Exploration of University Computer General Education Based on AI

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Abstract: *With the rapid development of artificial intelligence technology, its influence on various fields is becoming increasingly profound. In the field of university computer general education, integrating artificial intelligence elements has become an inevitable trend. This paper focuses on the content design of computer general education based on AI, explores how to build a curriculum system that meets the needs of the intelligent era, and cultivates comprehensive talents with computational thinking, AI literacy, and innovation ability. Through the re-examination of educational goals, the reconstruction of the knowledge system, the innovation of teaching methods, and the strengthening of practical links, it provides theoretical support and practical guidance for the reform of university computer general education. At the same time, it analyzes the successful cases of the integration of artificial intelligence and computer general education, summarizes the experience, and provides references for further promoting educational reform.*

Keywords: *Artificial intelligence; Computer General Education; Computational thinking; innovation ability*

1. Introduction

Many foreign universities have taken the lead in exploring the integration of artificial intelligence and computer general education. For example, the Massachusetts Institute of Technology (MIT), Stanford University, etc., have cultivated students' ability to solve interdisciplinary problems by offering diverse courses and projects. In China, some universities have gradually realized the importance of this trend and begun to carry out relevant curriculum reforms and textbook construction. However, overall, it is still in the development stage, and there is still room for improvement in curriculum content systems, teaching methods, and practical links.

2. Research Objectives and Methods

This research aims to design a systematic, scientific, and practically feasible content system for AI-enabled university computer general education, clarifying teaching objectives, knowledge frameworks, teaching methods, and practical models. The literature research method is used to sort out relevant research results and practical experiences at home and abroad; the case analysis method is used to draw on the experience and lessons of successful cases; and through questionnaires and interviews, the needs of students and the teaching status of teachers are understood to provide a basis for content design[1].

3. The Necessity of Integrating AI into University Computer General Education

3.1 The development of The Times to the new requirements of talent quality

In the intelligent era, the demand for compound talents with artificial intelligence knowledge and skills in various industries is growing rapidly. University computer general education should follow the trend of the times, enabling students to master the basic concepts, principles, and applications of artificial intelligence, and cultivating their ability to solve practical problems using artificial intelligence technology, so as to meet the society's demand for high-quality innovative talents[2].

3.2 Limitations of Existing Computer General Education

Traditional computer general education mainly focuses on imparting basic computer knowledge and programming skills, lacking a systematic introduction to cutting-edge technologies such as artificial intelligence. It is difficult to stimulate students' interest in emerging technologies and innovative thinking, and unable to provide students with the knowledge and ability reserve required to adapt to the future intelligent society[3].

3.3 Complementarity between Artificial Intelligence and Computer General Education

Artificial intelligence technology has injected new vitality into computer general education, providing rich teaching resources and innovative teaching methods. At the same time, computer general education lays the foundation for the popularization and application of artificial intelligence. The two promote each other and jointly promote the improvement of students' comprehensive quality[4].

4. The Construction of the Knowledge System of University Computer General Education Based on AI

4.1 Basic Knowledge Module

The curriculum should cover traditional computer basic knowledge such as computer systems, network technology, data structures, and algorithm analysis to provide necessary theoretical support for students to understand artificial intelligence technology. At the same time, the curriculum should introduce mathematical foundations such as information theory and probability theory to help students master the principles and model construction methods of artificial intelligence algorithms[5].

Figure 1 summarises the stages from digital encoding to algorithmic innovation shown in the diagram, and the impact of AI on memory, comprehension, application and assessment.
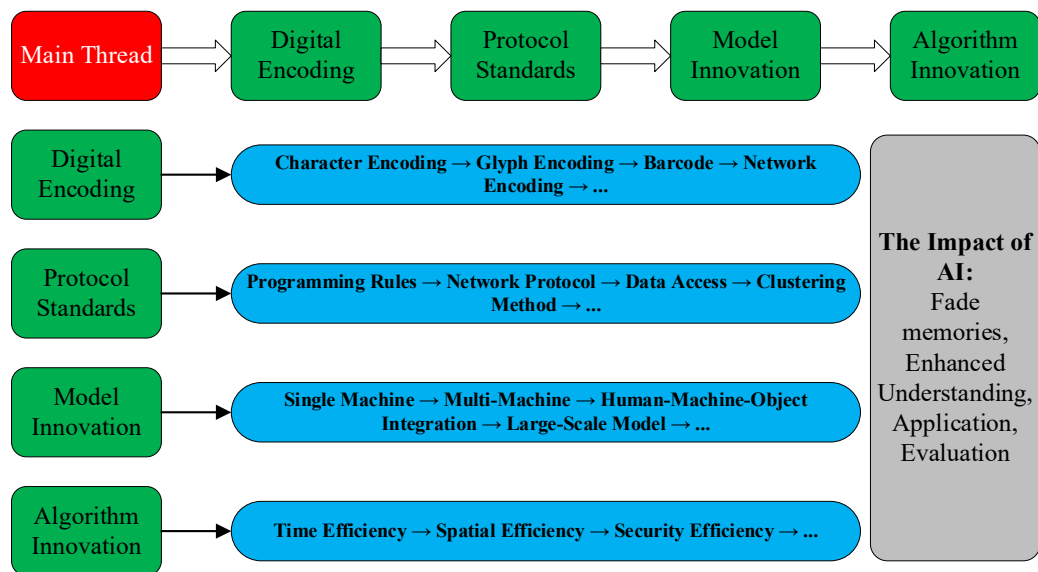

Figure 1: Artificial Intelligence Technology Development and Innovation Flowchart

4.2 Core Technology Module of Artificial Intelligence

This paper delves into the core technologies of artificial intelligence, such as machine learning, deep learning, natural language processing, and computer vision. It includes a detailed examination of classification, regression, and clustering algorithms within machine learning, an exploration of neural network architectures in deep learning, and a discussion of text classification, sentiment analysis, and machine translation technologies in natural language processing. Additionally, it covers image recognition, object detection, and image generation in the field of computer vision[6].

Figure 2 summarises the evolution from the information society and stand-alone systems to networks and database technologies to new network technologies and artificial intelligence and large-scale models,

as well as the programming path from initial programming to simple algorithm implementation.
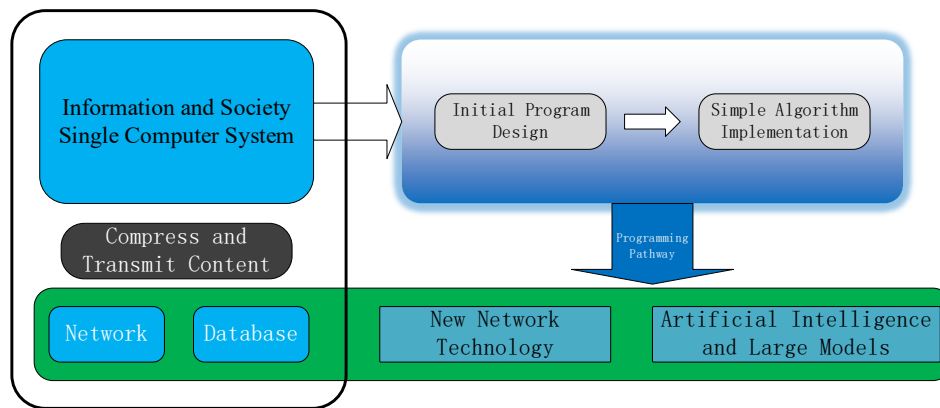

Figure 2: Information Technology and Artificial Intelligence Development Pathway Map

4.3 Application Field Expansion Module

This paper aims to introduce the wide application of artificial intelligence across various sectors, including intelligent healthcare, intelligent transportation, intelligent manufacturing, and intelligent finance. By conducting case analyses, the paper seeks to illuminate students on the transformative impact of artificial intelligence on traditional industries. It endeavors to cultivate and enhance students' capabilities to apply AI technology to solve practical problems, equipping them with the skills necessary to innovate and adapt to the challenges of the future.

Furthermore, the paper emphasizes the importance of staying abreast of the latest research outcomes and development trends in the field of artificial intelligence. It highlights advancements such as reinforcement learning, which enables machines to learn from past experiences, generative adversarial networks (GANs), which are used for generating new data instances, and the emerging field of quantum computing integrated with AI, which has the potential to solve complex problems at unprecedented speeds. By focusing on these cutting-edge areas, the paper aims to stimulate students' interest in scientific research and encourage them to contemplate the future trajectory of AI development. This approach is designed to lay a solid foundation for students' advanced studies and to inspire innovative research that could shape the next generation of AI applications.

5. The Innovation of Teaching Methods in University Computer General Education Based on AI

The curriculum should design practical projects based on artificial intelligence, such as intelligent recommendation systems and image classification applications, allowing students to learn and apply AI technology in a project-based setting. Throughout the project implementation process, educators will guide students to explore independently and to cooperate in teams, thereby cultivating their ability to solve practical problems and fostering innovative thinking. This approach not only enhances students' technical skills but also prepares them for collaborative work environments and encourages them to think critically and creatively.

The educational program should select representative artificial intelligence cases, such as AlphaGo and the application of face recognition technology in the security field, for in-depth analysis. By examining these cases, the program aims to provide students with a comprehensive understanding of the practical applications and implications of AI in various domains. This will enable students to grasp the complexities and potential of AI technologies, and to apply this knowledge in their own studies and future careers. Through case explanation, help students understand the principles and application scenarios of artificial intelligence and improve students' ability to analyze problems and apply knowledge[7].

The academic institution or department responsible for computer science and artificial intelligence education should strengthen the experimental teaching link by building an artificial intelligence laboratory. This laboratory should be equipped with relevant experimental equipment and software platforms that are essential for hands-on learning. Additionally, a variety of experimental projects should be designed, including data preprocessing, model training and evaluation, and algorithm optimization. These projects are intended to provide students with a practical experience of the implementation process of artificial intelligence technology, thereby deepening their understanding of theoretical knowledge and

enhancing their practical skills in the field[8].

5.1 Online Learning and Blended Teaching

The educational institution or program should utilize online learning platforms to provide rich teaching resources, such as online courses, teaching videos, and virtual laboratories, which are designed to facilitate students' autonomous learning and knowledge expansion. By integrating the advantages of both online and offline teaching methods, the program aims to carry out blended teaching. This approach includes online theoretical learning to provide a solid foundation of concepts, offline project practice to apply these concepts in real-world scenarios, and discussion and exchange to foster a collaborative learning environment. The goal of this blended teaching strategy is to improve teaching effectiveness and to enhance students' learning enthusiasm by offering a more engaging and comprehensive educational experience[9].

5.2 Course Design and Project Practice

The curriculum developers and educators are tasked with setting up comprehensive course design projects that challenge students to apply the artificial intelligence knowledge and technology they have acquired. These projects should have practical application value, such as creating an intelligent chatbot or an intelligent data analysis system. The course design is intended to exercise students' abilities in system design and development, teamwork, and project management[10].

Furthermore, educators should encourage students to participate in various artificial intelligence competitions, which can include prestigious events like the National College Student Artificial Intelligence Innovation Competition and the "Challenge Cup". These competitions provide students with opportunities to showcase their skills, engage with cutting-edge technologies and concepts, collaborate with peers from other institutions, and stimulate their innovative spirit, all of which are crucial for developing their innovative practical abilities and preparing them for future careers in the field of artificial intelligence. During the competition, students can be exposed to cutting-edge technologies and concepts, communicate and cooperate with students from other universities, stimulate innovative inspiration, and improve innovative practical ability.

The academic institution or the department of computer science and engineering should strengthen cooperation with enterprises to establish internship and training bases. This collaboration aims to provide students with practical opportunities that will enhance their understanding of real-world applications of artificial intelligence and other computer science concepts. By participating in internships and training programs, students can gain valuable experience, apply their theoretical knowledge to practical situations, and improve their professional skills, which are essential for their future careers in the industry. During the enterprise internship process, students can understand the actual needs and application scenarios of the industry, apply the knowledge they have learned to practice, and improve their professional quality and employment competitiveness.

Scientific Research Training and Academic Activities: The faculty and academic advisors at the educational institution should guide students to participate in teachers' scientific research projects and provide them with scientific research training. This mentorship is designed to cultivate students' scientific research abilities and enhance their academic literacy, ensuring they are well-prepared for advanced studies and research-oriented careers.

Additionally, the institution should hold academic lectures, seminars, and other educational activities, inviting experts, scholars, and technical personnel from enterprises to share the latest research findings and practical experiences. These events aim to broaden students' horizons by exposing them to current trends and innovations in their field, and to stimulate their interest in scientific research, encouraging them to pursue a lifelong journey of learning and discovery.

5.3 Textbook Construction and Resource Support for AI-Enabled University Computer General Education

Textbook Compilation and Selection, Compile textbooks for university computer general education enabled by AI, focusing on the systematicness, frontier nature, and practicality of the content. Textbooks should cover the basic knowledge, core technologies, application cases, and practical projects of artificial intelligence, and reasonably arrange teaching content according to actual teaching needs. The academic department or curriculum committee is responsible for selecting excellent relevant textbooks and

reference books from both domestic and international sources. This selection process is crucial to provide students with a diverse array of learning resources that can support their understanding of the subject matter, expose them to different perspectives, and enhance their educational experience. By offering a wide range of materials, the department ensures that students have access to comprehensive and up-to-date information, which is essential for their academic success and the development of a well-rounded knowledge base in the field of artificial intelligence and computer science[11].

Online Course and Teaching Platform Construction,It is recommended that the educational institution's curriculum development team, in collaboration with AI experts and instructional designers, should develop online courses for university computer general education that are enabled by AI technologies. The production of high-quality teaching videos, courseware and experimental guidance materials is a key responsibility, as these resources are vital for the creation of an engaging and effective online learning experience. Furthermore, the creation of an online teaching platform is required, which should facilitate interactive learning, provide open access to course materials and support autonomous learning. Furthermore, the platform should provide additional features, such as online discussion forums, homework submission systems, and assessment tools, with the objective of enhancing the effectiveness of the teaching process and improving the learning experience of the students. Online courses should have interactivity, openness, and autonomy, facilitating students to learn anytime and anywhere, supporting functions such as online discussion, homework submission, and test evaluation, and improving teaching effectiveness and students' learning experience[12].

Laboratory Construction and Equipment Renewal,The university administration, particularly the Department of Computer Science and Artificial Intelligence, is committed to improving the educational infrastructure by increasing investment in computer laboratories. They are committed to building advanced artificial intelligence laboratories equipped with high performance computers, servers, GPU clusters and essential hardware. They will also provide a range of deep learning frameworks, data analysis software and other experimental software platforms to facilitate hands-on learning and research. They will be responsible for ensuring that these labs are regularly updated with the latest AI technologies and tools, providing robust support for practical teaching and keeping the curriculum at the forefront of the field. This commitment to maintaining state-of-the-art facilities will prepare students for the challenges of the modern workforce and contribute significantly to their academic and professional development in the field of artificial intelligence[13].

Teacher Team Construction and Training,It is imperative that educational institutions prioritise the development of their teaching staff by fostering a cohort of educators who are not only conversant with the intricacies of artificial intelligence but also possess the pedagogical expertise to effectively impart knowledge to their students. It is crucial to motivate these educators to participate in AI-related training programmes, engage in academic exchange activities and collaborate on enterprise practice projects. These initiatives are designed to elevate their professional level and enhance their teaching capabilities. Furthermore, the institution should actively recruit professionals with a background in artificial intelligence to enrich and optimise the composition of the teaching staff. This will ensure a dynamic and knowledgeable team that can effectively guide students in the rapidly evolving field of AI.

6. Conclusion and Prospect

In conclusion, the integration of artificial intelligence into university computer general education is of great significance and necessity. Through the construction of a knowledge system that combines traditional computer knowledge with artificial intelligence core technologies and application fields, as well as the innovation of teaching methods and the strengthening of various supporting measures, students' computational thinking, artificial intelligence literacy, and innovation ability can be effectively cultivated.

In the future, with the continuous development of artificial intelligence technology, university computer general education should keep up with the pace of the times, continuously explore and innovate, and strive to cultivate more high-quality comprehensive talents who can adapt to the needs of the intelligent era and contribute to the development of society and the progress of science and technology. We look forward to seeing more fruitful results in the field of university computer general education reform and the cultivation of innovative talents.

In short, the exploration and practice of AI-based university computer general education is an ongoing process that requires the joint efforts of educators, students, and society to jointly promote the continuous improvement and development of computer education in the intelligent era.

Acknowledgments

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