Original Paper

Integration and Innovation of Artificial Intelligence Technology in Computer Application Technology Course

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Abstract

With the rapid development of artificial intelligence technology, its integration and innovation in computer application technology courses has become an important trend in the field of education. The purpose of this paper is to discuss the current situation of the application of artificial intelligence technology in computer application technology courses, the integration methods, innovative practices and the far-reaching impact on education and teaching. By analyzing specific cases, this paper reveals the potential of AI technology in improving teaching quality, optimizing learning experience, promoting personalized learning, etc., and proposes the future direction of integration and innovation.

Keywords

artificial intelligence, computer application technology, curriculum integration

1. Introduction

Artificial Intelligence (AI), as one of the most influential technologies in the 21st century, is profoundly changing all walks of life. From the initial algorithm research to today's wide range of applications, AI technology has penetrated into many fields such as healthcare, finance, education, transportation and so on. In the field of education, the introduction of AI technology has not only brought innovation to the traditional teaching mode, but also provided new ideas and methods for the teaching of computer application technology courses.

Computer application technology course is an important basic course for computer science and technology majors, aiming to train students to master the basic knowledge and skills of computer hardware, software, network and other aspects. With the rapid development of information technology, the content of the computer application technology course is constantly updated and expanded to meet the social demand for high-quality computer talents.

The integration of artificial intelligence technology into computer application technology courses can

not only enrich the teaching content and improve the teaching effect, but also cultivate students' innovative thinking and practical ability. Through the assistance of artificial intelligence technology, students can understand the principles and applications of computer technology more intuitively and improve their learning interest and enthusiasm.

2 The Current Status of the Application of Artificial Intelligence Technology in Computer Application Technology Courses

2.1 Application of Machine Learning in the Course

Machine learning is one of the core areas of artificial intelligence, which has a wide range of applications in the computer application technology courses. For example, in the image processing course, machine learning algorithms can be used to classify, recognize and understand images; in the natural language processing course, machine learning models can be used to achieve text classification, sentiment analysis and other functions. In addition, machine learning can be used to optimize the design of algorithms, improve computational efficiency and other aspects.

2.2 Application of Deep Learning in Courses

Deep learning is a machine learning method based on neural networks, which has achieved remarkable results in computer vision, speech recognition and other fields in recent years. In the computer application technology course, deep learning technology can be used in many aspects such as image recognition, speech recognition, natural language processing and so on. For example, in the image processing course, deep learning algorithms can be used to realize the super-resolution reconstruction of images, target detection and other functions; in the speech recognition course, the accuracy and robustness of speech recognition can be improved by deep learning models.

2.3 Application of Natural Language Processing in the course

Natural Language Processing (NLP) is an important branch of Artificial Intelligence, aiming at allowing computers to understand and generate human language. In computer applied technology courses, NLP technology can be used in a variety of ways, such as text classification, sentiment analysis, and machine translation. For example, in the information retrieval course, NLP technology can be used to realize intelligent search and recommendation; in the intelligent customer service course, human-computer dialogue and question and answer systems can be realized through NLP models.

3. The Way of Integration of Artificial Intelligence Technology in Computer Application Technology Courses

3.1 Convergence of High Performance Computing and Artificial Intelligence Based on High Performance Computing

The integration of High Performance Computing (HPC) and Artificial Intelligence is an important means of realizing large-scale data processing and complex computation. In computer application technology courses, efficient data processing and computation can be realized by introducing a high

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performance computing platform combined with artificial intelligence algorithms. For example, in big data analysis courses, high-performance computing clusters and machine learning algorithms can be used to rapidly analyze and mine massive data; in deep learning courses, the training and inference process of deep learning models can be accelerated by high-performance computing.

Running AI applications on existing high-performance computing infrastructures Many colleges and universities and enterprises have already established high-performance computing infrastructures, such as high-performance computing systems based on Intel® Xeon® processors. Running AI applications on these infrastructures can fully utilize existing computing resources and improve computational efficiency. For example, with optimized AI frameworks such as TensorFlow and Caffe, the training and inference of deep learning models can be implemented on high-performance computing systems, thereby accelerating the processing speed of tasks such as image processing and natural language processing.

Incorporating AI in Modeling and Simulation Workflows In modeling and simulation courses, AI can be integrated into existing workflows to gain insights from results faster. For example, in biomedical engineering, simulation data can be processed and analyzed using AI techniques to accelerate the development of new drugs and the diagnosis of diseases. With continuous workflows, it is possible to automate the processing of simulation and modeling HPC workloads and provide the created data to AI workflows for improved insights.

3.2 Convergence Based on Intelligent Education Platforms

Intelligent education platform is one of the important applications of AI technology in the field of education. Through the intelligent education platform, personalized teaching, intelligent assessment, online interaction and other functions can be realized. In the computer application technology course, the teaching resources and tools provided by the intelligent education platform can be used to improve the teaching effect and learning experience.

Personalized teaching, the intelligent education platform can provide personalized teaching resources and recommendations based on students' learning and interest preferences. For example, in programming courses, the intelligent education platform can recommend suitable programming tasks and projects according to students' programming level and interest direction; in database courses, it can provide personalized learning paths and resources according to students' learning progress and comprehension ability.

The intelligent education platform can provide automatic assessment and feedback on students' assignments and exams through machine learning algorithms. For example, in programming courses, the intelligent education platform can automatically check the correctness and efficiency of the code and give suggestions for improvement; in database courses, it can automatically assess students' query optimization and data management abilities.

The intelligent education platform can provide online interactive functions, such as online discussion and Q&A system, to facilitate communication and cooperation among students. For example, in

teamwork courses, the intelligent education platform can provide online collaboration tools to facilitate file sharing and discussion among students; in project management courses, online project management tools can be provided to help students with project planning and progress tracking.

3.3 Integration based on Virtual Reality and Augmented Reality

Virtual Reality (VR) and Augmented Reality (AR) technologies provide new teaching tools and experiences for computer application technology courses. Through VR and AR technologies, immersive learning environments can be created to enable students to understand the principles and applications of computer technology more intuitively.

Immersive learning environments, VR technology can create realistic virtual environments that enable students to experience immersive application scenarios of computer technology. For example, in the computer network course, VR technology can be used to create a virtual network environment, so that students intuitively understand the working principles of network protocols and routing algorithms; in the operating system course, VR technology can be used to create a virtual operating system environment, so that students can personally operate and manage system resources.

Augmented reality assisted teaching, AR technology can superimpose virtual information into the real world to provide students with a more intuitive and vivid learning experience. For example, in computer hardware courses, AR technology can be used to superimpose virtual hardware components onto real computers to help students better understand the hardware structure and working principles; in programming courses, AR technology can be used to superimpose virtual code blocks onto real programming environments, which facilitates students' code writing and debugging.

4. Innovative Practices of Artificial Intelligence Technology in Computer Application Technology Courses

4.1 Development and Application of Intelligent Teaching Resources

Intelligent teaching resources refer to teaching resources and tools developed using artificial intelligence technology with features such as self-adaptation and personalization. These resources can automatically adjust the teaching content and difficulty according to students' learning situation and interest preferences, thus improving the teaching effect and learning experience.

4.1.1 Intelligent Courseware and Tutorials

Intelligent courseware and tutorials can automatically adjust the teaching content and difficulty according to students' programming level, interest direction and learning progress. For example, in programming tutorials, the system can intelligently recommend programming tasks and projects suitable for the current level of students based on their code submissions, which are neither too simple nor too complex to ensure that students grow in challenges. In database tutorials, the system can dynamically adjust the difficulty and depth of the tutorials according to the students' query efficiency and data management ability, helping students gradually master advanced skills.

4.1.2 Intelligent Experiment Platform

The intelligent experiment platform uses artificial intelligence technology to realize the automation and intelligent management of the experiment process, which greatly improves the efficiency and accuracy of the experiment. In computer network experiments, the platform can automatically configure the network environment and parameters, monitor the experimental process and results in real time, and automatically generate experimental reports and recommendations to help students better understand and master network knowledge. In operating system experiments, the platform can automatically manage system resources and task scheduling to ensure the stability and reliability of the experimental environment and reduce human error.

4.2 Personalized Learning Path Planning and Recommendation

Personalized learning path refers to the learning plan and resource recommendation tailored for students according to their learning situation and interest preferences. This kind of personalized learning can better meet students' needs and improve the learning effect.

4.2.1 Learning Behavior Analysis

Through real-time monitoring and analysis of students' learning behavior, we can gain a deeper understanding of students' learning habits, interest preferences and knowledge level. For example, in programming courses, the system can analyze students' programming habits, code submission frequency and quality, and other indicators, so as to assess their programming level and direction of interest. In database courses, the system can analyze students' query optimization ability, data management ability and other indicators, so as to understand their learning progress and understanding level.

4.2.2 Learning Path Recommendation

Based on the results of learning behavior analysis, the system can recommend personalized learning paths and resources for students. For example, in programming courses, for students with lower programming level, the system can recommend some basic programming tasks and projects to help them consolidate their basic knowledge; for students with higher programming level, the system can recommend some challenging programming tasks and projects to stimulate their creativity and innovation. In database courses, the system can recommend course content and practice topics suitable for students' current level according to their learning progress and comprehension ability.

4.3 Establishment of Intelligent Assessment and Feedback Mechanism

The intelligent assessment and feedback mechanism uses artificial intelligence technology to realize automatic assessment and feedback of students' assignments and exams, which improves the efficiency and accuracy of assessment.

4.3.1 Development of Automatic Assessment Algorithm

By developing automatic assessment algorithms, the system can automatically assess student assignments and exams. For example, in programming courses, the system can utilize machine learning algorithms to automatically check indicators such as code correctness, efficiency and readability, and

give corresponding scores and suggestions. In database courses, the system can use data mining algorithms to automatically assess students' query optimization ability, data management ability and other indicators, and generate detailed assessment reports.

4.3.2 Real-time Feedback and Guidance

The real-time feedback and guidance mechanism helps students find and correct errors in time to improve learning results. For example, in programming courses, when students make mistakes or do not meet the specifications when writing code, the system can give real-time error tips and improvement suggestions to help students quickly locate and solve problems. In database courses, when students have problems in executing queries or managing data, the system can give real-time feedback on query results and optimization suggestions to help students better understand and master database knowledge.

5. Challenges and Countermeasures of Artificial Intelligence Technology in Computer Application Technology Courses

5.1 Challenge Analysis

5.1.1 Technical Challenges

The application of artificial intelligence technology in computer application technology courses faces many technical challenges. For example, how to realize efficient data processing and computation? How to develop intelligent teaching resources with features such as adaptive and personalized? How to establish an accurate and reliable intelligent evaluation and feedback mechanism? These problems need to be solved by the joint efforts of researchers and educators.

5.1.2 Teaching Challenges

The application of artificial intelligence technology in computer application technology courses also brings challenges to the traditional teaching mode. For example, how to adapt the development and application of intelligent teaching resources? How to adjust the teaching plan and teaching methods to adapt to the planning and recommendation of personalized learning paths? How to cultivate students' innovative thinking and practical ability to adapt to the requirements of intelligent assessment and feedback mechanisms? These questions require educators to explore and practice continuously.

5.2 Suggestions for Countermeasures

5.2.1 Strengthen Technological R&D and Innovation

In order to cope with technological challenges, it is necessary to strengthen technological R&D and innovation. For example, R&D investment in key technologies such as high-performance computing, machine learning, natural language processing, etc. can be increased; cooperation and communication with enterprises and research institutions can be strengthened to jointly promote the development and application of AI technology; teachers and students can be encouraged to participate in research projects and technological innovation activities to improve their technical level and innovation ability.

5.2.2 Reform the Teaching Mode and Methods

In order to cope with the teaching challenges, it is necessary to reform the teaching mode and method. For example, a blended teaching mode can be adopted, combining online and offline teaching resources and tools to improve the teaching effect and learning experience; teaching methods such as project-based learning and inquiry-based learning can be adopted to cultivate students' innovative thinking and practical ability; the training and support for teachers can be strengthened to improve their ability and capability to apply intelligent teaching resources and methods.

6. Case Studies

6.1 Tsinghua University's Artificial Intelligence Teaching Assistant Case

Tsinghua University utilizes GLM4, a large model of hundreds of billions of parameters independently developed with independent intellectual property rights, as a platform and technical base to carry out pilot work for eight courses. Through fine-tuning to form the vertical domain models of different courses, it develops exclusive AI teaching assistants to realize the functions of example generation, automatic questioning, answering questions and solving puzzles, arithmetic reasoning, and evaluation and guidance. This case demonstrates the innovative application and practical achievements of AI technology in course teaching, providing useful reference and inspiration for other universities.

6.1.1 Technical Realization

Tsinghua University's AI teaching assistant was developed based on the GLM4 big model, using machine learning and natural language processing technology to realize intelligent teaching functions. By fine-tuning the formation of vertical domain models for different courses, personalized teaching services can be provided for specific course contents and needs. For example, in programming courses, AI teaching assistants can automatically recommend suitable programming tasks and projects according to students' programming level and direction of interest; in database courses, the difficulty and depth of tutorials can be automatically adjusted according to students' learning progress and comprehension ability.

6.1.2 Teaching Effect

The AI teaching assistant at Tsinghua University has achieved remarkable results in terms of teaching effectiveness. Through the application of intelligent teaching functions, it has improved students' interest and motivation in learning; through personalized learning path planning and recommendation, it has improved students' learning effect and performance; through real-time feedback and guidance mechanism, it has helped students find and correct errors in time, and improved learning efficiency and quality.

6.2 The Case of "AI+" Classroom Teaching Intelligent Evaluation System of Beijing Normal University

Beijing Normal University's innovative "AI+" Classroom Teaching Intelligent Evaluation System realizes interconnectivity through smart cameras, smart audio, smart screens and other devices, and is

equipped with an intelligent management system to monitor the teaching and learning in the classroom in real time. The system is capable of real-time monitoring and analysis of multi-dimensional indicators such as teachers' teaching behavior, students' learning behavior, teaching content and classroom organization, as well as quantitative assessment and visual display.

6.2.1 Technical Realization

The "AI+" Classroom Teaching Intelligent Evaluation System of Beijing Normal University is developed based on artificial intelligence technology, using computer vision, natural language processing and big data analysis to realize intelligent evaluation functions. It collects audio and video data in the teaching scene through intelligent cameras and audio devices; analyzes the dialogues between teachers and students through natural language processing technology; and quantitatively evaluates and visualizes multi-dimensional indicators through big data analysis technology.

6.2.2 Teaching Effect and Management Enhancement

Beijing Normal University's "AI+" Classroom Teaching Intelligent Evaluation System has achieved remarkable results in teaching effect and management improvement. Through real-time monitoring and analysis of the teaching situation, it helps teachers understand the teaching effect and students' feedback in a timely manner; through personalized teaching services, it provides targeted teaching suggestions and improvement plans; and through quantitative assessment and visual display, it provides scientific basis and decision-making support for teaching management.

7. Conclusion and Outlook

The integration and innovation of artificial intelligence technology in computer application technology courses has important practical significance and far-reaching impact. Through the development and application of intelligent teaching resources, the planning and recommendation of personalized learning paths, and the establishment of intelligent evaluation and feedback mechanisms, the teaching effect and learning experience can be significantly improved; through the proposal and implementation of countermeasures, such as strengthening technological research and development and innovation, reforming teaching modes and methods, and perfecting ethical norms and regulatory mechanisms, the challenges and problems faced by AI technology in the application of the field of education can be addressed. Through the proposal and implementation of countermeasures such as strengthening technological R&D and innovation, reforming the teaching mode and improving the ethical norms and regulatory mechanism, we can cope with the challenges and problems in the application of AI technology in education.

In the future, with the continuous development and improvement of AI technology, the prospect of its application in computer application technology courses will be broader. On the one hand, new AI technologies and methods can be further explored and applied, such as deep learning, reinforcement learning, etc. On the other hand, the application areas and scope of AI technologies in curriculum teaching can be further expanded and deepened, such as intelligent education platform, virtual reality

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and augmented reality technologies, etc. At the same time, it is also necessary to strengthen the construction and improvement of the ethical norms and regulatory mechanisms for the application of AI technology in the field of education, so as to ensure that it develops in a healthy and orderly manner and makes greater contributions to the cause of education and teaching.

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