International Journal of Scientific Research and Engineering Development-– Volume 7 Issue 5, Sep-Oct 2024
Available at www.ijsred.com

RESEARCH ARTICLE OPEN ACCESS

AI-Enhanced Teaching Model Reconstruction: A Case Study of Data Collection and Cleaning Course

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Abstract:

This paper discusses how to improve the traditional teaching status of data collection and cleaning courses through the "AI + Data Collection and Cleaning" teaching model in the context of artificial intelligence technology. The paper proposes a student-centered teaching model divided into four stages: exploration, practice, application, and innovation, utilizing AI technology to enhance students' initiative, practical ability, and innovation capability in learning data collection and cleaning. Through AI-assisted data processing teaching examples, the learning experience has been significantly improved, enhancing students' sense of achievement, reducing the burden of technical learning, and effectively improving students' expression and communication skills.

Keywords — **AI, Data Collection and Cleaning,Teaching Model.**

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I. INTRODUCTION

Currently, artificial intelligence (AI) has widely penetrated every corner of social life[1], not only greatly improving production efficiency and service quality but also becoming an important force driving industrial upgrading and social progress. Based on such widespread influence and enormous potential, the concept of "AI+" has emerged, aiming to explore and realize the deep integration of artificial intelligence technology with other industrial fields[2], and education is no exception. "AI + Education" as an unstoppable trend is leading an unprecedented transformation in teaching models[3]. This paper takes the data collection and cleaning course as an example to discuss how to use AI to reconstruct and optimize traditional classroom teaching.

II. CURRENT STATUS OF DATA COLLECTION AND CLEANING COURSE

Data collection and cleaning, as infrastructure in the information age, is of self-evident importance. However, since its inception, the teaching model has fallen into a fixed pattern: students repeatedly experience basic operations of data acquisition and processing. Although these contents are core, the teaching process often emphasizes mechanical step demonstrations and theoretical instillation, lacking close connection with real applications and the stimulation of innovative thinking. This leads to a bland learning experience, making it difficult to stimulate students' curiosity and creativity in exploring the depths of technology.

Furthermore, the teaching focus of data collection and cleaning courses often centers on writing data processing procedures, where students need to constantly transform abstract data requirements into specific processing code. Although this is key to mastering data operations, the lack of real project context in practice can make students feel like they are "coding for coding's sake," and these dull and meaningless exercises gradually erode their learning motivation and interest.

More critically, the differences in programming foundations and comprehension abilities among students pose huge teaching challenges for teachers. Teachers have to spend considerable time on one-on-one code tutoring, assignment grading, and answering questions, which not only exhausts teachers' energy and reduces teaching efficiency but also makes it difficult to achieve effective large-scale guidance. Repetitive errors and confusion of basic concepts frequently occur, not only increasing

teachers' workload but also limiting the possibility of in-depth interaction and extensive discussion in class, thereby negatively affecting overall teaching quality and learning environment.

III. AI + Data Collection and Cleaning Teaching Model

In the AI era, how can students learn a new course with the help of AI? How can they maintain their dominant position and learning enthusiasm? How can teachers better serve students in collaboration with AI? How can AI's inherent code generation advantages be leveraged to assist teaching? These are questions worth deep consideration. The student-centered "Explore→Practice→Apply→Create" data collection and cleaning course teaching model has emerged in response.

A. Explore

This model is dedicated to strengthening students' active learning awareness, especially in the field of data collection and cleaning. With the assistance of AI technology, students transform from passive recipients of knowledge to active explorers. In the exploration phase, teachers motivate students to deeply explore data collection and cleaning principles and technologies through carefully planned knowledge maps. AI not only provides convenient resource navigation services, helping students quickly locate and digest complex data processing theories, but also stimulates students' exploratory desire and critical thinking through intelligent prompts and question generation, expanding horizons and deepening theoretical understanding.

B. Practice

Entering the practice phase, teachers transform into guides, leading students to master data collection and processing skills through simulation and practical operations. AI plays an important role in this process, providing simulation environments, immediate feedback, and adaptive exercises, allowing students to consolidate foundations and quickly master data processing techniques and operational skills through hands-on practice.

C. Apply

In the application phase, teachers encourage students to apply what they've learned to solve practical problems. AI assists students in identifying and analyzing specific cases, using data collection and cleaning technologies to solve actual business challenges, deepening understanding of the application value of data processing technology through practice.

D. Create

In the innovation phase, teachers stimulate students' innovative potential, guiding them to combine AI technology to explore new applications of data collection and cleaning technology or optimize existing solutions. AI assists in generating design ideas, promoting students' transformation from theory to practice, catalyzing innovative designs and projects, and cultivating students' innovation ability and technology integration capability.

IV. Implementation Effects of AI + Data Collection and Cleaning

Taking data processing as an example, both learning experience and learning outcomes have seen significant improvements in the practice of this teaching model. By integrating AI technology into the generation process of data processing procedures, students only need to accurately express processing requirements, and AI can provide immediate feedback with efficient and correct data processing code, greatly improving the learning experience.

Firstly, immediate feedback significantly enhances students' sense of achievement. As long as students clearly and completely express their data processing requirements, AI will provide correct processing code. This process of "one question, one answer" getting immediate results that can be instantly copied and pasted for validation creates satisfaction and stimulates students' learning motivation and self-efficacy.

Secondly, this model effectively reduces students' pressure to focus on technical details. In traditional teaching, students often need to spend considerable time memorizing exact steps of data processing procedures, which is not only tedious but may also distract from understanding the processing logic

itself. Under the "AI+" model, students are freed from the constraints of technical details, allowing them to invest more energy in precise understanding and logical construction of data processing requirements, which not only improves learning efficiency but also promotes deep understanding of data collection and cleaning principles.

Moreover, this model imperceptibly improves students' language organization and expression abilities. To obtain ideal processing results, students must learn how to accurately and clearly express processing requirements to AI, a process that prompts them to continuously optimize their expression methods and improve the logic and accuracy of their language. Over time, students' communication and expression abilities are exercised, learning how to effectively transform complex technical requirements into concise and clear language descriptions, which will be valuable soft skills for their future whether in technical work or cross-departmental communication.

V. CONCLUSIONS

This exploration only shows the tip of the iceberg of "AI + Data Collection and Cleaning" teaching, but it has already reflected AI's significant potential in assisting programming logic and improving teaching efficiency. Looking to the future, with the deep development of AI technology, such as deep learning, it will play a huge role in more areas like personalized teaching and problem-solving strategies, not only optimizing learning experiences but also promoting the improvement of students' comprehensive abilities, leading education towards a smarter and more efficient era.

ACKNOWLEDGMENT

This research was funded by the Education Reform Project of Zhejiang Business Technology Institute(Project NO. jg202411) , the Famous Class Teacher Studios of Zhejiang Business Technology Institute in 2024.

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