Research on the Teaching Reform of Machine Learning Course in Universities

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Abstract: With the gradual penetration of artificial intelligence technology into various fields of society, it has brought many deeper and broader impacts, gradually improving the status of artificial intelligence in talent cultivation and education to adapt to the current development of social intelligence technology. Therefore, as the core course of artificial intelligence education in universities, machine learning needs to deeply analyze and explore the main factors that affect its development, in order to better mobilize students' learning enthusiasm and teachers' educational innovation, enhance the teaching and learning effectiveness of the course, and maximize the exploration of the educational achievements of artificial intelligence.

Keywords: Machine Learning; Course Teaching; Reform

1. Introduction

The vigorous development of artificial intelligence technology, coupled with the surge in demand for advanced talents in society, has brought huge development prospects for the artificial intelligence major in universities. As the leading course in artificial intelligence education in universities, machine learning has become the main battlefield for students' computer practice and theoretical education. Due to the complexity and abstractness of the subject, the improvement of teachers' teaching efficiency and quality, as well as students' learning enthusiasm and abilities, the curriculum involves multiple subjects such as statistics, probability, matrices, and algorithm theory. This has become a key focus of education and the key to the development of the subject.

2. The content and teaching significance of the "machine learning" course

Machine learning integrates theoretical and algorithmic knowledge from multiple disciplines with complex abstract hands-on practices, and the development background of the discipline is quite complex. The main content of machine learning course includes several key points in the learning of computational intelligence technology: decision tree learning, function learning, probability theory learning, case learning, rule learning, and evaluation learning of common algorithm efficiency. Based on this, the course introduces a flexible theoretical learning mechanism to help students consolidate basic theories and conduct in-depth research on algorithm analysis. The subjects of advanced mathematics, linear algebra, mathematical logic, probability statistics, algorithm design and analysis, and programming language are set up. At the same time, other professional courses in machine learning such as pattern recognition and data mining have been added, providing important methodological and theoretical foundations for students' practical theoretical foundations.

3. Problems in the teaching of machine learning course

3.1 Problems in the theoretical teaching process

The machine learning course mainly focuses on the development of computational intelligence science, and conducts learning on the basic principles and computational mechanisms of various intelligent technologies. Due to the fact that theoretical learning is based on complex mathematical backgrounds and abstract mathematical models, students need to conduct in-depth research on the basis of understanding in order to gain a theoretical development foundation for the course. But for these dull data and algorithms, in actual

classroom learning, students' classroom enthusiasm and interest research points are not high. On the one hand, most students have not included the content of machine learning courses in their future work plans. On the other hand, a small number of students succumb to theoretical learning or are only in the exploratory stage of learning, without systematic planning for this course, resulting in low enthusiasm in the theoretical classroom. In addition, some schools' machine learning courses continue the traditional classroom education model, which Limit its innovative development in terms of time and space, fix the educational model of students as learning objects and teachers as teaching subjects, and mechanically use blackboard writing and multimedia courseware display to provide theoretical explanations for students. Without classroom interactivity and sense of immersion, students can only rely on classroom notes to master knowledge, lacking corresponding resource linked learning, resulting in a serious disconnect between students' mastery and understanding of classroom content and course progress.

3.2 Problems in experimental teaching

Firstly, there is insufficient emphasis on the integration and development of theoretical education and practical innovation. Due to the different development status of machine learning courses from the main subject, only in the experimental stage do students briefly review the theoretical knowledge in the classroom, resulting in the phenomenon of complete annihilation and plagiarism of homework in experimental exercises. This leads to a lack of genuine thinking, problem-solving, and theoretical application in practical practice, making it impossible to achieve the goal of deepening theoretical knowledge through experimental operations and strengthening practical abilities in practical applications. Secondly, students are not proficient in the application of practical language and algorithm tools related to the course, such as C language and MATLAB. Although they have sufficient theoretical foundation in theoretical education, their ability to flexibly apply tools to complete relevant experimental operations in practical applications is seriously insufficient. When learning neural network algorithms, students are unable to analyze the matrix multiplication, transposition, inversion, and other calculations reasonably based on the problem, select the best solution tool, or only choose theoretical tools, and their ability to try is relatively weak, causing students to develop a mentality of perfunctory, resistant, and evasive towards practical activities in experimental classes. Furthermore, the operational practice activity mode in experimental classes is fixed, only guided by simple operational steps, without practical innovation based on the depth of relevant course content, thereby increasing the difficulty of practical breakthroughs in machine learning.

4. Research on the teaching reform of machine learning course

4.1 Guiding course teaching with scientific methods

Students need a strong support in understanding and controlling knowledge in machine learning courses, and this process requires the guidance of scientific educational methods from teachers. Firstly, we should scientifically plan the curriculum and guidance, enhance students' initiative in learning, and strengthen the cultivation of abilities. We should also implement group learning, communication, and discussion, and conduct targeted research on machine learning course algorithms. On the other hand, we can use pre class content reports to conduct pre class preview checks. By combining classroom questioning with teacher feedback, teachers can accurately capture students' questions and interests. Furthermore, teachers can provide scientific and effective problem-solving and interest guidance based on student reports, laying a solid foundation for their systematic explanation of machine learning courses.

4.2 Theoretical teaching lays the foundation for the course

There is a phenomenon of hierarchical connection and disciplinary extension in the curriculum and learning content of machine learning courses in universities. We should upwardly undertake the knowledge of basic courses such as advanced mathematics, linear algebra, computational methods, algorithm design and analysis, and downward link the applied basic methodology of intelligent science and technology majors such as pattern recognition, data mining, and information retrieval. Therefore, teachers should enrich their teaching methods, establish corresponding theoretical connections and review models for knowledge and practice related to machine learning courses at each stage, and enhance the practicality and importance of abstract theoretical knowledge. Utilizing the advantages of the development of the Internet, we offer micro courses, MOOCs, and live streaming teaching modes for students to exchange theoretical teaching, so as to achieve international integration of knowledge, and enhance the basis of theoretical teaching. It can enrich students' teaching resources in machine learning courses and enhance the penetration of artificial intelligence in classroom

learning.

5. Specific measures for teaching reform of machine learning course

5.1 Innovative course theory teaching design

In the new era, the reform of the teaching syllabus aims to enable students to systematically understand the relevant concepts and principles, basic methods involved, and professional technical foundations of the corresponding field through course teaching, cultivate their ability to choose appropriate learning content based on the characteristics of the problem, and achieve effective control over the learning quality and process. The content of machine learning courses is an architecture based on relevant knowledge points, connecting theoretical concepts, principles and methods, and application cases of artificial intelligence into a whole. Therefore, teaching should strengthen goal management and strictly implement the three levels of theoretical understanding, knowledge understanding, and practical mastery in education. In the hierarchical design, each teaching link is designed to enhance the integration of theoretical homework and practical activities in education based on teaching requirements, thereby effectively improving the effectiveness of classroom teaching.

5.2 Strengthening the intensity of course experimental teaching

The purpose of experimental teaching is to strengthen the practical application foundation of theoretical teaching, enhance students' practical application ability, and enhance the motivation of theoretical learning. Therefore, experimental teaching should focus on the handling and classification of problems. Experimental courses should focus on evaluating classroom experimental attendance, program design and production, and submitting experimental reports. On the premise that students meet the attendance requirements, they are required to conduct relevant experimental practices. Students are required to actively review theoretical knowledge to gain a foundation in experimental operations, ensuring that their algorithm design is reasonable and able to independently solve general problems that arise in the experiment. Teaching students to submit comprehensive, truthful, and correctly recorded experimental reports. Teachers can use reasonable evaluation methods to evaluate experimental results, thereby enhancing the scientific and rigorous nature of experimental education.

6. Conclusion

In the development process of education, machine learning courses belong to an "emerging" curriculum. Long term repeated research and practical feedback on educational development are needed to complete the reform of curriculum education. On the one hand, teachers need to make targeted adjustments and optimizations to their teaching plans, curriculum settings, and implementation methods in the early stages. During the process, teachers should start from the practical problems raised and discovered in machine learning courses, and scientifically analyze the causes of theoretical and practical problems. Based on the perspective of the preliminary plan, propose corresponding teaching reform plans and implementation methods, and continuously improve the educational development process of machine learning courses.

References

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