

Exploration of Machine Learning Teaching based on the EduCoder Platform

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Abstract: In order to better focus on ability cultivation and stimulate students' innovative abilities, this paper proposes a teaching model based on the EduCoder platform for machine learning courses. This paper analyzes the drawbacks of traditional teaching, combines the needs of machine learning as a discipline, and through mode reform, combined with the EduCoder platform, demonstrates the operational application of it in teaching. It not only greatly improves students' learning interest, but also allows students to truly become the main body of learning, consequently yielding a substantial enhancement in instructional effectiveness.

Keywords: Machine Learning; EduCoder Platform; Practical Teaching.

1. Introduction

Machine learning is a multidisciplinary field that involves various disciplines such as probability theory, statistics, optimization, and algorithm complexity theory. It studies how to simulate human learning behaviors by using computers to acquire new knowledge or skills, or to better organize existing knowledge structures. Machine learning is the core of artificial intelligence and is one of the fundamental approaches to make computers intelligent. Its applications pervade various domains of artificial intelligence.

However, traditional methods of teaching machine learning have some issues. Firstly, traditional classroom teaching often prioritizes theory and lacks practical components. Students passively receive knowledge and have difficulty truly understanding and applying the concepts and methods of machine learning. Secondly, the learning process of machine learning requires a large amount of data and computational resources, which traditional teaching facilities cannot meet. Additionally, the implementation and debugging of machine learning algorithms, such as the multi-kernel clustering algorithm, also require certain programming skills. However, traditional teaching methods often cannot provide sufficient practice opportunities. After several months of teaching practice, it has been found that the EduCoder platform [1] not only provides common teaching service functions (such as attendance check-in, video learning, assignment collection, online exams, learning analysis, etc.), but also provides reliable and comprehensive support for online experimental practice operations.

2. Problems in Traditional Teaching

In the past few decades, the education community has been actively exploring and implementing new teaching methods and technologies. However, traditional teaching model still dominate in many schools and educational institutions. Despite the advantages of traditional teaching models, there are also some problems that need to be solved.

2.1. Lack of Ability to Think Proactively

The traditional teaching model emphasizes the guidance of

teachers, while overlooking the cultivation of students' abilities of active participation and interaction. In a traditional classroom, students are usually passive recipients, while teachers are the knowledge providers. This one-way teaching method restricts students' thinking development and cultivation of creativity. Students are only required to memorize and repeat the knowledge taught by teachers, lacking the ability to think critically and solve problems actively. This passive learning model is not conducive to students' comprehensive development.

2.2. Inadequate Educational Function

The traditional teaching model focuses too much on class notes and exam scores, while neglecting the cultivation of students' practical application abilities. In a traditional classroom, students are often required to memorize a large number of knowledge points and formulas in order to achieve good grades in exams. However, this memorization-based learning method does not truly cultivate students' critical thinking and problem-solving abilities. Students simply memorize information to pass exams without truly understanding and mastering the knowledge they have learned. This exam-oriented education model [2] is not favorable to the cultivation of students' innovation abilities.

2.3. Lack of Innovation and Challenges

The traditional teaching methods lack personalized teaching approaches. In traditional classrooms, teachers often adopt standardized teaching methods, ignoring the existence of individual differences among students. Each student has different learning styles, but traditional teaching model cannot meet the needs of every student. The standardized teaching methods may let a part of students learn difficultly; thus, they may feel uninterested and bored. In machine learning education, there is a lack of brainstorming to stimulate students' imagination and innovative thinking, resulting in overly traditional and uninspired practices. The lack of process management in the students' practical process also leads to a great gap between the tasks they complete and the requirements. As a result, the traditional teaching model fails to achieve the expected teaching outcomes.

3. The Importance of Code in Machine Learning

Machine learning is a discipline that achieves automated learning through computer algorithms. In machine learning, the code plays a crucial role. It defines the implementation details and logic of the machine learning algorithm.

The practice of coding in machine learning serves as a bridge between theory and practical applications. While theoretical and algorithmic research is essential in machine learning, it is not sufficient to stay at the theoretical level. By writing code, based on theory and algorithms, complex mathematical models can be transformed into executable programs. Therefore, computers can improve their own calculations and learning performance by learning from data, thereby solving a series of complex problems. Therefore, the coding practice is a critical step in applying machine learning theory to problems, as well as achieving automation and efficiency.

In traditional data analysis, manual data processing is a time-consuming and error-prone task. However, with the appearance of machine learning, the process of data processing and analysis can be automated and made more efficient. By writing machine learning programs, we can enable machines to automatically learn patterns and trends from large amounts of data, thereby achieving automated data processing and analysis. This not only significantly reduces the workload of manual data processing but also improves the accuracy and efficiency of data analysis.

However, writing and debugging code is not easy. Machine learning algorithms often involve complex mathematical models and massive data processing, requiring a deep understanding of algorithms.

Therefore, writing high-quality machine learning code requires a solid foundation in mathematics and computer science, as well as rich practical experience.

4. Model Practice based on Educoder Platform

4.1. Description of Educoder Platform

The Educoder platform is an online learning platform aimed to practical teaching. It provides students with a comprehensive learning environment, helping them gain a deeper learning experience by combining theoretical knowledge with practical operations. The concept of the Educoder platform is designed based on the idea of practical teaching. Practical teaching is a teaching method that is guided by practical operations and activities, aiming to enhance students' learning and practical abilities through hands-on experience. The Educoder platform assists students in better understanding and applying the knowledge they have learned by providing a series of practical teaching resources and tools. The Educoder platform has many characteristics.

1) Rich teaching resources

It provides a rich variety of practical teaching resources, including experimental simulations, virtual practices, case studies. Students can engage in hands-on activities and practical exercises by using these resources to enhance their practical skills.

2) Convenient teaching platform

The Educoder platform also provides a learning environment that teachers and students can interact at any time [3]. Students can discuss with teachers and other students

online, sharing experiences and perspectives. This interactive learning environment can help students better understand and apply the knowledge they have learned.

3) Personalized learning characteristics

The Educoder platform also has the characteristic of personalized learning. Based on students' learning needs and interests, the platform can provide them with personalized learning resources and learning plans to help them learn and grow better.

Therefore, the Educoder platform is an online learning platform focused on practical teaching. It helps students gain a deeper learning experience by providing practical teaching resources and tools. It has a rich variety of practical teaching resources, real-time interactive learning environment, and personalized learning characteristics. Its advantages lie in providing a deeper learning experience, more flexible learning methods, and a wider range of learning resources. The Educoder platform will provide students with a comprehensive learning environment to help them learn and grow better [4].

4.2. Transformation of Experimental Teaching Mode

With the focus on ability cultivation and application, we strengthen the cultivation of practical aspects for students and highlight the comprehensive abilities of computer usage and solving engineering problems. We adopt a combination of "offline teaching + Educoder training project" method.

As a basic course in the field of artificial intelligence, this course introduces the fundamentals of machine learning, including an overview of machine learning, basic operations of numpy and Pandas, and classical algorithms of machine learning, mainly including KNN algorithm, linear regression, logistic regression, naive Bayes, decision tree, support vector machine, and ensemble learning. Machine learning courses are similar to related courses such as C/C++/Java languages and Data analysis. It is a professional course where students listen to teachers' lectures in the classroom and practice programming exercises in the dormitory. Although such courses are usually taught in professional computer rooms, it is difficult to evaluate students' coding abilities. This is mainly because completing programming assignments usually requires the use of professional programming development tools such as Eclipse, Visual Studio, and PyCharm, and for the program code submitted by students. Teachers rely more on personal experience to judge, making it difficult to quantitatively analyze students' programming practice level for the assignments. To address this issue, Educoder platform provides a "cloud programming" environment, which solves the current problem effectively. In the "Classroom Experiment" part of the Educoder platform, teachers fill in basic project information, select programming images, and open code repositories to create practical project. Since the Educoder platform provides the "cloud programming," it enables teachers and students to complete programming tasks without the need to install various IDE on their computers. While providing great convenience for students' programming exercises, the platform can also scientifically assess students' programming level, improving the teaching efficiency and quality of experimental courses [5].

4.3. Programming Practice

With the continuous progress of technology and the

popularity of the internet, programming has become an increasingly important skill. In this digital age, mastering programming abilities can bring significant competitive advantages to individual and enterprise. However, learning programming is not easy, especially for beginners. To help learners better grasp programming skills, many online learning platforms have emerged. Among them, the Educoder platform, as an application focused on programming education, provides learners with a wealth of programming exercises and learning resources, playing a positive role in the application of programming exercises.



Figure 1. Example of Laboratory Project Content

Firstly, in the "Classroom Experiment" part of the Educoder platform, teachers can create practical projects, fill in basic project information, select programming images, and open code repositories (as shown in Figure 1). By providing diverse programming exercises, the Educoder platform helps learners improve their programming abilities. In the process of learning programming, exercises are very important as they help learners transform theoretical knowledge into practical skills. The platform provides a rich exercise library, covering programming problems of different levels and types, from basic syntax exercises to complex algorithmic problems. Thus, learners can choose exercises suitable for their own level and interests to practice and gradually improve their programming skills (as shown in Figure 2). In terms of the Python program code submitted by the student, teachers can verify the precision and execution efficiency of the code by clicking the "Evaluation" button.

Secondly, the Educoder platform also provides detailed problem-solving ideas and explanations to help learners better understand and master programming knowledge. In the process of solving problems, learners often encounter various difficulties and questions, and the explanations provided by the platform can help them find methods and approaches to solve problems. The problem-solving ideas on the platform usually include problem analysis, problem-solving steps, and specific code implementation, all of which can help learners better understand the essence of the problem and the methods to solve it. The platform also provides many practical cases and sample codes, allowing learners to better apply the knowledge they have learned and improve their programming skills.

Furthermore, the Educoder platform also provides opportunities for communication and interaction, making

learning programming more interesting and effective. Learning programming is often a lonely process, but the Educoder platform allows learners to communicate and share experiences with other programming enthusiasts by providing forum function. Learners can post their own questions and doubts on the platform and receive help and answers from others. At the same time, the platform also has many exciting programming challenges and competitions, in which learners can participate and compete with others, constantly improving their programming skills. Such communication and interaction mechanisms not only increase the fun of learning but also stimulate learners' motivation to learn, making the learning effect more significant.

In summary, the application of programming exercises on the Educoder platform is very valuable for learners. It helps learners improve their programming abilities by providing diverse programming exercises; it helps learners better understand and master programming knowledge through detailed problem-solving ideas and explanations; it makes learning programming more interesting and effective through opportunities for communication and interaction. Therefore, I believe that Educoder will play a more important role in the future of programming education, providing high-quality learning resources and experiences for more learners.

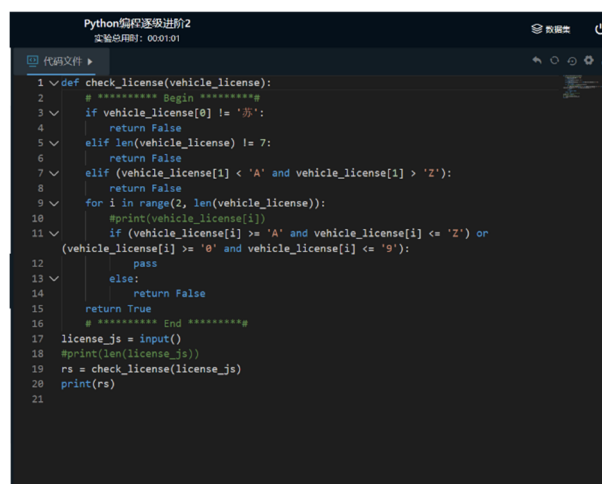


Figure 2. Intelligent Evaluation Example

5. Conclusion

This paper introduces the application of the practice teaching platform of Educoder in the teaching of machine learning computer courses, effectively solving the problems of difficult practical implementation of computer code and teachers' inability to understand students' level in the classroom teaching process. The reasonable use of the platform can not only improve students' innovative ability and enhance their learning enthusiasm, but also reduce the teaching burden of teachers, improve teaching quality and efficiency. In the future, it is believed that Educoder platform can provide a more friendly online practice teaching innovation and service environment for college teachers and students, and promote the benign development of higher education teaching towards intelligence, humanity, and science.

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