated and optimized production process through real-time data exchange and decision-making. This not only enhances production efficiency but also substantially reduces production costs and human error rates. In the healthcare sector, smart interconnected systems offer immense convenience and support to patients and healthcare professionals. By connecting various medical devices and monitoring systems, real-time health data can be obtained and analyzed by AI for personalized medical advice and remote diagnosis, significantly improving medical efficiency and patient care quality and satisfaction. In smart transportation systems, various modes of transport and infrastructure are interconnected, realizing information sharing and intelligent scheduling. Intelligent traffic lights, autonomous vehicles, and public transportation systems collaborate, optimizing traffic flow, reducing congestion, and enhancing traffic safety through data analysis and real-time communication. This system's efficient operation is also attributable to the robust support of computer communication technology. In summary, smart interconnected systems leverage the powerful data transmission and processing capabilities of computer communication technology to realize the application of artificial intelligence across various fields, highlighting their efficiency and degree of intelligence through efficient information exchange and intelligent analysis. As communication technology continues to advance, smart interconnected systems will gain even broader applications and continuously drive the cutting-edge development of artificial intelligence technology. In this process, computer communication technology not only serves as a foundational

support but also plays a crucial role as a catalyst igniting the endless potential of AI applications [3].

3.4. Real-time communication and artificial intelligence

The fusion of real-time communication technology and artificial intelligence can be likened to a captivating movement in the symphony of modern technology. At the core of real-time communication lies efficient, low-latency data transmission, a feature that greatly expands the scope and efficacy of artificial intelligence applications. In reality, many scenarios have stringent requirements for data transmission speed, and real-time communication technology provides indispensable support for these scenarios. In the field of autonomous vehicles, real-time communication technology is crucial. These vehicles rely on sensors, radars, cameras, and other devices to continuously collect road and environmental data, which is then transmitted via communication networks to the central processing system for immediate analysis and decision-making. Even the smallest delay could result in serious traffic accidents. Therefore, reliable real-time communication ensures that autonomous vehicles can respond quickly and accurately to dynamic road conditions and unexpected events, thus enhancing traffic safety and efficiency. Another domain benefiting from the integration of real-time communication and artificial intelligence is online medical diagnosis. Doctors and patients can engage in remote consultations through real-time video communication, eliminating the inconvenience caused by geographical limitations. Efficient data transmission allows physiological monitoring data to be promptly delivered to doctors, followed by AI algorithms analyzing and providing recommendations. This model not only improves the utilization of medical resources but also offers patients more timely and personalized medical services. In financial transactions, high-frequency trading relies on the combination of real-time communication technology and AI algorithms. Financial markets are constantly changing, requiring trading decisions to be made within milliseconds. Real-time communication technology ensures that trading instructions and market data are transmitted with extremely low latency, while AI completes data analysis and decision-making processes in an instant. This efficient synergy significantly enhances trading efficiency and profitability, while also reducing risks. The esports industry is also a beneficiary of the deep integration of real-time communication and artificial intelligence. In online games, immediate feedback is necessary for every player action to ensure smoothness and fairness in the game. Real-time communication technology provides a low-latency and highly stable network environment, while AI is used for anti-cheating measures and game experience optimization. The collaboration between the two significantly enhances player interaction and game quality. Real-time communication technology is not limited to the swift transmission of data; rather, its immense potential unveils when combined with artificial intelligence. It allows AI to exhibit excellent performance in a wider range of application scenarios, from autonomous driving to online healthcare, from financial transactions to esports entertainment, all serving as vivid examples of this technological fusion. In the future, with the widespread adoption of 5G and next-generation communication technologies, real-time communication and artificial intelligence will witness broader development prospects, serving as an inexhaustible driving force for societal progress and technological innovation. This collaborative technology not only demonstrates its exceptional performance in terms of efficiency and speed but also heralds the infinite possibilities of AI in real-time responsiveness and handling complex tasks.

4. The influence of computer communication technology on artificial intelligence

4.1. Optimization of artificial intelligence algorithm by communication technology

Communications technology has significantly enhanced the performance and efficacy of artificial intelligence algorithms. Modern communication technology provides an efficient and stable network environment, facilitating swift and reliable data transmission across various devices and systems. This high-quality communication infrastructure strongly supports the training and deployment of AI algorithms. The advancement in communication technology has made distributed computing feasible in large-scale data processing. Through high-speed network connections, multiple computing nodes can collaborate and distribute the workload for complex AI tasks. This not only significantly reduces the algorithm training time but also enhances the model's accuracy. Cloud computing platforms serve as a prime example of this phenomenon, where distributed AI algorithms can swiftly process vast amounts of data, providing more precise outcomes through efficient data transmission and communication protocols. The development of edge computing has further broadened the application scenarios for artificial intelligence algorithms. Leveraging advanced communication technologies, edge devices can swiftly collect and transmit data, engaging in real-time interactions with central servers. This efficient data processing and transmission mechanism enables AI algorithms to operate closer to the data source, reducing latency and enhancing real-time capabilities. This is particularly crucial for application domains like autonomous driving and intelligent security that require rapid responses. Communications technology serves not only as a medium for data transmission but also as a vital catalyst that stimulates the potential of artificial intelligence. Its progress directly propels AI algorithms from the confines of laboratories towards practical applications, creating a more intelligent and efficient future. The deep integration of communication technology and AI algorithms has already, and will continue to, exert profound influences across various sectors of society [4].

4.2. Communication security and privacy protection

The role of communication security and privacy protection plays a crucial role in the fusion of computer communication technology and artificial intelligence. With the frequent transmission of data across different devices and systems, ensuring its security and privacy has become an undeniable issue. Efficient communication technology requires robust security measures to prevent data from being stolen, tampered with, or lost during transmission. In the field of artificial intelligence, the credibility and integrity of data are directly related to the accuracy and reliability of algorithms. Unauthorized access not only leads to the leakage of private information but may also have adverse effects on the decision-making process of AI systems. In this context, the adoption of advanced encryption technology and secure protocols becomes particularly important. These technologies can effectively protect every link of data transmission, ensuring that only authorized users and applications can access sensitive information. Privacy protection is equally an important aspect that needs attention. Artificial intelligence systems often need to process large amounts of personal data for learning and optimization, and the leakage of this data may not only infringe on personal privacy but also give rise to serious legal and ethical issues. Technologies such as differential privacy and federated learning can maximize the utilization of data while minimizing the infringement on individual privacy. Differential privacy protects individual data privacy by introducing random noise into the data, while federated learning processes data locally, only sharing model parameters, thereby avoiding the risks associated with centralized data storage and transmission. In the future, the development of communication technology will face more security challenges and privacy protection needs. Only by ensuring communication security and privacy

protection can artificial intelligence technology truly bring welfare to society. Strengthening communication security and privacy protection is not only an inevitable requirement for technological development but also a practice of user trust and social responsibility.

4.3. The role of communication technology in promoting the development of artificial intelligence

The field of computer communication technology plays an indispensable role in driving the advancement of artificial intelligence. Communication technology provides a high-speed and stable channel for data transmission, enabling various AI algorithms to efficiently collaborate across different hardware architectures and geographical locations. Such collaboration not only enhances computational efficiency but also significantly accelerates the iterative and optimization processes of algorithms. High-performance communication networks further support the development of cloud computing and distributed computing, allowing AI technology to train and analyze on large-scale datasets. Through these advanced computing resources and communication means, AI models can rapidly process massive amounts of data, continuously improving their precision and adaptability. For instance, autonomous driving technology relies on high-speed data transmission between vehicles and cloud servers to achieve real-time environmental perception and decision-making, all of which heavily depend on the support of advanced communication technology. The development of the Internet of Things (IoT) further amplifies the driving role of communication technology in artificial intelligence. Countless sensors and smart devices connected through communication networks collect and transfer data in real-time, providing valuable training materials and operational support for AI systems. This comprehensive interconnection enables concepts such as smart homes and smart cities to gradually become reality, showcasing the significant driving force of communication technology in expanding AI application scenarios. The emergence of 5G technology undoubtedly marks another breakthrough, substantially reducing network latency, enhancing transmission speed, and laying a solid foundation for the real-time and high efficiency of artificial intelligence. Thanks to 5G technology, the performance of AI applications in fields such as telemedicine and virtual reality will be more outstanding, responding and processing user demands more promptly. It can be said that communication technology not only provides strong impetus for the development of artificial intelligence but also shapes the current and future technological landscape. Efficient communication networks and advanced transmission technologies are continuously opening new possibilities for artificial intelligence, propelling it towards new heights [5].

5. Conclusion

In summary, computer communication technology serves as a solid foundation for the development of artificial intelligence, manifesting remarkable facilitating roles in areas such as data transmission, edge computing, intelligent networking systems, and real-time communication. This bidirectional interactive relationship not only propels the advancement of existing technologies but also offers infinite possibilities for the innovation of future technologies. However, it is crucial to confront the challenges it faces, such as communication security and privacy protection issues, necessitating concerted efforts at both the technical and policy levels to address them. The integration of computer communication technology and artificial intelligence will continue to drive societal progress, ushering in a more intelligent way of life for humanity. Only through continuous exploration and refinement can we seize opportunities in the wave of the new era and achieve comprehensive breakthrough development.

References

- [1] Cen B , Liu L .Discussion about the advantages of artificial intelligence technology and its case study in computer networking technology[J].*Bio Technology: An Indian Journal*, 2014, 10.
- [2] Cunbing G .Discussion on Application and Development Path of Artificial Intelligence Technology in China Agricultural Field[C]//2020 International Conference on Artificial Intelligence and Education (ICAIE). 2020. DOI: 10.1109/ICAIE50891.2020.00021.
- [3] Ji Shujun, Nie Zhanglong. The practical application of computer communication technology and electronic information in the field of artificial intelligence [J]. *Electronic test*, 2019 (10): 121-122.
- [4] Cao, Ting. "The Application of Computer Communication Technology and Electronic Information in Artificial Intelligence Field." In *2020 International Conference on Data Processing Techniques and Applications for Cyber-Physical Systems: DPTA 2020*, pp. 69-75. Springer Singapore, 2021.
- [5] Zhonghua Z. Explore the Application of Artificial Intelligence in Computer Network Technology [J].*China Computer & Communication*, 2018:12.