Exploration of the Application of Artificial Intelligence in Computer Information Technology

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Abstract: *With the rapid development of computer information technology, artificial intelligence (AI), as an important branch, is gradually penetrating into various fields of society, demonstrating unprecedented application potential and value. Based on this, this article briefly introduces the overview of computer information technology, analyzes the overview and technical application value of artificial intelligence, and conducts research on the application of artificial intelligence in computer information technology, providing reference for the further development and application of artificial intelligence.*

Keywords: Computer; Information technology; Artificial intelligence; Application.

1. INTRODUCTION

Artificial intelligence, as a technology that simulates human intelligence and achieves abilities similar to human thinking and decision-making through computers and algorithms, has become a hot topic in today's technology field. With the improvement of computing power, the arrival of the big data era, and the continuous innovation of algorithms, the application of artificial intelligence in computer information technology is becoming increasingly widespread. From simple numerical calculations and problem solving to complex intelligent decision-making and self-learning, artificial intelligence is constantly breaking through the boundaries of traditional computer functions and bringing profound changes to human society. Wang et al. (2025) conducted an empirical study on the design and optimization of an AI-enhanced intelligent financial risk control system specifically tailored for multinational supply chains[1]. In neural engineering, Wu et al. (2023) developed Jump-GRS, a multi-phase structured pruning approach for neural networks applied to neural decoding tasks[2]. Recruitment technology was advanced by Xie and Liu (2025) through EvalNet, which integrates sentiment analysis and multimodal data fusion for processing recruitment interviews[3]. Legal text processing saw improvements with Xie et al. (2024) proposing a Conv1D-based approach for multi-class classification of legal citation texts[4]. Urban planning applications were explored by Xu (2025) through CivicMorph, a generative modeling framework for public space form development[5]. Development tools for large language models were enhanced by Zhang, Yuhan (2025) with InfraMLForge, providing developer tooling for rapid LLM development and scalable deployment[6]. The same author also contributed to advertising technology through a reinforcement learning framework for automated ad campaign optimization targeting small businesses[7]. Network analytics was advanced by Zhang, Yujun et al. (2025) with MamNet, a novel hybrid model for time-series forecasting and frequency pattern analysis in network traffic[8]. Green finance applications were addressed by Zhang, Zongzhen et al. (2025) through deep learning approaches for carbon market price forecasting and risk evaluation under climate change[9]. Computer vision saw innovations with Zheng et al. (2025) developing Diffmesh, a motion-aware diffusion framework for human mesh recovery from videos[10]. Agricultural technology was enhanced by Zhou (2025) through a swarm intelligence-based multi-UAV cooperative coverage and path planning system for precision pesticide spraying in irregular farmlands[11]. Business workflow optimization was addressed by Zhu (2025) with TaskComm, a task-oriented language agent designed for efficient small business workflows[12]. Finally, Zhuang (2025) explored the evolutionary logic and theoretical construction of real estate marketing strategies in the context of digital transformation[13].

2. OVERVIEW OF COMPUTER INFORMATION TECHNOLOGY

The origin of computer information technology can be traced back to the 1940s, when the University of Pennsylvania successfully developed the world's first electronic digital computer ENIAC, marking the beginning of a new era in electronic computing for humanity. Despite the fatal flaw of ENIAC's lack of stored programs, its

birth marked the birth of the "electronic brain" and laid the foundation for the rapid development of computer technology in the future. With the continuous advancement of electronic technology, computers have undergone multiple updates and replacements from electronic tubes, transistors, integrated circuits to ultra large scale integrated circuits. Each technological leap has brought significant improvements in computing power and extensive expansion of application fields. The core of computer information technology lies in the computer, which is a modern intelligent electronic device capable of automatically and rapidly performing a large amount of numerical calculations and various information processing according to pre stored programs. Computers not only have fast processing speed and high calculation accuracy, but also have logical judgment ability and strong memory, which make them play an irreplaceable role in multiple fields such as data processing, industrial control, auxiliary design, auxiliary manufacturing, and office automation. At the same time, computer information technology also includes various software and hardware technologies related to computers, such as operating systems, programming languages, database systems, network technology, etc. These technologies together constitute the complete system of computer information technology. In terms of application, computer information technology has almost touched every industry and field. In the fields of business and finance, computers are widely used in data management and analysis, e-commerce, financial transactions, accounting, and financial management, greatly improving work efficiency and accuracy. In the field of education, computer information technology has promoted the development of new teaching models such as teaching management systems, online learning platforms, and multimedia teaching, providing students and teachers with richer and more convenient learning resources. In addition, computer information technology plays an important role in multiple fields such as healthcare, entertainment and culture, transportation and logistics, communication and networking, scientific research, engineering, and manufacturing, becoming an indispensable part of modern society.

3. OVERVIEW OF ARTIFICIAL INTELLIGENCE AND ITS TECHNICAL APPLICATION VALUE

The core of artificial intelligence lies in enabling machines to possess abilities similar to those of humans, such as perception, learning, reasoning, decision-making, and self correction. This process relies on powerful algorithms, massive amounts of data, and high-performance computing power. From early rule-based systems to advanced technologies such as deep learning and reinforcement learning, the development of artificial intelligence has undergone a leap from simplicity to complexity, and from single task to multi task processing. Nowadays, artificial intelligence is capable of handling complex tasks such as image recognition, speech recognition, natural language processing, and robot control, demonstrating strong application potential and infinite possibilities. In terms of technological application value, artificial intelligence is influencing various industries with unprecedented breadth and depth.

Firstly, in the manufacturing industry, artificial intelligence has achieved automation, intelligence, and efficiency in the production process through concepts such as smart factories and intelligent manufacturing. By utilizing technologies such as machine vision and predictive maintenance, enterprises can monitor production status in real-time, optimize production processes, and improve product quality and production efficiency. Meanwhile, through big data analysis, enterprises can accurately predict market demand, achieve on-demand production, and reduce inventory costs. Secondly, in the field of healthcare, the application of artificial intelligence is also remarkable. Through technologies such as deep learning, AI systems can assist doctors in disease diagnosis, developing treatment plans, and even participating in surgical operations. This not only improves the accuracy and efficiency of medical services, but also alleviates the problem of tight medical resources. In addition, artificial intelligence can play an important role in drug development, gene sequencing, and other areas, accelerating the process of new drug launches and promoting the progress of medical technology. In the financial field, the application of artificial intelligence is equally widespread. Through technologies such as natural language processing and machine learning, AI systems can automatically process large amounts of financial data for risk assessment, fraud detection, investment decision-making, and other tasks. This not only improves the intelligence level of financial services, but also reduces operating costs and enhances customer experience. Moreover, artificial intelligence can provide personalized products and services for financial institutions to meet the diverse needs of customers. In the field of education, the application of artificial intelligence is gradually changing the traditional teaching mode.

4. THE APPLICATION OF ARTIFICIAL INTELLIGENCE IN COMPUTER INFORMATION TECHNOLOGY

4.1 Application of Natural Speech Understanding and Generation

In the vast expanse of computer information technology, artificial intelligence is like a brilliant star, shining particularly brightly in the field of natural speech understanding and generation, profoundly influencing the boundaries of human-computer interaction, transforming machines from cold command executors to intimate partners who can "understand" and "respond" to human language. Natural speech understanding and generation technology, as the pearl on the crown of artificial intelligence, is leading human-computer interaction towards a more natural and anthropomorphic direction. Natural speech, this treasure trove of sound information containing all things in the world, contains rich information and emotions, from the ticking sound of light rain to the cheerful singing of birds in the forest, to the complex and varied language communication of humans. Artificial intelligence uses advanced hardware devices - from smartphones to smart home speakers, to in car systems and even robot brains - as tentacles to perceive the world, capturing and parsing these natural sounds. Among them, human language, as a bridge of communication, is the core focus of natural speech understanding and generation technology. When humans input voice information in oral or typing form, artificial intelligence systems quickly activate their powerful processing capabilities. This process is like a translator proficient in multiple languages, not only able to recognize the source and type of sound, but also able to intelligently simulate and parse based on the complex grammar rules of human language. By comparing a large training dataset, the system can accurately recognize every word and sentence in speech, thereby achieving accurate understanding and recognition. This process is a deep integration of artificial intelligence technology and linguistic wisdom, as well as a tribute and transcendence to human linguistic intelligence. The generation of natural speech, on the basis of understanding, endows machines with the ability to "speak". The artificial intelligence system simulates the rhythm, tempo, and emotional color of human language based on the understood content, combined with rich speech data and emotion models, and generates accurate and expressive feedback speech.

4.2 Application of Machine Vision Recognition

Machine vision recognition, as another important window for artificial intelligence to perceive the world, is undoubtedly the visual center of artificial intelligence technology, and its importance is comparable to that of human eyes. This technology endows machines with the ability to "see". Through the fusion of cutting-edge technologies such as infrared scanning, microwave detection, and high-precision optical recognition, machines can not only capture the basic attributes of objects within their field of view, such as shape, color, texture, etc., but also deeply analyze the subtle features of objects, such as unique biometric identifiers such as eye lines and fingerprints. This process is not only a simple collection of surface information of objects, but also a deep exploration and understanding of the essential properties and features of objects. The core of machine vision recognition technology lies in its powerful pattern recognition and analysis capabilities. It can simulate the human visual perception process, efficiently process the acquired image data, and automatically classify and recognize objects by comparing preset databases or applying deep learning algorithms. This ability not only greatly expands the application scenarios of machines, but also provides key technical support for the development of intelligent machines. With the continuous advancement of technology, machine vision recognition has been able to achieve a leap from simple object recognition to complex scene understanding, laying a solid foundation for the improvement of artificial intelligence's intelligence level. In addition, machine vision recognition technology is widely used in the field of environmental protection. Garbage scanning and classification technology can accurately determine the type of garbage and provide reasonable classification suggestions by scanning the appearance characteristics of garbage and combining them with intelligent algorithm analysis, effectively promoting the intelligence and precision of garbage classification work. The emergence of intelligent sorting robots has taken machine vision recognition technology to the extreme. They can quickly scan and identify tags or feature information on goods, automatically complete the sorting and classification of goods, greatly improving the operational efficiency and accuracy of the logistics industry.

4.3 Application of Positioning and Data Modeling

Positioning technology, as a cornerstone of modern science and technology, has long been deeply rooted in our daily life. From the navigation function of smart phones to the auto drive system of cars, all of them demonstrate their importance. For mobile artificial intelligence robots, positioning technology is their compass for exploring

the unknown world. Traditional GPS positioning technology determines the three-dimensional spatial position of objects by receiving satellite signals, providing basic navigation capabilities for robots. However, in complex and ever-changing real-world environments, a single GPS positioning often fails to meet the precision and stability requirements of robots. Therefore, artificial intelligence robots often need to integrate multiple positioning technologies, such as visual module recognition, natural speech understanding, sensor technology, etc., to achieve more accurate and comprehensive environmental perception and positioning.

On the one hand, visual module recognition technology, as the "eyes" of artificial intelligence, can capture and analyze image information within the robot's field of view, identify key elements such as obstacles and road signs, and provide robots with intuitive environmental cognition. By combining advanced algorithms such as deep learning, robots can further understand semantic information in the scene and construct more refined environmental models. Natural speech understanding technology endows robots with the ability to communicate with humans, enabling them to adjust their action strategies or provide relevant information based on human instructions or inquiries.

On the other hand, sensor technology is an important tool for robots to perceive the world. By integrating multiple sensors such as LiDAR, ultrasonic sensors, inertial measurement units, etc., robots can obtain real-time information on their own motion status, changes in the surrounding environment, and provide rich data support for positioning and navigation. These sensor data can be fused and processed to generate more accurate and reliable environmental models, providing strong support for robots' autonomous decision-making and actions. Under the joint action of positioning and data modeling technology, mobile artificial intelligence robots can achieve barrier free walking in various geographical environments such as flat ground, stairs, walls, stairs, and slopes.

4.4 Application of Machine Learning

Machine learning, as a shining pearl in the field of artificial intelligence technology, is not only the core driving force for its development, but also a model of interdisciplinary technology integration. It cleverly interweaves the wisdom of multiple fields such as computer science, control theory, information theory, psychology, linguistics, etc. This field is profound and vast, and its core lies in the synergistic effect of algorithms, computing power, and data, which endows machines with the ability to self learn and adapt, enabling them to continuously optimize and evolve in complex and changing environments.

From an algorithmic perspective, machine learning encompasses diverse methods such as supervised learning, unsupervised learning, reinforcement learning, transfer learning, and deep learning. Supervised learning guides machine learning models to establish mapping relationships between inputs and outputs using known datasets and labels; Unsupervised learning allows machines to autonomously discover hidden patterns and structures in data without any prior knowledge; Reinforcement learning simulates the process of trial and error, allowing machines to learn optimal strategies through continuous interaction with their environment; Transfer learning promotes effective transfer of knowledge between different tasks and accelerates the learning process; Deep learning, as the hottest branch in recent years, has led a new wave of artificial intelligence with its powerful feature extraction and representation capabilities.

At the level of computing power, it is the cornerstone that supports the rapid development of machine learning. With the continuous innovation of AI chips and computing architectures, the computational efficiency and energy consumption ratio have been significantly improved, providing strong support for the training and inference of large-scale complex models. These high-performance computing platforms, like the "brain" of machine learning, drive continuous optimization and breakthroughs in algorithms. On the data level, it is an indispensable "fuel" for machine learning. In the context of the big data era, the massive, diverse, and high-speed nature of data provides rich raw materials for machine learning. However, how to efficiently process, store, and mine data to extract valuable information has become a major challenge for researchers. Through advanced data processing technology and storage solutions, combined with intelligent data mining algorithms, machines can more accurately understand the world, providing a solid data foundation for subsequent learning and decision-making.

4.5 Applications in Information Security

The application of artificial intelligence in information security is first reflected in the precise identification and rapid response to potential threats. Traditional security solutions often rely on fixed rule libraries or signature matching to detect malicious behavior, which is inadequate in the face of new attack methods. Artificial

intelligence, especially machine learning technology, can automatically learn and identify abnormal patterns by analyzing massive security logs, network traffic data, and user behavior data, even if these patterns have not been clearly defined as threats before. This behavior based detection method greatly improves the sensitivity and accuracy of security systems, enabling security teams to detect and respond to potential security risks earlier. In addition, artificial intelligence can also play an important role in identity verification and access control. Traditional authentication methods, such as passwords, tokens, etc., although to some extent ensure the security of the system, also have drawbacks such as being easily stolen and forgotten. Artificial intelligence, through deep learning of user behavior patterns, interaction habits, and biometric features such as fingerprints and facial recognition, can construct more personalized and difficult to replicate identity verification mechanisms. This mechanism not only improves the accuracy and convenience of identity verification, but also effectively reduces the risk of unauthorized access.

5. CONCLUSION

The application of artificial intelligence in computer information technology not only greatly improves information processing efficiency and security, but also promotes innovative development in various industries. Through the application of machine learning, deep learning and other technologies, artificial intelligence can extract valuable information from massive data and provide strong support for decision-making; Meanwhile, artificial intelligence has also demonstrated enormous potential and value in fields such as information security, intelligent work, autonomous driving, medical diagnosis, and financial risk management. In the future, we need to continue to strengthen technological research and innovation, improve the relevant legal and regulatory system, and ensure the healthy development and application of artificial intelligence.

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