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Big Data Curriculum Design and Teaching Practice Based on Smart Learning Environment

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Abstract: *This article proposes a smart learning system model based on big data. The system model is based on a big data architecture, combined with an adaptive general learning model, and provides information assistance and technical support for learners and teachers to learn through education big data and learning analysis technology. And based on the overall design framework, a learning early warning system model based on multi-modal data and an intervention mechanism process model are proposed. Experimental research shows that the intelligent learning system model can solve teaching resource management and the construction and application of various online courses. Help schools improve teaching quality, improve teaching efficiency, simplify teaching management, and promote teaching reform.*

Keywords: *Big data, smart learning system, multi-modal data analysis.*

1. Introduction

Computer technology, mobile Internet technology, and Internet of Things technology have achieved rapid development, and the amount of information that people can generate and contact with has exploded. Big data technology also came into being on this background. As the core technology of the data age, big data technology has promoted the development of many industries and even triggered industry revolutions in some industries. Among them, the education industry has inevitably carried out reforms and innovations under the impact of the "Internet +" model and big data technology [1]. One of the biggest changes is the learning environment. From the traditional learning environment to the online learning environment, the mobile learning environment and the smart learning environment today, modern education models and advanced computer technology play an important role in this. Wisdom learning is to achieve the goal of learning knowledge while promoting the cultivation and development of thinking. The learning process of learners is the process of generating wisdom. Wisdom education is the teaching process of teachers and the process of cultivating wisdom. Learners can learn wisdom as their goal. With the in-depth application of "Internet + Education", online learning has been fully developed, and it is also facing many problems, which seriously hinder the effective development of online learning. The article addresses the problems faced by existing online learning systems and analyses their causes, combined with the promotion and application of smart teaching and smart learning, it is urgent to design a smart learning system based on big data, model the system from the perspective of the learning system ecosystem, and strive to Effectively connect online and offline learning, build a smart learning system that integrates "guidance and learning", and use educational big data and learning analysis technology to provide information assistance and technical support for student learning and teacher guidance.

2. Precise teaching mode in a smart teaching environment

Based on the analysis of precision teaching, the research team constructed a precision teaching model in a smart teaching environment, including four parts: precise determination of goals, formulation of learning tasks, organization of the teaching process, and learning diagnosis and evaluation, as shown in Figure 1. Accurate teaching uses certain smart technical means to monitor and record students' learning performance in real time; according to learning performance, recursive algorithms and other techniques are used to accurately locate short-board knowledge and skills; teachers are designed based on the results of technical analysis of students' cognitive style and knowledge structure Organize and optimize teaching activities to make students "heartbeat" learning tasks; after the completion of the teaching activities, the teacher judges the student's knowledge mastery and intervenes in time based on the visualized learning

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data analysis provided by the system.

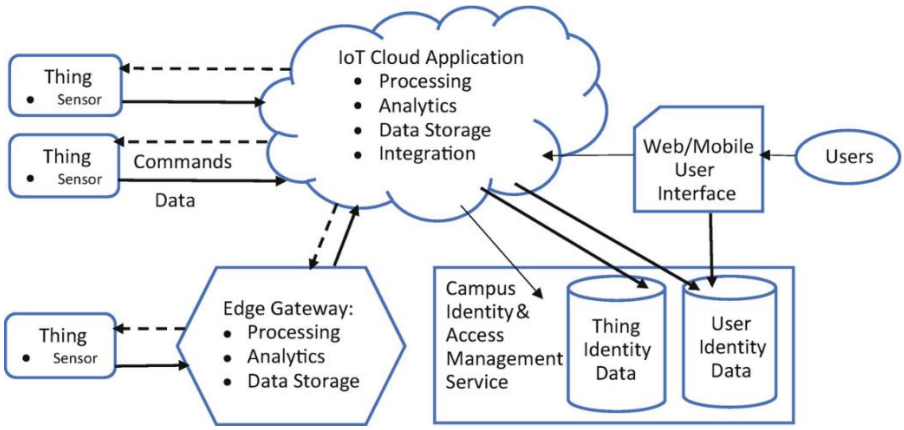

Figure 1: Precise teaching mode in a smart teaching environment

3. The overall architecture and design of the smart learning environment

The smart learning environment is an intelligent, advanced, flexible and humanized learning environment built on the basis of big data and cloud computing with learners as the centre. Whether it is a smart learning environment or a traditional learning environment, it is strictly a service environment [2]. The service needs to uphold the people-oriented tenet. People-oriented here means that the learner is the centre. To promote the learning of learners as the fundamental purpose, the construction and management of the learning environment from the perspective of learners, to create a comfortable and intelligent learning environment for learners. The two foundations of a smart learning environment are big data and cloud computing. The big data centre stores learning resources, learner data, and environmental data. These data are the data foundation of the smart learning environment. Relevant data can interact with the "cloud layer", and can also be used in smart classrooms, training rooms, learning centers and other terminals after data analysis. Cloud computing is the hub of the smart learning environment, providing computing services for the entire learning environment and maintaining the operation of the entire environment. In addition to data interaction with the big data centre, it also participates in computing services during data analysis. The work of smart classrooms, smart laboratories, and smart training rooms almost all rely on the "cloud layer" to provide them with computing services and data feedback. The "cloud layer" can also provide cloud services for mobile smart terminals, making them a smart mobile classroom. The overall structure of the smart learning environment is shown in Figure 2.

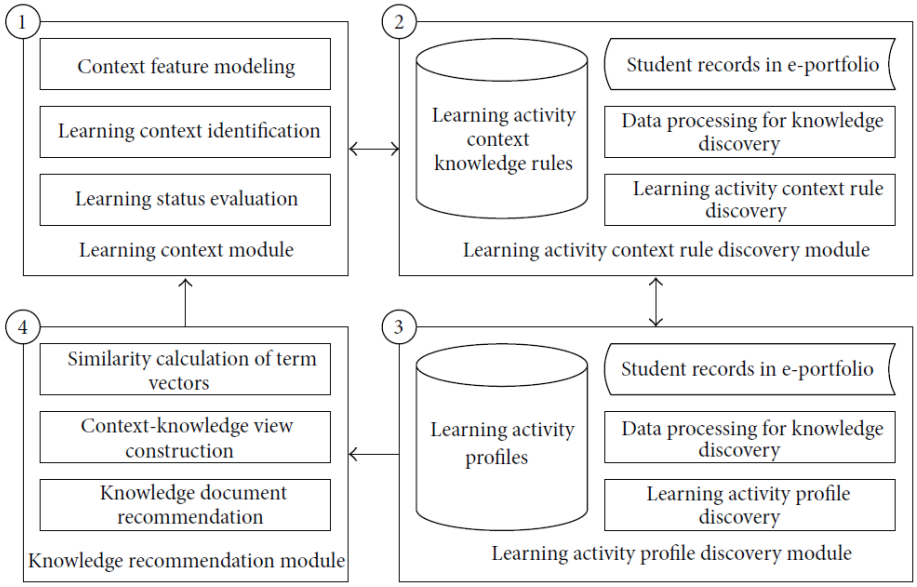

Figure 2: The overall architecture of the smart learning environment

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3.1 Information collection layer

The information collection layer is mainly composed of various application terminals such as personal computers, mobile phones, tablets, and collection hardware devices such as cameras and microphones, as well as external application systems [3]. This layer is responsible for the collection and acquisition of various learning data of learners. In accordance with the design principle of "internal and external studies", in order to obtain more extensive data, the primary programming curriculum Hui learning system is associated with performance management, student comprehensive quality evaluation and other systems. The data of the associated system is supported by big data technology. Evaluate the basic data of students' learning level.

3.2 Data layer

The data layer uses various data collection interface modules to obtain diversified raw data resources from the information collection layer, such as images, sounds, videos, learners' application process data in other related learning systems, and data records of online and offline learning activities., Forming a rich structured and semi-structured original data pool.

3.3 Information storage layer

The information storage layer is a big data warehouse that provides meaningful data resource storage for the system. Use ETL and other technologies to clean and transform the original data in the data layer [4]. After processing, the useful data is refined and stored in the corresponding various feature databases. At the same time, the subsequent transmission data of the data layer is continuously processed, and the databases have been updated.

3.4 Application layer

The application layer is to provide users with personalized, adaptable and intelligent various business services, including learning content presentation, learning tool support, learning context creation, learning activities, teacher guidance activities, learning strategies and other modular services as well as external Data access service.

4. Model design and analysis of multi-modal data learning and early warning system

4.1 Model design of learning early warning system

Traditional learning early warning systems mostly analyse the learning behaviour data of learners in the online learning process, and provide early warning of the learning status of students in the learning process. For traditional classroom learning, due to the inconvenience of learners' cognition, behaviour, and emotional data collection in the learning process, and the lack of effective methods for data analysis and processing, the traditional classroom learning process is ignored. Researchers learn early warning system. The emergence of a smart learning environment has built a technical platform for the collection of big data in the process of blending online and offline learning [5]. At the same time, with the application of artificial intelligence technology in the education field, the use of deep learning analysis methods provides an efficient data analysis method for modelling that incorporates multi-modal data. Therefore, this research focuses on the overall design framework of "five in one" and proposes to build a learning early warning system model based on multi-modal data in a smart learning environment to provide a theoretical framework for the monitoring of the learning process in the future smart learning environment. The system model design is shown in Figure 3.

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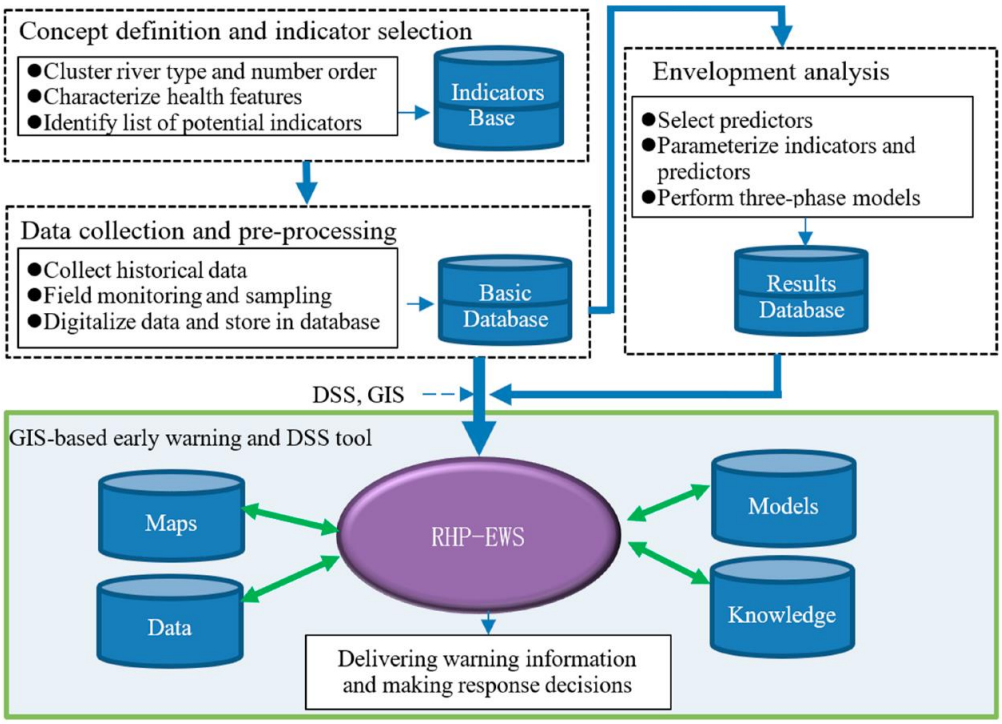

Figure 3: Model diagram of learning early warning system based on multi-modal data

4.2 Model analysis of learning early warning system

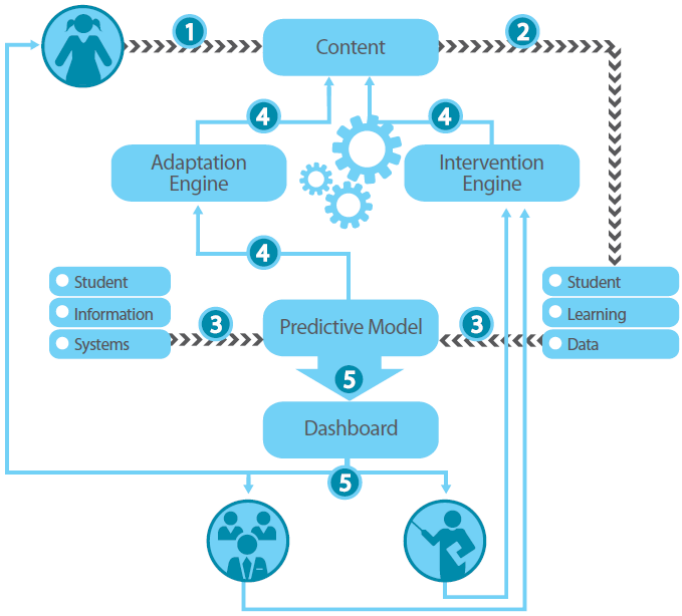

Figure 4: Intervention model process diagram

The visual analysis module is a service provided by the client to provide visual analysis results. This module mainly uses Echarts technology to realize the visualization of data analysis results. The content presented includes changes in students' personal learning status and changes in students' overall learning status. The way of presentation is presented in the form of charts, dashboards and radar charts. In addition to visual analysis of the learning status of individual students and groups, the system also compares and judges the collected student learning-related data through the data analysis and processing layer, and analyses whether the current learning status of individual learners needs early warning [6]. If an early warning is required, the system analyses the main reasons that affect the student's learning status through the attribution analysis engine based on the collected data, and displays it on the student application client

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(tablet) by sending reminders, pushing personalized learning resources, encouragement, etc., Wearable devices, etc.), the system realizes automatic and personalized intervention. If the intervention measures do not work, the learner is still in a low-engagement learning state. It is necessary to give play to the teacher's reminder or individual guidance to enable students to adjust their learning status as soon as possible and engage in the classroom learning process. If the overall learning status of the students in the class is lower than the model standard, then teachers need to adjust the teaching progress and teaching strategies in time to stimulate students' enthusiasm for learning and mobilize students' learning enthusiasm. The specific intervention model is shown in Figure 4.

4.3 System function

The functional design of the smart teaching system is based on the Panya platform, the mobile learning channel serves as a synapse, the smart educational administration serves as the management decision-making centre, and the smart classroom serves as the classroom terminal to activate the traditional classroom and redefine the teaching activities under the background of informationization. That is, the classroom end uses the existing hardware in the ordinary classroom to set up computer screens, which can realize smart courses, upgrade traditional classrooms, and provide the possibility of realizing flipped classroom teaching. Students use the mobile terminal to achieve MOOC learning, submit homework, and participate in exams through the Panya platform, and participate in smart classrooms through Learn Tong, conduct classroom online check-in, discussion, voting, answer questions, tests and other links, and leave learning records. Form a learning file. You can also use Xuetong as a mobile library to use fragmented time to complete extracurricular extended reading, independent knowledge acquisition, join interest groups, and share learning experience. The management side can realize the analysis of teaching big data, monitor the teaching quality, realize the teaching evaluation in the process, and carry out the teaching reform through the intelligent teaching affairs. And cooperate with the learning pass to realize educational administration, teaching management, data viewing, office applications, and integrate other systems to realize a unified mobile portal, which is convenient for data collection and one-click office.

5. Conclusion

Smart classroom is a product of informatization development. It is based on the Fanya Superstar Learning Communication Platform, supported by various teaching resources, and makes full use of software and hardware information platforms such as Linux cloud servers to carry out homework, examination, Q&A, discussion, evaluation and other interactions. This article describes the smart teaching system from the basic concepts of the smart teaching system, the technology used and its functional architecture, functional modules, and big data analysis, focusing on three aspects: teaching big data, mobile analysis system, and big data screen management. The system was analyzed.

Acknowledgements

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