

Research and Practice of Intelligent Teaching Mode for Big Data Courses based on Big Data Analysis

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Abstract

In view of the relatively few applications of current big data analysis technology in the education field, the low performance of the information-based intelligent teaching system, and the low utilization of teaching resources, an intelligent teaching platform based on big data analysis technology is proposed. Construct an analysis platform based on teaching big data, collect and analyze teaching data in real time and efficiently, intelligently visualize analysis results and push teaching suggestions, so as to iteratively promote the continuous optimization and improvement of teaching mode to achieve the goal of intelligent teaching. Practice has shown that the intelligent teaching platform based on big data analysis improves the utilization rate of teaching resources, and at the same time can carry out personalized learning resource recommendation, and has achieved good teaching results in the teaching practice of big data courses.

Keywords

Big Data Analysis Technology; Teaching Resources; Teaching Quality Evaluation; Intelligent Teaching System; Cloud Computing; Resource Recommendation.

1. Overview of Intelligent Teaching Mode based on Big Data Analysis

In the context of the era of big data, the mining and utilization of data resources has received more and more attention from all walks of life. It is used to collect consumer preferences, guide production and product development, and greatly improve the production efficiency of enterprises.

However, the application of big data analysis technology in the education field is relatively small. At present, the massive amounts of data stored in the school's undergraduate teaching database such as examination scores, homework scores, experimental scores, and employment information of previous students are only purely recorded data information, but it is difficult to intuitively discover the underlying data from these data. Hidden information [1].

In fact, there are inextricable links between courses and courses, between the knowledge points in each course, and between students' grades and the setting of courses. The existing data at this stage does not Play its true value.

How to build an analysis platform based on teaching big data, collect and statistically analyze teaching data in real time and efficiently [2], intelligently visualize analysis results and push teaching suggestions, so as to iteratively promote the continuous optimization and improvement of teaching models to achieve intelligent teaching the goal?

2. Intelligent Teaching Mode of Big Data Courses based on Big Data Analysis Technology

Computer major big data courses have a strong practicality. Through the study of related courses, students should be able to master basic software design and big data analysis skills

such as programming language, database design, software development methods, and big data cloud computing technology.

Under the traditional teaching model, massive amounts of college student achievement data are left unused. In the era of big data, the data information of colleges and universities, especially student achievement information, has not been deeply excavated and analyzed, and has failed to serve the purpose of giving feedback, guiding actual teaching and teaching reform. Failed to give full play to its true value.

Therefore, it is proposed to launch a big data analysis pilot based on the teaching data of the Information Engineering College and big data courses, build an informationized teaching analysis platform based on big data analysis, and choose to conduct intelligent in-depth mining and analysis of score data information to obtain different dimensions. Analyze the results of student performance changes, and discover the laws and causes behind the performance fluctuations, and promote the continuous iterative improvement and optimization of the teaching model.

This paper designs an intelligent teaching system for big data analysis technology, arrange personalized teaching methods and content for learners. Use the big data recommendation module realizes personalized teaching recommendation, using teaching quality evaluation. The evaluation module completes the evaluation of individualized teaching quality. Design a multi-layered system structure of the intelligent teaching system of big data analysis technology, the overall functional structure of the system is shown in Figure 1.

The system mainly includes four functional platforms and two mechanisms: an intelligent analysis platform for teaching big data, a cloud & mobile teaching platform, an intelligent collection platform for teaching big data, and a resource construction platform.

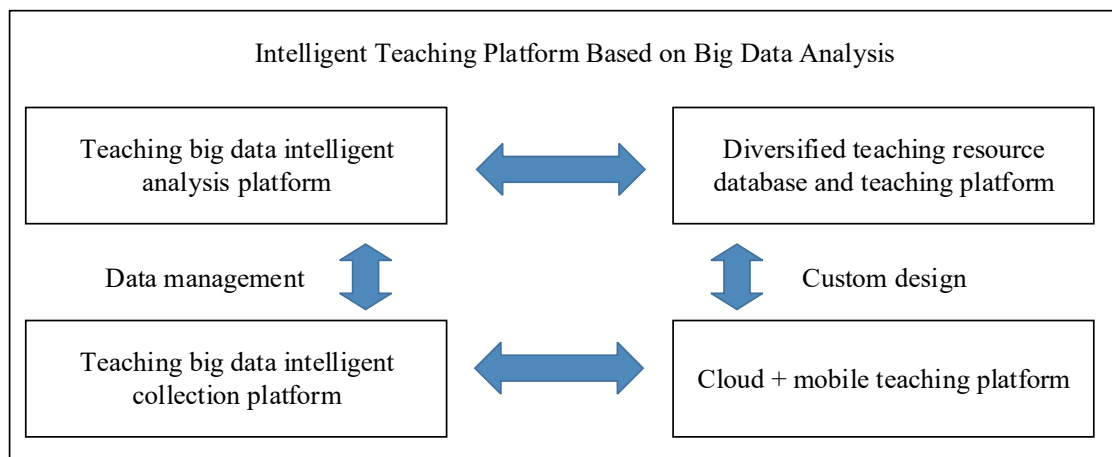


Figure 1. The overall functional structure of the system

- 1) Teaching big data intelligent analysis platform: Based on the existing teaching data of the School of Information Engineering and computer network courses, launch a big data analysis pilot, and build an intelligent teaching analysis platform based on Hadoop & Spark big data analysis [3];
- 2) Cloud & mobile teaching platform: build cloud big data course teaching resources based on "Alibaba Cloud", at the same time build a mobile teaching platform based on "Blue Moyun" app, and cloud + mobile together to build big data course teaching platform;
- 3) Teaching big data intelligent collection platform: based on Kafka components, real-time, intelligent and efficient collection and preprocessing of various teaching information such as

score data information, teaching process data information, and student feedback data information in the teaching of big data courses;

4) Diversified teaching resource database and teaching platform: based on "Alibaba Cloud" cloud and mobile teaching segment based on "Blue Mo Cloud", a diversified teaching resource database and teaching platform for big data courses are constructed for online and offline teaching. Provide resource support;

5) Multi-dimensional evaluation mechanism: further in-depth mining, analysis, statistics and visualization of teaching effects, through comparison of historical big data to obtain teaching effect evaluation, and obtain the analysis results of student performance changes in different dimensions;

6) Iterative optimization and improvement mechanism: discover the laws and causes behind the fluctuation of performance, form effective teaching feedback, promote continuous iterative optimization and improvement of teaching methods, methods, teaching resources and other aspects of teaching to achieve the goal of intelligent teaching. Each module of the four layers cooperates with each other to complete the personalized strategy of the entire system together [4]. The personalization of the user interface is achieved through navigation; the personalization of learning resources, recommendations and activities is achieved through the learning modules of the service layer; the personalization of communication is completed through the communication modules of the service layer; personalized guidance assistance is achieved through intelligent guidance Finish.

3. Practice of Intelligent Teaching Mode for Big Data Courses based on Big Data Analysis Technology

(1) Build a diversified teaching resource library and teaching platform for big data courses. The diversified teaching resource library and teaching platform of big data courses are shown in Figure 2:

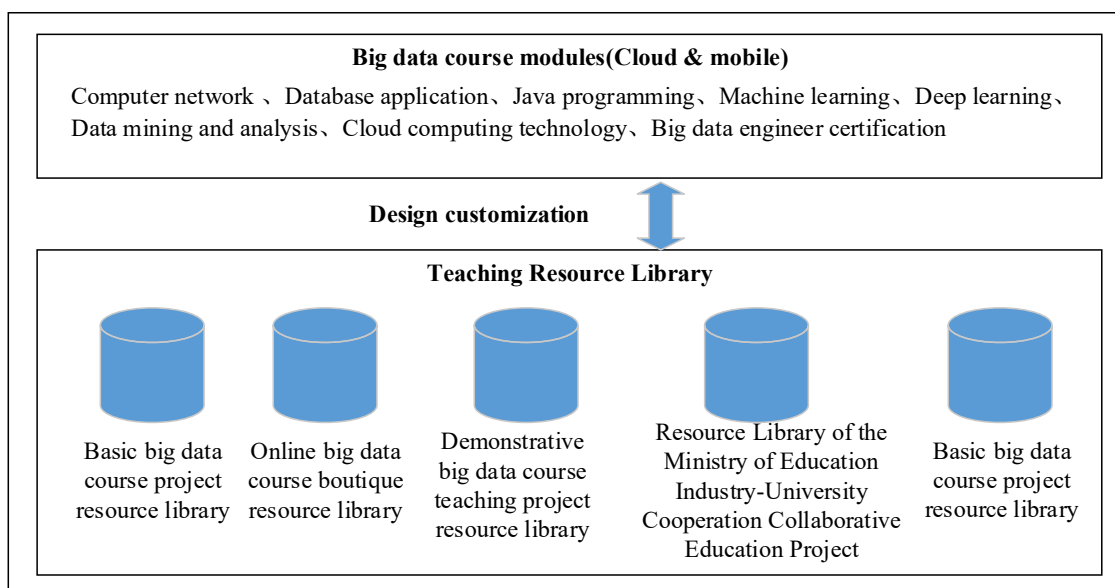


Figure 2. The structure diagram of the diversified teaching resource library and teaching platform of big data courses

- 1) Build a cloud teaching resource library and teaching platform based on "Alibaba Cloud"
- 2) Build a mobile teaching resource library and teaching platform based on "Blue Mo Cloud"

3) Teaching resources mainly come from: high-quality course teaching resources, enterprise project cases, virtual simulation system

(2) Building an intelligent collection platform for teaching big data

Using Kafka-based big data real-time intelligent collection platform, real-time diversified collection of student and teacher teaching big data from the cloud, mobile terminal, and classroom. The structure of the intelligent collection platform is shown in Figure 3:

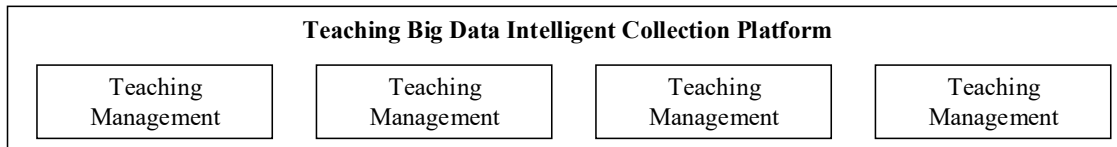


Figure 3. Intelligent collection platform for teaching big data

(3) Building an intelligent analysis platform for teaching big data

Using the big data processing platform of Hadoop & Spark, it provides multi-dimensional analysis methods and tools for the diverse data collected by students and teachers, and realizes the visual display of analysis and statistical results. The specific functional modules are shown in Figure 4:

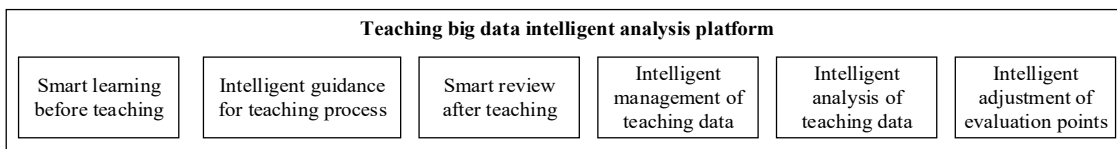


Figure 4. Intelligent analysis platform for teaching big data

(4) Big data recommendation module

The three parts of user feature generation, information matching and recommendation generation constitute the big data recommendation module, as shown in Figure 5. By collecting massive amounts of user interest and usage demand data, performing calculations and selections based on recommendation algorithms, counting and extracting scores to obtain the best recommendation results.

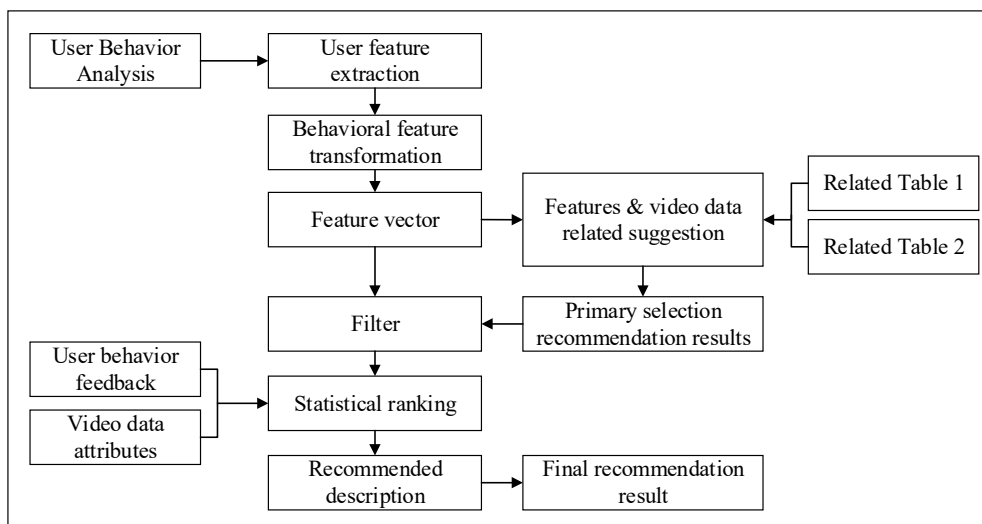


Figure 5. Big data recommendation module

The big data recommendation module includes three analysis processes:

- 1) Generate user feature vectors: user behavior features include personal hobbies and usage data, etc. The system will convert user behavior features into data and generate feature vectors;
- 2) Primary selection recommendation results: According to the data category and preliminary selection, the system selects data similar to the user feature vector and generates a data table;
- 3) Final recommendation results: The module performs statistics and arrangement on the data tables selected in step 2) to obtain the final recommendation results.

Comprehensive consideration of the performance, cost and load capacity of the system's big data recommendation module to ensure smooth operation of the teaching system and more convenient operation for users. At the same time, it is convenient to formulate the name and detailed form of each field of the log when creating the log. After the user log is successfully pushed, subsequent analysis can be performed and the data can be saved in the database. Pass points the method of layer design processes user data: the first layer is the report; the second layer is analysis of user habits; the third layer is the information that needs to be promoted. User data points after the analysis is implemented, use offline and real-time methods to complete the content push, and push content to users; real-time push means push content to user.

(5) Establish a multi-dimensional assessment system and teaching improvement mechanism

1) Establish a multi-dimensional assessment and evaluation system:

The teaching quality assessment module has good interactivity and usability, and can provide functions such as teaching feedback, classroom discipline supervision and intelligent attendance. The student terminal, classroom terminal, educational administration terminal, teacher terminal and cloud server constitute the teaching quality evaluation module. Each terminal and cloud server use mobile network communication to connect and utilize the development of client and classroom terminal. Through the combination with cloud server and the construction of background data, a teaching quality evaluation module is formed [5].

The assessment and evaluation standards of big data courses should correspond to the teaching analysis system, and it should be carried out in stages. Within the specified time, students complete the phased goals of the task, using a combination of student self-evaluation, student mutual evaluation, teacher comments, etc. The method summarizes and evaluates the students' learning situation, and gives appropriate scores, which are converted in a certain ratio with the final exam results. The final result can reflect the students' mastery of theoretical knowledge and the students' practical hands-on the final comprehensive score of ability [6].

The teaching quality evaluation module has good interactivity and usability, which can be provides functions such as teaching feedback, classroom discipline supervision and intelligent attendance. Teaching the structure diagram of the quality assessment module is shown in Figure 6.

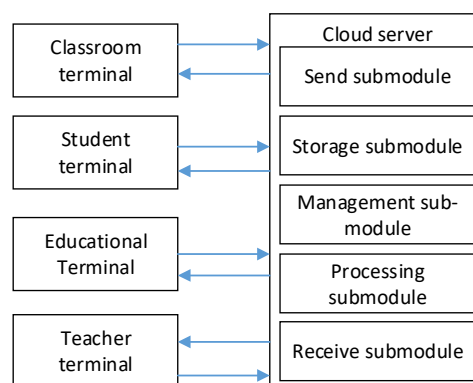


Figure 6. Teaching quality evaluation module structure

From student terminal, classroom the terminal, educational administration terminal, teacher terminal and cloud server constitute the teaching quality evaluation module. Each terminal and cloud server use mobile network communication for connect. Utilize the development of client and classroom terminal, through and cloud server combined with the construction of background data, the teaching quality evaluation module is formed. Should the module collect data from the classroom terminal through image processing technology. In addition, the module is also used for data transmission among clients, classroom terminals and databases. The classroom terminal is set in the classroom, including network communication sub-modules, data collection sub-module, terminal management sub-module and frame processing sub-module. Cloud service the server transmits the management signal to the network communication sub-module, and the network communication sub-module the module transmits the management signal to the terminal management sub-module; the data collection sub-module collects classroom data according to the management signal, which includes images and video frequency; the frame processing sub-module intercepts the collected videos into frames according to time sequence image, judge the current frame image, if the current frame image and the previous frame the similarity of the image is less than the set similarity threshold, delete the current frame like, complete the frame acceleration and processing of the video stream [9]; network communication sub-module the video and image processed by the frame processing sub-module and the collected image and video the frequency is transmitted to the cloud server for storage.

The client terminal includes teachers, educational administration and student terminals, and the main functions include send, receive and display, use the cloud server to receive and send from each terminal image and text information, and the number returned by the cloud server passes through each terminal receive and display [10-11]. The main function of the cloud server is to carry out the analysis of attendance, attendance rate and classroom behavior, and finally analyze the result is fed back to the client through the feedback unit.

From attendance analysis unit, attendance rate analysis unit, and classroom behavior analysis the unit and the feedback unit constitute the processing sub-module. These four units are mainly used for the analysis and feedback of classroom data.

2) Establish an iterative teaching improvement mechanism

The processing sub-module is composed of the attendance analysis unit, the listening rate analysis unit, the classroom behavior analysis unit and the feedback unit. These four units are mainly used for the analysis and feedback of classroom data.

Discover the laws and causes behind the fluctuations in performance, form effective teaching feedback, and promote continuous iterative optimization and improvement of teaching methods, methods, teaching resources and other aspects of teaching to achieve the goal of intelligent teaching [12-13].

(6) Establish a research group

1) Combining the professional expertise of big data course teachers and the characteristics of the courses taught, such as: computer network, cloud computing technology, Java programming, database design, C language programming, Android development, etc., invite these teachers to join the research group [14].

2) Invite experts from big data companies to cooperate to guide the improvement and perfection of the teaching analysis system, and invite experts from big data to guide students with targeted teaching statistics and make them the consultants of the research group.

4. Concluding Remarks

After many years of teaching practice of big data courses in the School of Artificial Intelligence of Wuhan Institute of Business and Technology, the teaching mode of the intelligent teaching platform based on big data analysis has improved the teaching effectiveness, which is mainly reflected in:

- 1) Constructing a cloud + mobile-based teaching resources and platform, the teacher can be customized for different courses and teaching requirements, and the student can intelligently carry out teaching pre-school resources, middle-school teaching tests, and post-school analysis results push;
- 2) Automatically sort out, analyze, and dig out the rules and causes behind the massive teaching data. The analysis results can provide data support for teachers to conduct targeted teaching reflections, thereby improving the quality of teaching;
- 3) The analysis results can provide data support for the formulation of teaching reform decisions, making teaching reform decisions more accurate and efficient.
- 4) Build a systematic intelligent teaching analysis platform based on Hadoop & Spark big data analysis to provide analysis and statistical support for teaching information of different courses and different specialties.

In short, the intelligent teaching model based on Hadoop & Spark big data analysis has a positive effect and significance in promoting the teaching of computer major big data courses, and even other professional courses with strong practicality, and improving the quality of teaching.

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