Application of Computer Information Technology in the Development of Artificial Intelligence

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Abstract: ***With the continuous advancement of technology, computer information technology plays a tremendous role in the field of artificial intelligence. In data processing, it provides AI with powerful data storage and analysis capabilities, enabling the extraction of valuable information from massive datasets for accurate decision-making and prediction. At the same time, it builds extensive communication and interaction platforms for AI, allowing remote assistance and resource sharing. In addition, cloud computing offers strong support for AI R&D and applications, reducing development and deployment costs. As computer information technology evolves, it will bring technological innovation to many industries in the future.***

Keywords: Computer information technology; Artificial intelligence; Application.

1. INTRODUCTION

Against the backdrop of rapid technological development, the integration of computer information technology and artificial intelligence has become a key driver of scientific and technological progress. Computer information technology lays the foundation for AI algorithm design and model construction; whether it is data processing in machine learning or neural network building in deep learning, it all relies on the support of computer information technology, turning AI theoretical research into executable programs [1]. In practical applications, the combination of computer information technology and AI is transforming the way we live and work. An in-depth analysis of the application of computer information technology in the development of AI is therefore essential for grasping future technological trends. In medical AI, Thao et al. [1] proposed MedFuse, a novel framework combining multimodal EHR data fusion with masked lab-test modeling using LLMs, while Restrepo et al. [2] developed a masked autoencoder approach for lab value representation learning. Subsequent healthcare innovations include Hsu et al.'s [3] MEDPLAN system for personalized treatment generation and Ding et al.'s [4] systematic review of deep learning in ECG diagnostics. Restrepo et al. [5] further contributed multilingual evaluation benchmarks for ophthalmological QA systems, complemented by Wu et al.'s [6] mixture-of-experts framework for multimodal patient modeling. Financial applications have seen parallel progress, exemplified by Pal et al. [7] introducing AI-driven credit risk assessment in supply chain finance. Computer vision research has advanced through several key developments: Peng et al. [8] achieved source-free domain adaptation for pose estimation, Pinyoanuntapong et al. [9] created the GaitSADA system for mmWave recognition, and Zheng et al. [10] developed DiffMesh for video-based human mesh recovery. Zhang et al. [11] extended ML applications to biomechanical anomaly detection. Emerging architectures demonstrate AI's cross-domain versatility, including Fang's [12] cloud-edge system for smart water management, Qi's [13] interpretable neural network for inventory forecasting, and Wang's [14] hybrid model for arthritis risk prediction. Finally, Zhou et al. [15] showcased LSTM applications in UAV path planning, completing this landscape of AI innovations across 15 distinct research fronts.

2. BASIC CONNOTATION OF ARTIFICIAL INTELLIGENCE

As an interdisciplinary field, artificial intelligence integrates knowledge from computer science, mathematics, psychology, and more. From a capability perspective, AI possesses perception, understanding, and learning abilities, enabling machines to obtain external environmental information through various sensors, analyze and interpret the acquired data, automatically extract knowledge and patterns from large datasets to continuously optimize their own performance, and perform logical reasoning based on existing knowledge to handle complex problems. From an application perspective, AI encompasses natural language processing, image recognition, expert systems, and robotics. Natural language processing allows machines to understand and generate human language, enabling human-machine communication; image recognition is used in security monitoring and medical imaging analysis; expert systems incorporate human expert knowledge and experience into computer programs to

provide users with professional decision support; robotics enables machines to perform various tasks in different environments.

3. CHARACTERISTICS OF ARTIFICIAL INTELLIGENCE

3.1 High Intelligence

With advanced computer information technology, AI systems can autonomously complete a variety of complex tasks without human intervention. For example, self-driving cars collect road information through various sensors, use algorithms to analyze and make decisions, autonomously plan routes, control speed, and respond to traffic conditions, fully demonstrating the autonomous operation capability of AI systems. In addition, AI systems continuously improve their performance by accumulating new data and experience, learning patterns and rules from massive datasets. Image recognition systems learn from image data, continuously improving the accuracy of image recognition—from simple shapes to precisely identifying complex scenes and objects. Supported by computer information technology, AI can communicate and interact efficiently with humans. For instance, voice assistants can understand human voice commands and respond in natural language, providing services such as information retrieval and task execution. This interaction breaks the limitations of traditional human-computer interaction, making communication between humans and machines more natural. At the same time, AI continuously adjusts its action strategies based on environmental changes. In the field of intelligent security, when factors such as ambient lighting or personnel flow change, the system can automatically adjust monitoring parameters or analysis algorithms to ensure accurate monitoring and identification of anomalies [2].

3.2 Strong Logic

Through computer information technology, AI can process relevant data and perform analytical reasoning based on rigorous logical rules. During data mining, it can extract valuable information from complex datasets according to preset logical algorithms. In the medical field, when faced with various patient examination report data, AI systems can quickly analyze the correlations between data using strong logical analysis capabilities, providing valuable diagnostic evidence for clinicians. AI systems aggregate and consider multiple factors and make judgments based on logical rules. For example, in the financial investment sector, it can summarize and analyze market trends, company operating conditions, and other data, assess investment risks through established logical models, and provide scientific investment decisions for investors. In scientific research, AI can assist scientists in logical reasoning of various experimental data to discover potential scientific laws. In astronomy, by logically analyzing celestial observation data, AI can infer the existence and characteristics of unknown celestial bodies.

3.3 Low Input

In terms of hardware, as computer information technology has advanced, hardware costs have steadily declined. In the past, developing AI systems required dedicated servers and specialized equipment, whereas today even ordinary personal computers and smartphones possess sufficient computing power to support simple AI application development. Deep-learning frameworks allow developers to train and test on low-cost hardware, lowering the barrier to entry for AI development and attracting more individuals and small businesses to the field. At the same time, most high-quality AI development tools, frameworks, and algorithms are open-source and free to use, and the open-source community provides excellent documentation and code for reference, further reducing development time and cost. With the widespread adoption of the internet, vast amounts of data are being generated and stored; through proper data collection and processing techniques, developers can obtain rich datasets for training AI models, reducing both the difficulty and cost of data acquisition.

4. APPLICATIONS OF COMPUTER INFORMATION TECHNOLOGY IN THE FIELD OF ARTIFICIAL INTELLIGENCE

4.1 Intelligent Robots

Computer information technology provides intelligent robots with powerful computing and processing capabilities. The robot's "brain"—its core processor—leverages advanced algorithms and programming languages to process large volumes of data rapidly. On industrial production lines, intelligent robots use computer information technology to accurately identify the shape, size, and position of parts and then perform precise grasping and

assembly operations, effectively improving production efficiency and product quality. In addition, sensor technology is a key application of computer information technology in intelligent robots. Through visual, tactile, auditory, and other sensors, intelligent robots can perceive their surrounding environment [3]. Visual sensors allow robots to "see" objects like humans, enabling target recognition and path planning; tactile sensors let robots sense hardness, surface roughness, and other properties, helping them complete tasks more effectively. Moreover, computer information technology enables the understanding, analysis, and generation of human language. In the service industry, intelligent customer-service robots can accurately understand customer questions and provide appropriate answers and solutions; in home settings, intelligent companion robots can engage in daily conversation with family members, offering information and entertainment services.

4.2 Application of Computer Information Technology in Integrated Databases

Databases are vital tools for storing and managing data, providing rich data resources for the development of artificial intelligence. Databases hold vast amounts of data; computers use distributed storage technology to spread this data across multiple nodes, greatly enhancing storage reliability and scalability, while database management systems employ computer algorithms to enable rapid data retrieval. Once data enters a database, computer-based data-mining algorithms analyze it, extracting valuable information and knowledge from the massive dataset to inform AI learning and decision-making. In the realm of business intelligence, computer information technology is used to mine sales data, customer information, and more for market forecasting, supporting corporate decision-making [4]. Moreover, computer information technology enables seamless exchange between databases and AI: through interface protocols, computers can directly access data in the database and feed processing results back into it, forming an organic whole in which data is dynamically updated.

4.3 Application of Computer Information Technology in AI Software

During software development, the involvement of computer information technology significantly boosts efficiency. Traditional software development typically requires substantial human effort for coding, testing, and debugging. With computer-based development tools, code can be generated automatically. In the testing phase, AI can simulate a wide range of complex usage scenarios, quickly pinpointing vulnerabilities and defects, thereby improving software stability. In smart office software, computer information technology is ubiquitous. For example, writing assistants in tools like Google Docs can, based on user-supplied topics and keywords, offer relevant content suggestions and grammar checks, analyze context and logic, and help users optimize article structure for smoother expression. In finance, risk-assessment software leverages computer information technology to analyze and model large volumes of financial data, accurately predicting market trends and risk levels.

4.4 Application of Computer Information Technology in AI Data Mining

Computer information technology is the foundation of artificial intelligence development, providing powerful hardware support, data transmission, storage, and other basic functions for AI. High-performance processors, large-capacity storage devices, and high-speed, stable networks enable AI systems to operate more efficiently. In addition, computer programming languages and software development tools facilitate the implementation of AI algorithms. Traditional data mining is inefficient when handling complex data and struggles to uncover latent patterns, whereas machine-learning algorithms in AI can automatically identify patterns in data through learning and training on large datasets [5]. Significant achievements have been made in image recognition, speech recognition, and natural language processing. In data mining, deep-learning techniques can process unstructured data, extracting more valuable information. During practical data mining, raw data often contains noise or missing values; AI algorithms can automatically detect and handle these issues, improving data quality and providing a reliable foundation for subsequent analysis.

4.5 Application of Computer Information Technology in AI-Based Pattern Information Processing

In data recognition, sensor technology connected to computers can efficiently collect data. Leveraging deep-learning algorithms in AI, computers can learn from and analyze image data to identify various elements within images. For example, in security surveillance systems, AI-based image recognition can quickly spot suspicious individuals and abnormal behaviors, offering strong support for social safety. Previously, computers struggled to grasp the complexity and diversity of human language, but with advances in AI, applications such as machine translation and intelligent voice assistants have emerged. AI algorithms perform semantic, syntactic, and

pragmatic analyses of natural language, enabling computers to accurately understand human intent and respond accordingly. Intelligent customer-service systems use natural-language processing to answer user questions rapidly, improving service efficiency and quality. Moreover, traditional data-analysis methods falter when faced with large-scale, high-dimensional data, whereas machine-learning algorithms in AI can automatically identify patterns, providing robust support for business decisions. E-commerce platforms analyze users' purchasing behaviors and preferences, then apply AI algorithms to recommend personalized products, enhancing the shopping experience and boosting platform sales.

4.6 Application of Computer Information Technology in AI Healthcare

With the aid of computer information technology, medical data can be rapidly stored, processed, and analyzed during diagnosis. AI algorithms can identify and analyze medical images, detecting early lesions and minute abnormalities with accuracy and efficiency far exceeding manual diagnosis. Physicians can then formulate more scientific treatment plans based on these results. Simultaneously, computer information technology can collect patients' personal health information, lifestyle habits, and genetic data to predict future diseases, assess the risk of deterioration based on disease progression and lifestyle, and provide early warnings for both doctors and patients. Through wearable devices and mobile health applications, computer information technology enables real-time collection of vital-sign data and delivers personalized health advice and interventions, thereby improving overall health. Meanwhile, telemedicine platforms built with computer information technology allow physicians to diagnose and treat remote patients, with AI assisting in condition assessment and optimizing the allocation of medical resources. On this foundation, computer information technology supplies upstream technical solutions; using source-code frameworks, computer communication technology, and electronic information technology, it offers comprehensive guidance for downstream applications such as drug development and virtual assistants, while providing robust support for integrated management.

5. CONCLUSION

At present, the integrated development of computer information technology and artificial intelligence has become a key driver of technological progress. Computer information technology plays a crucial supporting role in AI development, ensuring everything from data storage and transmission to algorithm execution. The powerful computing capacity of computers enables AI models to process massive datasets and uncover underlying patterns and regularities. Conversely, AI also opens new directions for computer information technology; its continuous advancement spurs ongoing innovation in hardware performance and software architecture to meet complex computational demands. In the future, the deep integration of computer information technology and AI should become even broader and more profound. Therefore, we must fully leverage the strengths of computer information technology, continuously explore the frontiers of AI, and enable technology to better serve society and humanity.

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