

Applying DeepSeek, a Large Language Model, to the Teaching of Computer Organization Principles

Min Wen, Ziyue Xu, Zhanpeng Guan

School of Big Data and Computer Science, Guangdong Baiyun University, Guangzhou 510080, Guangdong, China

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Abstract

The rapid development of big data and artificial intelligence has made generative artificial intelligence a core competency for reform and innovation in the field of education. The traditional way of teaching the principle of computer organization has a variety of challenges that need to be solved, and the introduction of DeepSeek brings new opportunities for the teaching of the principle of computer organization. In this paper, the application of DeepSeek in the teaching of computer organization principles is introduced in detail, such as the intelligent generation of teaching resources, and real-time interaction with students to answer students' questions. Finally, the effectiveness and potential value of DeepSeek in the teaching of the Computer Organization Principle is verified through the specific application of three scenarios.

Keywords

generative artificial intelligence
the principle of computer organization
teaching
DeepSeek
real-time interaction

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1. Introduction

In today's era of rapid development of information technology, the principle of computer organization, as a core basic course for computer majors, is critical. However, the teaching of this course is facing many difficulties. On the one hand, the knowledge system involved in the course is huge and complex, while the actual theory and experimental hours of instruction are only 48 hours; heavy teaching preparation work also makes the teacher pressure; on the other hand, the traditional "teacher talk, students listen" one-way lecture teaching method makes students in a passive state of knowledge, and the existing teaching mode is not

cutting-edge enough. On the other hand, the traditional "teacher talk, student listen" one-way teaching method puts students in a passive state of knowledge acceptance, and the existing teaching mode has the problem of the insufficient frontier, which makes it difficult to meet the high requirements of the market for computer professionals^[1]. In addition, the traditional teaching mode makes it difficult to meet the diverse learning needs of students, and there are obvious limitations in taking into account the employment-oriented students' employment skills training and the depth of theoretical knowledge learning of the students who need to go to graduate school.

The rapid development of generative artificial intelligence and the steady advancement of digital transformation of education have given a brand new opportunity for change in the field of education^[2]. DeepSeek, as an advanced artificial intelligence tool, gives new development potential and application prospects for the teaching of the principle of computer organization course by virtue of its powerful intelligent text generation function, dynamic real-time interaction capability, and efficient question-answering function. The purpose of this paper is to analyze the principle of computer organization in depth. The purpose of this paper is to analyze the existing pain points in the teaching of computer organization principles, and with the help of DeepSeek, an advanced artificial intelligence tool, to explore practical solutions to promote the benign interaction between teaching and learning, and to provide new ideas for the reform of computer professional course teaching.

2. Introduction to DeepSeek

DeepSeek is a new generation of artificial intelligence large language model developed by DeepSeek based on the Transformer architecture. It is an AI system with powerful natural language processing and code comprehension capabilities and excels in technical subject knowledge understanding and generation^[3]. The model is trained by massive high-quality educational resources and professional data in the field of computing, and it can accurately understand the core concepts in the principle of computer organization, at the same time, it can obtain the latest news of the cutting-edge development of the discipline with the help of networked search to ensure the timeliness of the teaching content. In terms of educational applications, DeepSeek presents three core values, namely, intelligent teaching resource generation, real-time dynamic interaction, and personalized learning support system, providing innovative technical support for the teaching reform of computer hardware courses.

The following are some specific application scenarios:

- (1) Intelligent teaching assistant: DeepSeek can be used as a virtual teaching assistant to help teachers generate a variety of teaching resources,

such as automatically generating teaching PPTs, lesson plans, syllabi, and other materials, which largely reduces the burden of teachers' preparation while assisting them in accurately preparing for classes.

- (2) Dynamic teaching interactive tool: DeepSeek can act as a dynamic teaching tool, answering students' questions in real-time during classroom teaching and assisting in classroom discussions.
- (3) Support for personalized learning: DeepSeek can recommend appropriate learning content for students according to their learning needs, and can also provide exercises and targeted tutoring to match students' ability levels.

3. The teaching status of the principle of computer organization

The principle of computer organization for students to learn computer-related professional courses to provide a systematic cognitive framework, through the understanding of the program execution process for subsequent programming to lay the underlying logical foundation. However, the principle of computer organization course also faces complex teaching challenges, its theoretical knowledge is abstract and difficult to understand, which largely affects the teaching of the principle of computer organization^[4].

3.1. Heavy burden of teaching document generation and optimization

In the teaching of computer organization principles, teachers have heavy preparation work before class. First of all, teachers have to plan the semester's teaching schedule according to the syllabus and teaching objectives when preparing the lecture plan, which requires much energy to follow the logical framework of knowledge and meet the cognitive laws of students' learning; once again, teachers have to make clear the teaching objectives of the course and its important and difficult points when preparing the syllabus of the lesson plan, the complexity of the knowledge has to be taken into account in the design of the teaching process, which needs to be broken down and introduce the knowledge points step by step. Finally, the PPT improvement link also consumes a lot

of teachers' time and energy, from carefully designing the layout, and selecting materials, to optimizing the content expression and animation effects, all need to be repeatedly proofread, so as to make the teaching content intuitive and vivid, to enhance the classroom effect. Each of the preparatory works of teaching is essential to ensure the smooth implementation of teaching.

3.2. The traditional teaching mode is not cutting-edge enough

In the current teaching model of the principle of computer organization, there is a significant lack of cutting-edge. Most colleges and universities' computer organization principal teachers rely excessively on the textbook supporting PPT to explain the theoretical courses to students in a one-way output mode^[5]. Teachers with this single form of instruction, it is difficult to accurately grasp the knowledge mastery of students, it is also difficult to pay attention to the real-time iterative trends in the computer industry through the existing means of timely adjustment of the teaching program and teaching progress, resulting in the content of the teaching of the cutting-edge technology is seriously out of touch. Even if the development trend of modern information technology is exponential, the teaching of the principle of computer organization is still confined to the classical theoretical framework, and it is not possible to timely incorporate the latest achievements in the field of AI chips and other cutting-edge into the teaching system. This teaching orientation that emphasizes theoretical inheritance and focuses on technological innovation makes students lack knowledge of the latest developments in the industry, resulting in little understanding of emerging technologies. Under the influence of a long-term passive learning environment, students also lack independent learning ability after entering the workplace, highlighting the gap between traditional teaching and the market demand for computer professionals.

3.3. Difficult to meet diversified student needs

With the introduction of the concept of results-oriented education, applied universities are gradually carrying out teaching reforms oriented to students' knowledge learning ability, and learning outcomes^[6], and students' learning needs are also diversified. Principle of computer

organization teachers in the traditional theoretical teaching process, most of the "one-size-fits-all" teaching plans and progress to carry out lectures, so that the individualized needs of students can not be fully concerned. For example, employment-oriented application-oriented students prefer to rely on the course to learn the underlying logic of computer hardware systems, after graduation to engage in computer hardware and software to lay the foundation for collaborative work, to improve their competitiveness in the job market; the principle of computer organization is the core subject of the master's degree enrollment examination of many colleges and universities of computer science majors, for the graduate school plan, they pay more attention to the theoretical knowledge of the course to cope with the theoretical problems in the examination and the examination of the students. To cope with the theoretical problems and comprehensive analysis questions in the examination. As a result, this teaching mode, which is not in line with students' needs, has an impact on students' career development and further education planning and also highlights the serious challenges faced by the teaching of Principles of Computer Organization in meeting the needs of diversified students.

4. Application of DeepSeek in the teaching of computer organization principle

4.1. DeepSeek can become an intelligent teaching assistant for teachers.

For teachers, artificial intelligence models such as DeepSeek have become popular in the teaching process by virtue of their own functional characteristics, which can effectively assist college teachers to save time in class preparation and efficiently complete the expansion of teaching resources, and has become an intelligent teaching assistant for teachers in the new era. Deepseek can help teachers prepare lessons based on the syllabus and semester course objectives, optimize teaching resources, and efficiently generate structured and detailed basic lesson plans and teaching courseware. It can also help teachers formulate questions based on the teaching objectives, provide teachers with new ideas for lectures, and help teachers form and improve the activity design^[7].

4.2. DeepSeek can become a dynamic teaching interaction tool

In classroom teaching, teachers can use Deepseek to break the “full irrigation classroom” teaching mode, through its interaction, and real-time answers to student questions. For example, in the explanation of the “program query mode”, when students are confused about the working principle of the program query mode, students can enter the question through the deep seek dialog window, and you can get graphic and textual answers to assist classroom teaching. At the same time, students are encouraged to talk directly with Deepseek to explore complex concepts such as the instruction execution cycle, breaking the traditional one-way model of “teacher speaks, student listens” and stimulating students’ enthusiasm to actively explore knowledge.

DeepSeek has a powerful information retrieval and integration capability, which can quickly obtain the latest research results, industry trends, and cutting-edge technology information in the field of computer science. Teachers can use DeepSeek to search for cutting-edge content related to the principle of computer organization courses, such as new processor architectures, advanced storage technology, etc., and integrate these contents into teaching courseware and teaching cases.

4.3. DeepSeek can provide personalized learning counseling for students.

In the teaching practice of the principle of computer organization in applied universities, the learning needs of students are diversified, and DeepSeek’s personalized learning tutoring function can bring innovative solutions to meet these needs.

For career-oriented students who want to make hardware-programming connections and develop practical skills for the workplace, DeepSeek uses deep thinking and networked search to link basic concepts of computer organization with programming and industry scenarios in a simple and intuitive way. Students can start real-time dialogues with DeepSeek, from asking questions about the knowledge of the curriculum to the logic behind programming, and ultimately expanding to employment scenarios, which builds a coherent path from knowledge of the principles to programming practice and then to job applications for students. For students preparing for

graduate school, their core need is to firmly grasp the theoretical knowledge and form a systematic problem-solving mindset, DeepSeek uses natural language processing technology to analyze their knowledge weaknesses and provide practice and targeted counseling that meets the students’ abilities. DeepSeek uses natural language processing technology to analyze their weak points and provide them with exercises and targeted tutoring that meet their abilities. It also designs a “step-by-step guide” mechanism for common exam questions, which doesn’t give them the answers directly, but rather inspires them to think by asking questions.

5. Conclusion

Principle of Computer Organization is a key basic course for computer science majors, but it faces the dilemmas of the heavy burden of teachers’ preparation, insufficient cutting-edge traditional teaching mode, and difficulty in meeting the diversified needs of students’ learning, which, to a certain extent, affects the teaching effect of the course and the cultivation of talents.

DeepSeek, as an advanced AI big language model, creates a new opportunity for the teaching reform of computer organization principles. In teaching applications, it is an intelligent teaching assistant for teachers, which can generate lesson plans, courseware, and practice questions based on the syllabus, reducing the pressure on teachers to prepare lessons. At the same time, it can act as a dynamic teaching interactive tool, breaking the traditional one-way teaching mode, teachers and students can use it to solve problems in real-time, access a wealth of learning resources, and stimulate students’ interest in learning. For students, DeepSeek can provide personalized tutoring to meet the learning needs of different students.

DeepSeek brings new solutions to the teaching problems of computer organization principles and promotes the innovation of teaching mode. However, it is still necessary to effectively integrate it with traditional teaching methods when applying it, to play the synergistic effect of teacher guidance and student body, and to prevent both sides from overly relying on AI technology. With the rapid development of AI technology, more similar tools are expected to be integrated into teaching, which will continue to help cultivate high-quality computer professionals.

Disclosure statement

The author declares no conflict of interest.

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