Application of Artificial Intelligence Technology in Personalized Online Teaching under the Background of Big Data

Lujun Chen*
Sichuan Technology & Business College, No. 8 Juyuan Section of Tianfu Avenue, Dujiangyan City, Sichuan Province, China

*Corresponding author e-mail: zhangnaf@nsu.cn

Abstract. Big data technology allows you to extract laws from large amounts of data. Through various industry practices, data mining, classification and analysis of large amounts of data can provide effective reference for decision-making. The same is true for the education industry. The introduction of data mining technology online education platform can effectively improve students' learning efficiency and education management level. In this article, I will mainly introduce the application of artificial intelligence technology in personalized online education in the context of big data. In this article, we apply constructive theory and big data technology to the online education system, and define some general education models for the current status of online education. The model monitors the learning process of students, adjusts educational strategies according to the characteristics of each student, and enables students to receive appropriate training to understand their personal information. Through the analysis of the experiment, it can be concluded that the personalized online education platform under the background of big data has been significantly improved. From a specific point of view, in the context of artificial intelligence, the number of users has increased by 9%.

Keywords: Big Data, Artificial Intelligence Technology, Personalized Online Teaching, Teaching Platform Design

1. Introduction
Universities are the concrete implementation link of our human resource strategy. In recent years, my country has been actively promoting education reform and the application of educational technology. With the application of new technologies such as computer technology, information technology and network technology, the prospects of higher education have become more optimistic [1]. Studies have shown that many university network platforms are single applications, most of which are major university education operation platforms or network library platforms, and the educational tasks have not been fully completed [2]. With the current level of technology and teaching methods, it is impractical to completely use Internet education platforms to replace manual education. However, the
Internet education platform can also be used as an attachment to manual education or an optional course education platform [3-4].

Today, big data technology has been successfully applied to many applications, including retail, telecommunications and telecommunications [5]. Although a large amount of data has been accumulated in the learning process of online education platforms, these data and information have not been fully utilized. In fact, big data also involves many valuable phenomena and laws, so we use big data technology to help education, education, curriculum development and innovative talent training. Need to discover phenomena and laws and effective decision-making [6].

The increase in the population of higher education and different school pathways for obtaining degrees have increased the heterogeneity of students in the classroom. Therefore, the effectiveness of traditional teaching methods is reduced [7]. Paiva-RC introduced the design, development, implementation and evaluation of the teaching system (TS) to increase students' participation in advanced mathematics. TS has designed a set of personalized teaching system based on satisfactory teaching methods, which can be applied to any higher education curriculum with mathematical requirements [8]. TS consists of small units of educational content with independent rhythms, including educational videos, reviews and official electronic assessments with personal reviews. TS should ensure that students are allowed to enter the next module only after reaching the competency standards required by the current module. However, due to the complexity of the design process, there are errors in the results [9].

The innovation of this article lies in the use of cluster analysis of student performance to obtain representative categories, and then specific analysis based on the performance of various types of students, discussing various performance characteristics, and providing data for the construction of learning programs and personalized recommendations Support [10].

2. Artificial Intelligence Technology in the Context of Big Data

2.1 Big Data Clustering Algorithm

The K-means algorithm is one of the classic grouping algorithms. It has irreplaceable research value and is widely used in text grouping, natural language processing and other fields. Its advantages are simple ideas, fast convergence speed and easy implementation. Disadvantages: The first assembly center is very sensitive, so it is easy to create the best local solution, which is complicated to use, especially in a big data environment.

The steps of the K-means algorithm are as follows:

Step 1: Select k initial cluster centers.
1) Find the maximum value max and minimum value min of each dimension attribute of the data set.
(2) Calculate the segment length d of each size attribute, and establish the address space and number corresponding to each size attribute. Hash all data into the corresponding address space.
(3) Find the k most dense address spaces. Calculate the data center points of each space in k address spaces, and use these k center points as the initial cluster centers of the K-means algorithm.

Step 2: Run the K-means clustering algorithm.
(1) Classify each sampling point into the category closest to the center point.
(2) Reset the center point of each category.
(3) Repeat steps (1) and (2) until they converge.

2.2 Big Data and Artificial Intelligence Technology

Artificial Intelligence (AI) is a comprehensive high-tech object for studying machine intelligence, originally created in the last century. This is a comprehensive technical issue involving multiple departments. We have made great progress in many fields and are gradually developing in all directions. Big data refers to large amounts of data that cannot be organized into useful information
within a valid time. The relevant central document clarified the need to use big data as the background to make great progress in the field of artificial intelligence and accelerate the deep integration of the Internet, big data, artificial intelligence and the real economy. The Congressional Office "promotes and regulates the application and development of critical health and medical data" to promote the construction of core platforms and data centers, and encourage the use of new technologies, new concepts and new models. And speed up the implementation of education goals. We can see that big data and artificial intelligence have been applied to all aspects of work and life from the national strategic level. Artificial intelligence also provides an important guarantee for medical education reform to meet the political requirements of relevant countries and understand the development of the era of big data. Teachers' use of big data and artificial intelligence technology is also an urgent need for online personalized education research.

2.3 Personalized Teaching
Individualized education is a kind of education model product of modern education development. Education refers to the process by which teachers teach students. Individualization means that teachers make educational plans by incorporating students' learning ability, learning interest, knowledge acceptance level, preferences, etc. into their educational activities. To achieve one-to-one educational planning arrangements. Individualized education not only allows teachers to change their traditional education plans, but also gives them great independent education rights. This is because the traditional education model is usually based on the commonality that most students develop with their education plans and curriculum. The traditional education plan regarding grades and students' learning interests can only be reflected on a common level. On the other hand, the concept of personalized education is to use targeted education programs to keep students interested, even unwilling to learn. Focusing on initiatives will help students grow.

Tutoring, pay attention to the personality of students (also called differences), and emphasize the subjectivity of students in teaching activities. The so-called personality is that students are independent individuals. In today's education reform, when individual students are unable to teach according to their own abilities, the student-centered educational philosophy has returned to traditional eiderdown education. Style teaching mode. Tutoring is a combination of individual differences between students. It is also a tutoring that enables students to develop independent study habits, cultivate independent interest in learning and allow students to passively participate in education. Through the plan, you can stimulate students' interest in learning. Gradually become an active participant, effectively improving the learning efficiency.

3. Personalized Network Teaching Experiment under the Background of Big Data

3.1 Data Acquisition
This experiment analyzes the learner's visit log, and obtains the learner's historical browsing record and the evaluation information of the course. There are two forms of learners' evaluation feedback on the course, one is obvious, the other is implicit. The displayed evaluation is easy to obtain and can be obtained by the learner's evaluation score for the course. The higher the evaluation score, the more popular the course is. On the contrary, it proves that the learner is not interested in the course. This method is relatively straightforward, but it needs to be obtained through a form similar to a questionnaire. This requires learners to do a questionnaire when registering on the platform, and fill in their hobbies and other information, and then the personalized recommendation system will help. Implicit evaluation information is usually displayed directly, but we can mine and analyze information such as browsing time and learning time of each course, website visit log, learner's customized record, etc., so as to imply the information in this information. Data mining reveals valuable information or laws. Whether it is explicit evaluation information or implicit evaluation information, it can ultimately be mapped to an evaluation record sheet.
3.2 Personalized Network Teaching Structure Design
The functional structure of the personalized online education system proposed in this paper is divided into three parts: education platform, student platform and management platform. Among them, the main responsibility of the management platform is to manage and maintain the system and users. The training platform is mainly to provide teachers with a platform for the management of the question bank and the test question bank, and to adjust the teaching strategy in time according to the results of data mining. The student platform is a learning interface for students, which can extend personal learning and comments. The system combines qualitative and quantitative evaluation mechanisms and uses an interactive learning environment. This learning method combines the functions of system guidance and independent learning of students, and integrates it into the design of each unit under the student platform. Among them, the system guide has been integrated into the learning strategy guide, which can guide the learning situation in the learning process and guide subsequent learning activities. Figure 1 shows the overall functional structure design of the network learning system development platform.

![Functional diagram of personalized network teaching system](image)

**Figure 1.** Functional diagram of personalized network teaching system

4. Personalized Online Teaching in the Context of Big Data

4.1 Application of Artificial Intelligence Technology in Personalized Online Teaching
In this article, we analyze the impact of personalized online education and traditional education in an artificial intelligence environment. The results are shown in Table 1.

| Attributes     | Teaching Quality | Teaching atmosphere | Student motivation | student's result | Teaching rate |
|----------------|------------------|---------------------|-------------------|-----------------|--------------|
| Traditional    | 64%              | 73%                 | 57%               | 88%             | 77%          |
| AI technology  | 75%              | 84%                 | 86%               | 97%             | 89%          |
In the context of artificial intelligence, the professional level of teachers will affect students' education and listening quality. In the teaching process, teachers should always pay attention to individual learning in the details of students. With the help of big data and artificial intelligence analysis, the learning characteristics of each student have become clearer. Among them, under the education model of AI technology, the quality of education has increased by 11%, and the education environment has also been significantly improved. The most important of these is student performance, which is 9% higher than the traditional teaching model.

How to use the results of big data analysis to realize the true meaning of education is a problem faced by teachers in the education field. Teachers must first establish the concept of lifelong learning, and secondly, they must establish a new concept of lifelong learning, and promptly inform the knowledge system and educational methods; finally, they must have a certain critical thinking ability and cannot be confused by a large amount of information. In short, teachers should also improve their professional skills as time and environment change.

4.2 Personalized Online Teaching Clusters

From a simple level, cluster analysis is the process of using certain specific restrictions to summarize scattered information and form a separate category. Through cluster analysis, we can use the previous decision analysis and association rules to find the difference between different courses. The inner connection of existence is realized and regularized.

The cluster analysis can improve the performance information of many students and analyze the distribution characteristics of student performance in different departments. Through the analysis of the relationship between the characteristics of performance distribution and departments, we can effectively understand the importance of performance among different departments, and then provide corresponding courses according to the relevant requirements of different disciplines in the school, and even improve the difference between different courses. understanding. The guidance of students to a certain department is to positively improve the academic performance of students with poor grades in a certain department, so that students can get rid of the influence of certain courses and achieve the purpose of cultivating talents. The result is shown in Figure 2:

![Figure 2. Analysis of 2016 grades by majors](image)

After analyzing the scores of the main professional courses of 13 classes in the 4 courses of 2016, several internal laws were found:

1) There is a dynamic distribution relationship between computer technology scores and computer science scores;
(2) The score distribution of the three courses of information systems, software engineering and electronic engineering is not stable, but the third course of the class with better scores in any of the three courses also has better scores;

(3) The distribution of students in the management department is relatively even, concentrated on both sides of the average score, and the overall average score is slightly lower.

5. Conclusions

On the basis of the study of learning theory, combined with the current situation of the online education system, it is proposed to establish a personalized education platform. Designs a personalized online learning process, a functional structure model of a personalized network learning system, and designs the system structure accordingly. The division of functional modules and the detailed design of the functions of each module. Since the intelligent personalized learning system is a very complex learning support and management system, involving network technology, artificial intelligence technology, pedagogy, psychology and other disciplines, there is still a lot of research work required to provide high-quality personalized services.

Acknowledgments

Our thanks to all of the people who have contributed to this paper. My paper is supported by the project of the Ministry of Education’s Fund for Educational Research Projects (2018A03007); construction and research of educational talent training mode in the era of “intelligence +” (2019JY04).

References

[1] Xue J W, Xu X K, Zhang F. Big data dynamic compressive sensing system architecture and optimization algorithm for internet of things [J]. Discrete and Continuous Dynamical Systems - Series S, 2017, 8(6):1401-1414.
[2] Mei J, José M. F. Moura. Signal Processing on Graphs: Causal Modeling of Big Data [J]. IEEE Transactions on Signal Processing, 2017, 65(8):2077-2092.
[3] Rathore M M U, Paul A, Ahmad A, et al. Real-Time Big Data Analytical Architecture for Remote Sensing Application [J]. IEEE Journal of Selected Topics in Applied Earth Observations and Remote Sensing, 2017, 8(10):4610-4621.
[4] Wang Y, Kung L A, Byrd T A. Big data analytics: Understanding its capabilities and potential benefits for healthcare organizations [J]. Technological Forecasting & Social Change, 2018, 126(JAN.):3-13.
[5] Zhang Y, Qiu M, Tsai C W, et al. Health-CPS: Healthcare Cyber-Physical System Assisted by Cloud and Big Data [J]. IEEE Systems Journal, 2017, 11(1):88-95.
[6] Zhang Y, Ren S, Liu Y, et al. A big data analytics architecture for cleaner manufacturing and maintenance processes of complex products [J]. Journal of Cleaner Production, 2017, 142(PT.2):626-641.
[7] Chen W L, Lin Y B, Ng F L, et al. RiceTalk: Rice Blast Detection Using Internet of Things and Artificial Intelligence Technologies [J]. IEEE Internet of Things Journal, 2020, 7(2):1001-1010.
[8] Hua T, Li L. Computer network security technology based on artificial intelligence [J]. Journal of Intelligent and Fuzzy Systems, 2019, 37(4):1-8.
[9] Paiva R C, Ferreira M S, Frade M M. Intelligent tutorial system based on personalized system of instruction to teach or remind mathematical concepts [J]. Journal of Computer Assisted Learning, 2017, 33(4):370-381.
[10] Jayathirtha G, Fields D, Kafai Y B, et al. Supporting making online: the role of artifact, teacher and peer interactions in crafting electronic textiles [J]. Information and Learning Environments, 2020, 121(5/6):371-380.