



Research on the Recommending Learning Model in the Intelligent Age

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Abstract

With the wide application of artificial intelligence technologies, such as “intelligent teaching and learning identification technology”, “learner learning analysis technology” and based on personalized learning, teaching and learning are undergoing profound changes. Guided by the “growth of people’s wisdom”, “Intelligent Education” uses artificial intelligence technology to create appropriate learning opportunities in education and form a precise, personalized and flexible education service system that can meet the development needs of students to the greatest extent. “Intelligent learning environment” emphasizes the use of data and algorithms to understand and serve students, including comprehensive perception of the learning place, flexible and innovative school layout, and deep interactive network learning space; “Intelligent learning style” advocates that students learn to solve problems while solving problems, and focuses on deep learning, interdisciplinary learning and boundaryless learning; “Intelligent education management” should break through the evaluation orientation of “efficiency first”, fully stimulate the vitality of schools, and build an education ecology with the participation of the whole society. This research paper is divided into four parts: the resource distributed learning mode in the intelligent era, the cloud computing learning behavior in the intelligent era, the knowledge big data learning mining in the intelligent era, and the intelligent service-oriented learning method in the intelligent era. Through in-depth analysis of the recommending learning model in the intelligent era, the paper predicts the future development direction of education and puts forward some countermeasures.

Subject Areas

Teaching and Learning Technologies

Keywords

The Intelligent Age, The Recommending Learning Model, The

1. Introduction

Artificial intelligence is the study of using computers to simulate certain thought processes and intelligent behaviors (such as learning, reasoning, thinking, planning, etc.). The era of artificial intelligence refers to the era of simulating, extending and improving human intelligence through the use of computer technology. With the rapid development of artificial intelligence technology in recent years, its impact on the field of education has attracted great attention. In January 2022, the State Council released the “14th Five-Year Plan for the Development of the Digital Economy”, which clearly calls on China to further promote intelligent education. In the same year, the Ministry of Education launched the National Strategy for the Digitization of Education. Based on foreign research, IBM first proposed the concept of intelligent education in 2009, pointing out five signposts of intelligent education: technology integration, personalized learning, new economy knowledge, global integration and economic linkage [1]. The application of artificial intelligence in education in China has also roughly gone through three phases: the embryonic phase from 2012 to 2017, when the concept of intelligent education was first proposed, the principles of intelligent education were analyzed and elaborated, and the concept of intelligent education was interpreted and theoretically developed. 2018-2022 is the second phase, in which the Chinese government released the “Education Information 2.0 Action Plan” and the establishment of a intelligent education demonstration zone. 2022 and beyond is the third phase in which intelligent education is popularized in China, and the launch of the Ministry of Education’s National Intelligent Education Platform is an important event [2].

In recent years, with the rapid development of artificial intelligence technology, its impact on the field of education has attracted wide attention. With the great success of machine learning algorithms represented by deep learning in the fields of machine vision and speech recognition, as well as the continuous development of cloud computing, big data, and other technologies, the maturity of artificial intelligence provides rich data resources and strong technical support, in this context, “intelligent education” has become an inevitable trend. Carrying out “intelligent education” can use artificial intelligence technology to provide students with more personalized and accurate education services, promote education equity, and improve education quality. At the same time, “intelligent education” can also provide teachers with more efficient and accurate teaching AIDS and support, helping them better complete teaching tasks and improve teaching quality. In the process of implementing intelligent education, we need to pay attention to the standardized application of artificial intelligence technol-

ogy. According to the characteristics of different disciplines, reasonable application programs and implementation plans should be formulated to ensure that the application of artificial intelligence technology can truly bring a positive impact on education. At the same time, it is also necessary to strengthen the research of “intelligent education”, constantly improve and optimize the theory and practice system of “intelligent education”, and provide more powerful support and guarantee for the future development of education.

2. The Resource-Distributed Learning Mode in the Intelligent Age Fulfills the Diverse Learning Needs

The distributed learning mode of learning resources refers to the mode in which learners log in remotely and use intelligent algorithms to store the learning resources developed by each school operating unit and extract them according to the learning needs of the students. In this way, the rich content and variety of teaching resources created by various educational institutions can be conveniently utilised and better meet the needs of learners. The model of intelligent resource-distributed learning has four main advantages [3]:

First, the abundance of resources. Due to distributed storage, each location has developed its own resources. This means that learners have access to a large number of learning resources that meet different learning needs. These resources are like a treasure house of knowledge waiting to be explored by learners.

Second, the convenience of learning. Learners can log in remotely and access the learning resources they need anytime and anywhere to learn, making it more convenient and faster to use these resources. Whether at home, on the road or anywhere else, you can learn with the the Internet. This kind of anytime, anywhere learning makes learning more flexible and free.

Third, personalized service. Intelligent algorithms can recommend suitable learning resources based on the learner’s learning history and learning preferences. This allows learners to take advantage of personalized learning services that are better tailored to their learning needs. The intelligent algorithm is like a personal tutor that makes the most appropriate learning suggestions according to the learner’s characteristics and learning progress.

Fourth, better learning outcomes. By integrating educational resources and a knowledge map, learners can learn more systematically. This helps them to better understand and master the knowledge, which increases the learning effect and learning efficiency. Through this systematic way of learning, knowledge is better organized and easier to grasp.

Due to the advantages mentioned above, this learning mode is mainly used for integrating educational resources, building a map of educational knowledge and using intelligent means to meet the diverse learning needs of learners. With the help of intelligent algorithms, we can recommend suitable learning resources to learners according to their needs and characteristics. This recommendation method can not only improve learners’ learning effect and efficiency, but also help

them better discover their potential and interests. In addition, we can use intelligent algorithms in a resource-distributed way to analyze and predict learners' learning behaviors to provide them with more personalized learning services and support.

In general, the intelligent learning mode is an efficient and personalized learning method. It makes full use of existing educational resources and better meets the needs of learners through the recommendations and personalized services of intelligent algorithms. This learning mode undoubtedly provides a new and effective way of learning for modern learners, which helps to improve the overall education level and learning effect. It makes it possible to free learning from time and space constraints and make knowledge more accessible.

3. The Learning Behavior Model of Cloud Computing in the Intelligent Age Provides Learners with More Accurate Learning Guidance

3.1. Characteristics of Cloud Computing Learning Behavior Mode in the Intelligent Age

The learning behavior model of cloud computing in the era of intelligence mainly refers to the sharing and optimal allocation of learning resources through cloud computing technology to improve learning efficiency and quality. This model has the following characteristics:

First, resource sharing. Cloud computing technology can gather all kinds of learning resources into a virtual cloud, and then provide external services through the network. In this way, students and teachers can access these resources anytime and anywhere, breaking the restrictions of traditional learning resources and realizing true resource sharing [3].

Second, optimize the configuration. Cloud computing can automatically adjust the allocation and combination of learning resources according to students' learning needs and behavior patterns to achieve a personalized learning experience. At the same time, cloud computing can also provide corresponding learning resources and services according to different teaching scenarios and goals to meet different types of learning needs [4].

Third, improve efficiency. Through cloud computing technology, students can access learning resources and services more quickly, improving learning efficiency. At the same time, cloud computing can also realize the automatic processing and analysis of data, help teachers better understand the learning situation and needs of students, and improve the teaching effect and quality.

Fourth, promote collaboration. Cloud computing technology can facilitate collaboration and communication in the learning process. Students can communicate and discuss with other students or teachers online through the cloud computing platform to solve problems and learn knowledge together. This type of collaborative learning can improve student engagement and learning effectiveness [2].

Fifth, innovation. The cloud computing learning behavior model in the intelligent era can not only realize the effective optimization of the traditional learning mode, but also combine new technologies and tools, such as artificial intelligence, big data, etc., to innovate teaching and learning methods, and provide students with a more personalized and efficient learning experience.

In short, the learning behavior mode of curriculum cloud computing in the intelligent age is an innovative learning mode based on cloud computing technology, which can realize the sharing and optimal allocation of learning resources, improve learning efficiency and quality, and promote cooperation and innovation.

3.2. Method of Generating Learning Paths through Cloud Computing in the Intelligent Age

The current cloud computing learning path generation methods are mainly divided into three categories: based on learner characteristics, based on semantic relationships, and based on cognitive relationships [2].

Firstly, the learning path is based on learner characteristics. This method mainly recommends personalized learning paths for learners according to their personal information, learning history, learning preferences, and other characteristics. For example, if a learner has demonstrated an interest in and strength in mathematics in a previous course, then an approach based on learner characteristics will prioritize recommending courses related to mathematics.

Secondly, the learning path is based on semantic relations. This method mainly recommends relevant learning paths for learners by analyzing the semantic relationship between learning content. For example, if a learner is learning the Java programming language, a semantic relationship-based approach would prioritize recommending Java-related courses, such as Java Web development or Java database programming.

Thirdly, learning pathways are based on cognitive relationships. This method mainly analyzes the cognitive relationship between learning content and recommends a reasonable learning path for learners. For example, if a learner is learning data analysis skills, a cognitive relationship-based approach would prioritize recommending courses related to data analysis, such as data visualization or statistics.

In addition, these methods can be further subdivided according to different stages of learning. For example, in the primary stage, a learner's feature-based approach can mainly consider the learner's interests and background, and recommend some entry-level courses; at the intermediate level, the approach based on semantic and cognitive relations can mainly consider the relationship and difficulty of the learning content, and recommend some advanced courses.

At the same time, with the continuous development and progress of technology, we believe that the future of learning will be more intelligent, efficient, and personalized.

4. Big Data Learning Mining Accurate Recommended Learning Path

With the rapid development of the knowledge economy and the continuous progress of big data technology, learning mining has become an important research direction in the field of knowledge management. Learning mining is a method that uses big data technology to extract useful information from massive data for in-depth analysis and mining to help individuals or organizations improve learning efficiency and optimize the learning process.

4.1. Big Data Mining has a Wide Range of Applications in the Field of Learning

In the era of knowledge big data, the application scenarios of learning mining are very wide. For example, in the field of online education, learning mining can help learners better understand the course knowledge, optimize the learning path, and improve the learning effect; In the field of vocational training, learning mining can provide personalized training suggestions according to different post needs, explore learners' ability shortcomings; in the field of scientific research, learning mining can find new research trends and research directions through in-depth analysis of scientific research data, and promote scientific research innovation. The core technology of learning mining includes data acquisition, data preprocessing, data analysis, and data visualization. Among them, data collection is the basis of learning mining, which needs to extract learning-related information from massive data. Data preprocessing is to clean, de-duplicate, and label the collected data to improve the accuracy of data analysis. Data analysis is the key link of learning mining, which needs to use machine learning, deep learning and other technologies to conduct in-depth analysis and mining of data. Data visualization is the presentation of analysis results in the form of charts, images, etc., to help users better understand and apply [5].

4.2. Apply Big Data Mining to Create an Accurate Portrait of the Learner [6]

Accurate learner portraits can provide important support and help for personalized teaching. It can help teachers better understand the characteristics and needs of each student, to provide them with more suitable teaching content and methods. At the same time, it can also help students better understand their learning situation and needs, to better plan their learning path and goals. Therefore, accurate learner portrait has become an indispensable part of modern education.

The establishment of an accurate learner portrait involves comprehensive consideration of many factors, including students' age, gender, character, interests, learning experience, ability level, and so on. Through in-depth analysis and research of these factors, teachers can fully understand the characteristics and needs of each student, to provide them with more accurate teaching content and methods.

Precision Learner profiling is a powerful tool that can help teachers and students better understand each other's needs and characteristics. By using this tool, teachers can provide more relevant teaching content and guidance based on the individual needs of students, and students can choose the learning methods and resources that best suit them according to their learning styles and needs. In this way, the individual needs of students can be better met, and their learning effect and learning experience can be improved.

4.3. Apply Big Data Mining to Obtain Precise Recommended Learning Paths

Big data mining can play a huge role in resource recommendation. Typical recommendation strategies include content-based recommendation, collaborative filtering recommendation, social network-based recommendation, association rule-based recommendation, mixed recommendation and so on. The above recommendation strategies have their advantages and disadvantages, and in practical application, the combination of recommendation strategies can be used to recommend specific problems.

4.3.1. Content-Based Recommendation

This is a recommendation method that recommends similar content based on the user's previous behavior and interests. It mainly analyzes user behavior and interests, as well as content characteristics, to find other content similar to user interests, and recommend this content to users.

4.3.2. Collaborative Filtering Recommendation

This recommendation method mainly analyzes the behavior of a large number of users, finds out the user groups with similar interests, and then recommends the content that these user groups like to new users. If a user likes watching *The Wandering Earth*, then they will probably also like watching *Crazy Aliens*.

4.3.3. Recommendation Based on Social Networks

This recommendation method is mainly to find influential users or topics by analyzing user relationships and behaviors in social networks, and recommend these users or topics to users. For example, if a user's social network has a lot of people talking about a certain movie, that movie might be recommended to that user.

4.3.4. Association Rule-Based Recommendation

This recommendation method is mainly through the analysis of the association rules between products, to recommend the user may be interested in the combination of goods. Association rules are an important data analysis method for discovering interesting relationships in a data set. This recommendation method is mostly used in the business field, in fact, it also has a good reference significance in the field of education. It mainly uses association rule mining algorithms, such as Apriori and FP-Growth, to extract interesting association rules from data,

design recommendation algorithms, and generate personalized learning combination recommendation lists according to users' learning habits for students to choose, which can improve learners' satisfaction [2].

4.3.5. Mixed Recommendation

This is a recommendation technology that integrates multiple recommendation methods. It can make full use of the advantages of various recommendation methods and minimize the disadvantages of various recommendation methods, to improve the quality and accuracy of recommendation. For example, content-based recommendations and collaborative filtering recommendations can be combined, or social network-based recommendations and association rules can be combined to generate richer recommendation results. In the hybrid recommendation model, there are two kinds of hybrid methods: one is to combine the recommendation results; the second is to combine the recommendation algorithm. When combining recommendation results, weighted average, linear combination, and other methods are usually used to fuse multiple recommendation results, to obtain the final recommendation result. This method can effectively reduce the error of a single recommendation result and improve the overall recommendation accuracy. When combining recommendation algorithms, content-based recommendation and collaborative filtering recommendation can be adopted.

In practical application, the mixed recommendation model also needs to take into account the differences and individual needs of different learners. Therefore, the multi-dimensional characteristics of learners, such as learning style, interests, and learning background, should be taken into account when establishing the mixed recommendation model, to provide learners with more accurate resource recommendation services. The research of knowledge big data learning mining in the intelligent era has far-reaching significance and value. Through the depiction of accurate learner portraits and the application of a mixed recommendation model, more personalized and accurate learning resource recommendation services can be provided for learners, and the improvement of learning effect and efficiency can be promoted.

5. Intelligent Service-Oriented Learning Methods Provide Students with Humanized Learning Services

Intelligent service learning is a new learning method, which aims to meet the needs of the intelligent age. This approach uses modern technologies such as artificial intelligence, big data, and cloud computing to provide learners with a more personalized, efficient, and convenient learning experience. It is always learner-centered, intelligently matching learning resources and support to improve learning efficiency and quality while avoiding the waste of learning resources. It uses big data analysis and other means to carry out comprehensive, objective, and effective assessment and feedback on the learning process, find and solve problems in time, and then improve the learning effect and learning

motivation [7]. In the fields of education and vocational training, intelligent service-oriented learning has a wide application prospect and can provide strong support for personalized learning and career development.

First of all, intelligent guidance is an important feature of intelligent education. By analyzing students' learning data and behavior habits, intelligent education can provide personalized learning paths and accurate learning suggestions for each student. This can not only help students master knowledge better, but also stimulate their interest and motivation in learning.

Secondly, accurate recommendation is another remarkable feature of wisdom education. Based on big data analysis, intelligent education can recommend the most suitable courses and learning materials for students according to their actual situation and learning needs. This can not only save students' time and energy, but also improve the learning effect and students' satisfaction.

In addition, customized tutoring is also an important feature of wisdom education. Intelligent education can provide customized tutoring services for each student according to their learning situation and needs. This service not only pays attention to students' academic performance, but also pays more attention to their individual needs and hobbies, aiming to help students better master knowledge and skills. The use of AI technology makes personalized tutoring possible. AI can provide each student with personalized learning plans and resources by analyzing their learning data and performance, thereby helping them to better master knowledge and skills. This customized counseling service can not only improve students' learning efficiency, but also reduce the waste of educational resources and realize the optimal allocation of educational resources.

Finally, careful evaluation is another key feature of wisdom education. Through comprehensive analysis and evaluation of student learning data, Intelligent education can provide refined evaluation results and recommendations for each student. This can not only help students better understand their own learning situation and shortcomings, but also provide more accurate teaching reference and basis for teachers.

6. Conclusion

With the advent of the intelligent age, the learning model is undergoing unprecedented change. In this process, many factors jointly influence the development of the learning model. In this paper, the learning mode in the intelligent age is analyzed in depth from four aspects: the resource distributed learning mode, the cloud computing learning behavior, the big data learning mining and the intelligent service learning method. With the development of the Internet and cloud computing technology, learning resources are no longer limited to traditional classrooms and teaching materials, but are widely distributed through the Internet. Students can access a variety of learning resources through search engines, online courses, educational apps and more. Cloud computing technology allows course resources to be centrally managed and shared, and students

can learn anytime, anywhere through cloud access. This learning method is convenient and efficient and can cater to the individual needs of students. Big data technology can perform a comprehensive analysis and evaluation of students' learning behaviors, interests, abilities and other aspects and strongly support personalized teaching. By analyzing big data, teachers can better understand the learning situation and students' needs to develop more accurate curricula and teaching methods. Finally, the intelligent service-oriented learning method in the intelligent age provides personalized tutoring services for students; the intelligent assessment system can evaluate students' learning outcomes in real time and provide feedback. The intelligent recommendation system can recommend relevant learning resources and courses based on the student's learning history and interests.

Therefore, the model of intelligent recommendation learning is an indispensable part of intelligent education, and it will become more widespread and popular with the advancement of technology in the future. It is worth mentioning that the application of ChatGPT technology in education has made a great impact. However, because ChatGPT is used too generally and the answers given are too vague, it is not yet able to achieve accurate and personalized mediation in the education field. If technical breakthroughs can be achieved, ChatGPT combined with intelligent learning recommendations will further support the comprehensive development of students.

Founding

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Conflicts of Interest

The author declares no conflicts of interest.

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