Data Analysis enabled self-Adaptive Learning System

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Abstract

In the era of rapid development of artificial intelligence and big data technology, the education departments are also experiencing the transformation from the traditional classroom to the blending learning mode mixed with online learning and offline classroom. In order to promote the modernization of education and realize the inclusiveness and individuation of future education, the self-adaptive learning platform is rising gradually, which emphasizes service orientation and provides personalized learning contents to students based on data collections and analyses, enhancing the pertinence and efficiency of students' learning, and improving students' learning experience. In this paper, the writer applies to big data and artificial intelligence technology into the educational environment and attempts to build an intelligent self-adaptive learning system to realize personalized teaching model for the purpose of serving for teachers and students. Besides, the writer also carries out some innovative explorations on personalized teaching based on learnercentered and improves teaching qualities with reminders and early warnings.

Keywords—*Education big data, online machine learning system, artificial intelligence*

I. INTRODUCTION

A. *Education Big Data Technology*

Under the background of the Internet age, with the computer technology entering all aspects of social life, the ways of data generation and storage are changing. Not only dose this make the world store more information than before, but also the growth rate of these information is very rapid, showing exponential growth. With the rapid development Internet of things, big data is

ushering in the outbreak. Big data is an idea that enables people to explore the essence of affairs by scientific calculation rather than by subjective assumption. Big data is a set of methodology. Through indirect data, we can infer the characteristics of things that are difficult to express objectively, prompt the internal essence and inevitable connection between things, help people to understand the action law of things more accurately, and then guide behavior. As early as the 2015 International Conference on Educational Informatization, Xi Jinping stressed the need to promote educational reform, innovation and development, and build a network, digitalization, individuation and lifelong education system in order to develop the information technology. We should actively promote the integration, innovation and development of information technology and education. At the Symposium on Network Security and Informatization held in 2016, Xi Jinping proposed the implementation of "Internet + Education" from the perspective of co-constructing the community of shared destiny in cyberspace to promote educational reform and innovation. The Internet should be made full use to promote the cultivation of innovative talents. Big

data education is a modern education reform method with data collection and analysis technology as an important auxiliary means. Using big data in education can not only give teachers more ways to understand students, but also better develop innovative education model.

B. Artificial Intelligence Technology

Artificial intelligence, as the most discussed field in today's society, has also developed rapidly in the information age. Artificial intelligence, as the name implies, is the intelligent expansion and application of human thought, which is another special manifestation of human wisdom. The intelligence in education is to be able to learn independently, and to have the ability to distinguish right from wrong. Since artificial intelligence is based on big data, it can be integrated with education big data, and the two can develop harmoniously, so as to explore new applications that adapt to education environment and serve people in education environment. For example, personalized learning platform, Virtual Tutor, educational robot, scene education based on virtual reality and so on. They can not only help students to learn better in their spare time, but also make teaching more

targeted. But they also have defects. There is only students' learning but less teachers' life guidance, so artificial intelligence is not only combined with education big data, but also integrated into schools and teachers' teaching. Internet education intelligent technology helps to realize personalized learning and large-scale education, and promotes the transformation and upgrading of education service ecosystem.

C. Demand Analysis of Education Industry

At present, the proportion of teachers and students in the school is relatively low, so it is difficult for teachers to give consideration to each student's ideas and achieve the goal of individualized teaching. For students, they want to know whether their learning methods are appropriate, what changes will take place in their learning results, what kind of plans they have for their learning routes and methods, and how schools and parents can find students' learning attitudes and make timely interventions. So how to make teachers' education and management more relaxing and how to make students more aware of their own situation have become a major issue. At present, there are many ways to improve the teaching efficiency and quality of teachers, such as MOOC teaching.

According to the teacher's pre-school task list, students can preview the video resources and exercises on the online education platform in advance. By testing teachers, can know the degree of students' mastery, what problems still exist, and then provide personalized guidance.

II. DESIGN OF INTELLIGENT ADAPTIVE LEARNING SYSTEM

From the perspective of academic research, at present, the theories of adaptive learning technology are mostly based on the basic theories of pedagogy and basic computer science, while the theories of data mining, data analysis, probability statistics and other disciplines are applied to realize adaptive learning. In addition to the knowledge of pedagogy, psychology and information technology, the construction of College Students' self-adaptive platform needs to have more innovative application consciousness and clear the key technology and core theory of platform construction, so as to better guarantee the construction quality of self-adaptive The idea of "two-way adaptation" should be established in the construction of adaptive learning system. And through the theoretical analysis of "two-way adaptation", we can get the

enlightenment, and design it in the aspects of intelligent diagnosis, information organization and presentation, navigation strategy. The research on the elements of adaptive learning system is mainly about the elements of learner model and domain model. Specifically, it analyzes the selfadaptive learning system from the evolution of learners' learning needs, the new demands of learning resources and the new characteristics of the system learning platform.

architecture. The application of knowledge modeling and analysis technology in education depends on the construction of ontology knowledge base and learning resource model. According to the characteristics of learners, the adaptive learning system is divided into four modules: adaptive module, student portrait module, early warning intervention module, and learning incentive module. The system flow chart is shown in Figure 1.
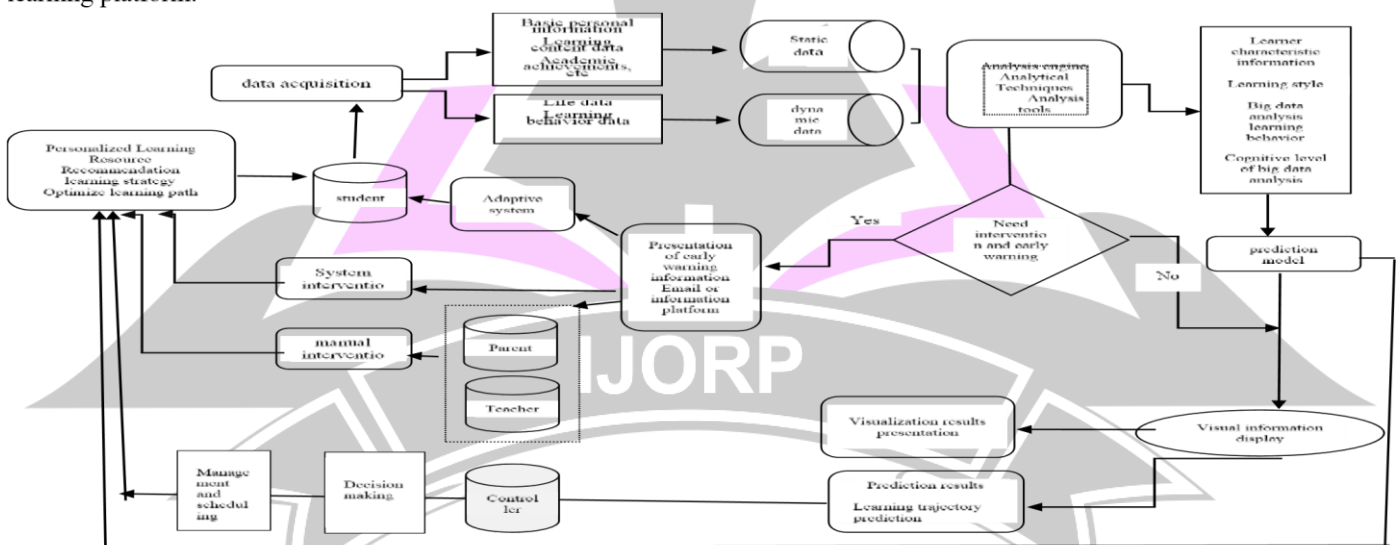

Fig. 1 System flow chart

1) Adaptive module. Adaptive control means that the system adaptively adjusts the internal parameters to make the system output close to the predetermined target after comparing the system output with the predetermined target. As the key of the whole system, this module is based on the data collection and analysis of big data. After getting the effective data, it triggers other modules and deeply explores and understands the learning habits and styles of students. It is good at the field, so as to get the specialty of students' learning habits and styles

and combine the learning status of students, so as to push more suitable learning resources for students. After getting these personalized resources, learners can choose suitable materials more conveniently and effectively to consolidate and improve their learning, and teachers can also learn more about students' styles and teach students in accordance with their aptitude. The main links of data-driven learning analysis technology, learner modeling and learning analysis include education data collection, data processing, learner modeling, learning analysis and result presentation.

2) Student portrait module. Through the student portrait module, the platform displays the information of different dimensions of students analyzed by education big data. Students can understand their real ability, learning habits, learning styles, etc. through their own student portrait. Teachers can provide knowledge map and learning guidance, and watch the students' portraits of each student in the class,

so that teachers can quickly and accurately grasp the basic situation of each degree in the class, as well as the learning style, so as to achieve the goal of individualized teaching. This module cultivates learners' metacognitive level development, constructs an open learner model, ensures learners to accurately understand their knowledge state, learning progress and learning performance in the learning process, helps learners to understand their current learning state, promotes learners' main construction and thinking development of knowledge, and helps to cultivate learners' metacognitive level of development.

3) Early warning and intervention module. Because of the limited educational resources, teachers can not understand the learning situation of each student in the class and not all students know their own learning situation. At this time, they need the help of the early warning and intervention module, which is mainly to count the arrival rate of students and the completion of assignments

and tests. It analyzes the students' daily learning effect and the test results before the test. The analysis engine will give email warning according to the students' specific learning situation. Parents and teachers will also receive the early warning information of students' situation and urge students to actively learn to achieve the goal of sustainable development. Through personalized Resource Recommendation, teachers can provide students with learning materials that are most consistent with students' learning situation and learning habits, and guide students to learn effectively.

4) Learning motivation module. Every student has a playful nature, and not every student has an interest in learning. At this time, the learning incentive module can combine education and entertainment, and fully mobilize students' interest and ambition in learning, such as providing video resources and animation demonstration to guide students to learn. This module will

distribute the self-study homework according to the students' daily learning data, and the system or teachers will supervise whether it is completed. For the students who finish better, the teacher will give encouragement and extra points. We can also send the excellent works completed by students to the sharing platform, so that students can learn from each other and promote each other, forming a competitive trend of chasing each other. For example, in the MOOC courses and other national online resources course, students will receive the certificate signed by the teacher after the completion of the course, and can also exchange credits in their school, effectively stimulating students' motivation and enthusiasm.

The adaptive learning system can be divided into four levels according to the types of users. The learning guidance for students, school administrators and learners' parents has been greatly improved.

III. CONCLUSION

With the popularity of intelligent learning and adaptive learning theory, the construction of adaptive learning platform has become the general trend. However, in order to make the adaptive learning platform work well and serve the diversified adaptive learning needs of students, colleges and universities need to explore the corresponding learning service and guidance mode, which can help students solve the difficulties and obstacles encountered in the process of adaptive learning in time. The self-adaptive learning platform needs to provide services such as retrieval and guidance of learning resources and learning content; it also needs to be free to schools, groups and individual students. This paper designs a set of self-adaptive learning system by combining education big data and artificial intelligence, which can not only provide students with personalized learning resources and design personalized learning path, but also let teachers and parents know the real learning situation of each student in time, and then carry out targeted guidance and intervention. For the school management, the system will show all the results of intelligent analysis and prediction to the school managers through visualization technology, and provide effective basis for the managers to make decisions.

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