# Research on Innovative Teaching Mode of Education Informatization Based on Artificial Intelligence Algorithm

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**Abstract**—With the rapid development of artificial intelligence technology and the continuous expansion of computer application fields, the traditional education model can no longer meet the needs of today's society for talents. Intelligence as a new teaching method provides the possibility to realize the comprehensive information ability and the characteristics of autonomy and open collaboration that students need to have in the learning process. Intelligent teaching mode has become the inevitable trend of future education development. In the context of the new era, we build a digital learning environment based on AI algorithms that is efficient and feasible and can effectively guide teachers in their practical work and improve the overall level of the school, innovate and reform the teaching mode, make the traditional education informatization method more suitable for modern development needs, and thus improve students' learning efficiency and classroom participation.

**Keywords**—Artificial intelligence algorithms. Education informatization. Innovative teaching mode

## 1 INTRODUCTION

Artificial intelligence algorithm, as an emerging intelligent language, has great advantages in the field of computer, and its development speed is amazing and its application prospect is broad. At present, China's universities lack effective management and control of education information technology teaching mode, based on traditional learning methods, students' passive acceptance of knowledge content and classroom time constraints and other factors hinder the current development of innovative thinking cultivation of information technology curriculum reform in China's universities, which requires the integration of artificial intelligence technology into education teaching to realize the process of students' independent learning and active inquiry, so that can provide innovative thinking mode for intelligent classroom [1]. On the other hand, it also restricts the pace of students' independent thinking ability and comprehensive quality level, while in the rapid development of computer technology, artificial intelligence teaching methods gradually get people's attention and are widely used. The innovative teaching mode of education informationization based on artificial intelligence algorithm can promote students' comprehensive quality ability and practical skills to a certain extent, and can effectively improve the quality of talent training requirements of schools, which is of great significance to promote the quality of talent training in China's universities [2].

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## 2 THE CURRENT SITUATION OF CHINA'S EDUCATION INFORMATIZATION DEVELOPMENT

In the process of education informatization development, China's colleges and universities have been in the fumbling stage, and the application of information technology is not comprehensive enough. At present, most areas in China still use traditional teaching as the main means of learning, due to deficiencies in computer network technology and multimedia technology, etc. This will lead to students not being able to better grasp the basic knowledge points, theoretical knowledge and practical operation skills. Students' learning efficiency is relatively low, which leads to the development of information technology in China's colleges and universities is affected, hindering the country's cultivation of high-quality talents, which is not conducive to the sustainable and healthy development of social economy. Secondly, the school has not formed a good and perfect information management system and related software system platform suitable for its own characteristics and needs, and has not formed a unified education informatization system, which leads to students encountering difficulties in the learning process can not get timely and effective help, which seriously affects the quality of teaching [3]. Finally, there is a shortage of education informatization talents and a lack of professional teachers to complete the development of information technology applications, which leads to the lack of attention to information technology teaching in China's colleges and universities and the failure to establish a complete and effective computer network platform to meet students' learning needs. Therefore, artificial intelligence-based algorithms have a very important role in the innovative teaching mode of education informatization.

Education informatization has not only broken the restrictions of time and place of traditional education mode, but also realized the zero distance communication between teachers and students. At present, China's teaching informatization reform has achieved certain results, mainly from four aspects: First, the infrastructure of education informatization, from the basic education stage of informatization construction to higher education institutions, they are emphasizing student-oriented, making full use of information technology to improve the quality of teaching. Second, the construction of information resources, in the information technology teaching, the construction and application of educational resources need to be student-oriented, through the means of information technology to improve the efficiency of the classroom. Third, the construction of organization, through the construction of resources to improve the quality of teaching and learning, information technology plays an important role in education. Therefore, the development and utilization of information resources is an inevitable trend of the current era. Fourth, information technology industry, the development of information technology, for education provides a new model, in teaching, teachers can combine information technology with the traditional classroom [4].

## 3 THE NECESSITY OF INNOVATION OF INFORMATIONIZATION IN HIGHER EDUCATION MANAGEMENT

With the development of information technology, computer technology, network communication and Internet technology have penetrated into the social life of human beings, and they have also been applied in the field of education. However, due to the influence of

traditional teaching mode and the low interest of students in learning, there is a lack of information technology talents cultivation in colleges and universities. The information base based on artificial intelligence algorithm is a new type of digital resource management model, which can be used to extract the knowledge hidden behind the massive data through data analysis and realize intelligent processing and control functions, and can effectively classify the complex and complicated systems, thus improving the efficiency and quality.

# 4 INNOVATION OF TEACHING MODE OF INFORMATIONIZATION BASED ON ARTIFICIAL INTELLIGENCE ALGORITHM

The innovation of education management informatization studied in this paper is to establish teaching management information system based on intelligent algorithm, which can not only improve students' learning efficiency, but also promote the utilization of information resources and realize the innovative teaching mode of education informatization. In the process of construction of teaching management information system, intelligent grouping algorithm is one of the important links to improve the quality of teaching information management. This paper mainly discusses the application of genetic algorithm in the field of intelligent grouping, and the mathematical model of the algorithm is discussed [5].

## 4.1 The Concept of Intelligent Paper Assembling

Intelligent group paper, as the name implies, is the introduction of computer science and technology to digitize test questions through computer technology and teach them through the network. Traditional computer technology has been unable to meet the demand for artificial intelligence algorithm learning ability, so intelligent grouping system is a new digital, high-speed computing equipment, it can be complex and large data quickly stored in a database to process and analyze these large and massive information. One of the most important aspects of the intelligent paper-forming strategy is the use of certain query parameters to query the test questions in the test bank. Because of its limitations, the traditional computerized paper composition technology often requires manual intervention in the teaching process, so the intelligent paper composition system is a very good tool [6].

1) Mathematical model of group paper problems. In the process of intelligent grouping, different constraints together form the corresponding grouping strategy, which is an important part of students' learning. In the traditional teaching mode, teachers need to do detailed analysis of the mastery of each knowledge point and skill and the required skills when conducting classroom lessons. The combination of intelligent paper-grouping technology and computer network technology has given rise to the new concept of artificial intelligence algorithms and has been rapidly developed.

From the mathematical point of view, the grouping strategy can be discussed by the corresponding mathematical model. The probability distribution of the sum of different grouping constraints is a random observable variable, which requires a mathematical model to be calculated, taking into account various influencing factors in the process. In the process of grouping the target papers, the constraints in the mathematical model are assumed to all hold. Therefore, all the test questions of the target paper need to satisfy n constraints, and the

mixture of n constraints is the n-dimensional feature vector of the test questions, and in the calculation, the n constraints need to be combined, that is, solved by the algorithm, so as to achieve the purpose of the target paper [7].

In the process of grouping the target test paper, assuming that the target test paper contains the number of test questions is m, the representation matrix of the test paper is an m*n matrix of order m, where m is the number of test questions. The corresponding m*n matrix is defined as shown in Equation (1):

$$F_g = \begin{bmatrix} a_{11} & a_{12} & \cdots & a_{1n} \\ a_{21} & a_{21} & \cdots & a_{2n} \\ \cdots & \cdots & \cdots & \cdots \\ a_{m1} & a_{m1} & \cdots & a_{mn} \end{bmatrix} \tag{1}$$

The above matrix corresponds to the previous discussion and the target matrix needs to satisfy the following conditions:

- $\sum_{i}^{m} C_{4i} a_{4i} = p_j$ knowledge units are divided, i.e., knowledge points are approximately bounded. Where $C_{4i} = \begin{cases} 1, a_{4i} = j \\ 0, a_{4i} \neq j \end{cases}$.

- $\sum_{i=1}^{m} a_{i1} = 100$, fraction constraint.

- $\sum_{i=1}^{m} C_{3i} a_{3i} = Z_p$, the capability level constraint. where $C_{3i} = \begin{cases} 1, C_{i3} = p \\ 0, C_{i3} \neq p \end{cases}$.

- $\sum_{i=1}^{m} a_{i1} a_{i2}$ is a test paper difficulty constraint.

2) The main methods of intelligent grouping

The Intelligent Paper Grouping method combines traditional manual language, graphical text, and artificial intelligence technology to analyze and process data and ultimately generate a complete system. It has strong automation and flexibility. In traditional teaching, teachers are usually assisted by computers to carry out the workflow of operations, records and calculations. Intelligent grouping can solve these problems: firstly, it requires a scientific and reasonable management method, secondly, it can study the difficulties and challenges

encountered in the learning process with students as the main target, and finally, it can be improved or perfected according to the specific situation [8]. At present, the main intelligent grouping algorithms are as follows:

- Prioritization algorithms

Prioritization algorithm is an important form of artificial intelligence, which to a certain extent reflects the students' ability to independently select learning content and can also reflect the algorithm can better help teachers in teaching. The new model and method based on intelligent technology is to develop the traditional education information technology to a new stage, this new model has strong innovative and timely characteristics, but also has a very prominent practical value, very good operational characteristics and very strong applicability and other advantageous features. In the future development should pay attention to the cultivation of students' thinking ability and make it as the key content in teaching to dig deeper.

- Random extraction algorithm

Random extraction algorithm is a digital matrix compression method based on artificial intelligence technology, which can extract information through the relationship between data sets in computer networks, so as to obtain the original information from a large number of high-dimensional data sources. Based on artificial intelligence technology can transform complex and abstract problems into simple and easy to understand problems, and can effectively solve the traditional teaching can not be handled, difficult to understand and many other problems, in the future construction of education information technology will have greater development prospects [9].

- Error compensation algorithm

The error compensation algorithm is proposed in the traditional teaching mode to solve the problems such as poor independent learning ability and inability of students to think independently. By introducing artificial intelligence technology into the classroom, students can perceive, analyze and process data and make judgments by themselves. At the same time, the computer integrates and processes the collected information to draw conclusions or process solutions to improve the quality and efficiency of teaching. The algorithm has achieved good results in traditional education information technology applications. In practice, it is still difficult to determine the error interval precisely.

- Retrospective probing method

- The backtracking trial algorithm is an improved algorithm based on the random sampling algorithm, which is based on computer technology and treats complex, abstracted problems as a system. It has an important role in teaching.

3) Allocation of the difficulty ratio of the test papers

Based on the above description it is possible to make the average difficulty calculation pattern of the papers coming out of the intelligent group as shown in Table 1.

**Table 1.** average difficulty calculation pattern

| Model Type | Difficulty Ratio Diffulty Level | Difficult | Harder | Medium | Easier | Easy |
|---|---|---|---|---|---|---|
| A | Difficult | 50% | 25% | 10% | 10% | 5% |
| | Difficult | 35% | 30% | 15% | 10% | 10% |
| | Medium | 15% | 25% | 30% | 20% | 15% |
| | ... | ... | ... | ... | ... | ... |
| B | ... | ... | ... | ... | ... | ... |
| | Easier | 5% | 5% | 30% | 40% | 20% |
| | easier | 0% | 5% | 30% | 30% | 35% |
| ... | ... | ... | ... | ... | ... | ... |

### 4.2 Network Architecture of Teaching Information System

Network architecture is the core of AI teaching mode, which can make the whole system have better stability and can ensure that the whole system will not produce redundancy in the application process, and also can ensure that computer resources and hardware equipment are not limited, this system adopts B/S ( Browser/Server) mode for development and design, B/S architecture refers to the close combination of AI technology with computer, network and other related disciplines, and realize intelligence and automation through its analysis of data. B/S architecture refers to the close combination of artificial intelligence technology and computer, network and other related disciplines, and through its analysis of data, to achieve intelligence and automation. B/S architecture is a distributed data structure-based teaching model, the core of which is: a server as the center, through the processing of a large amount of information, to achieve real-time tracking of a large number of knowledge points and objects. In practical application, different types of network resources can be used to complete the relevant functions, such as uploading students' learning results and teachers' lesson plans to the Internet for sharing, and some schools use their own storage space to store their own learning contents and download them to other institutions and other software to provide a service platform for use, etc. to meet the exchange and interaction needs among universities. In teaching, multimedia resources are used to complete the traditional education model in a single, and information technology can be used to share information through the network and also to process student learning and teacher lesson plan uploads, etc [10]. The B/S architecture is shown in Figure 1.

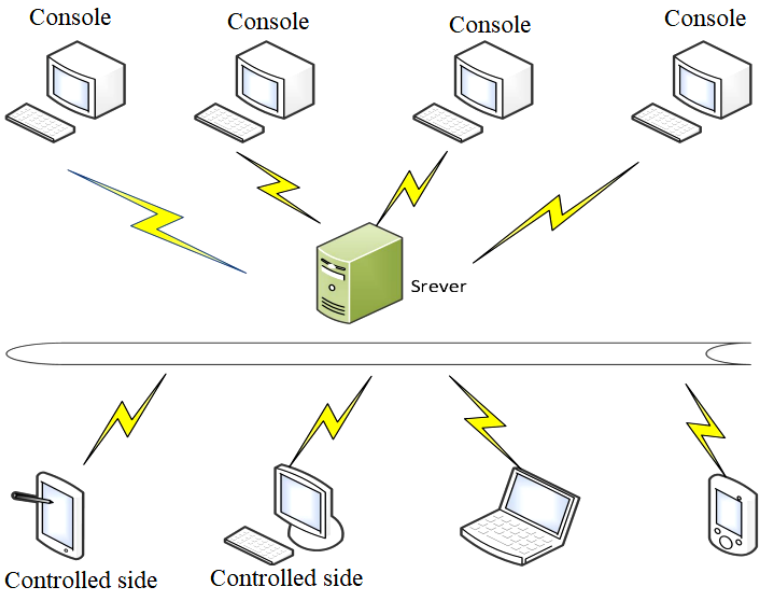


**Figure 1.** B/S architecture

### 4.3 System Design

The system is designed to realize the application of artificial intelligence algorithm in education information technology teaching, the overall structure and functional modules of the system include administrator module, teacher module, student module, etc., as shown in Figure 2.

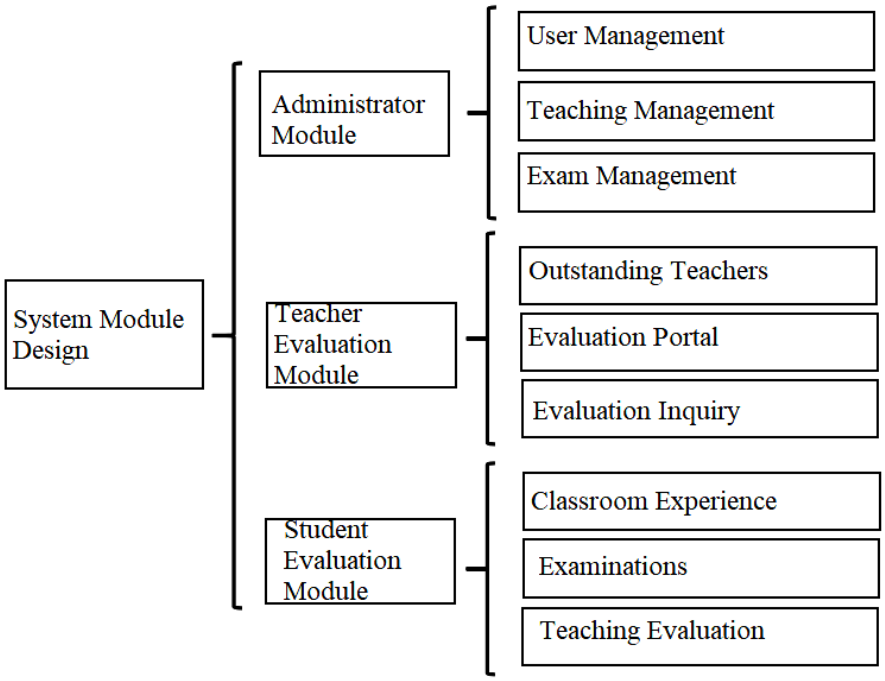


**Figure 2.** System module design

### 4.4 MySql Database

MySql, as a relational database, provides users with a variety of data and analysis, and is capable of performing many types of queries. In traditional education and teaching, it is a good way to use this approach to assist teachers in their teaching tasks. However, as artificial intelligence technology is more and more widely used in people's life and work, some problems have emerged: for example, how to use existing computer resources to achieve high efficiency, how to effectively solve a series of problems such as the large amount of information faced by students in the learning process and the difficulty in getting enough time to acquire relevant knowledge, and the inefficiency caused by poor data processing ability.

MySql database is developed in both C and C++ for the underlying logic, and is compatible with both Windows and Linux operating systems. MySql has different API interfaces for different programming languages and its architecture is shown in Figure 3.

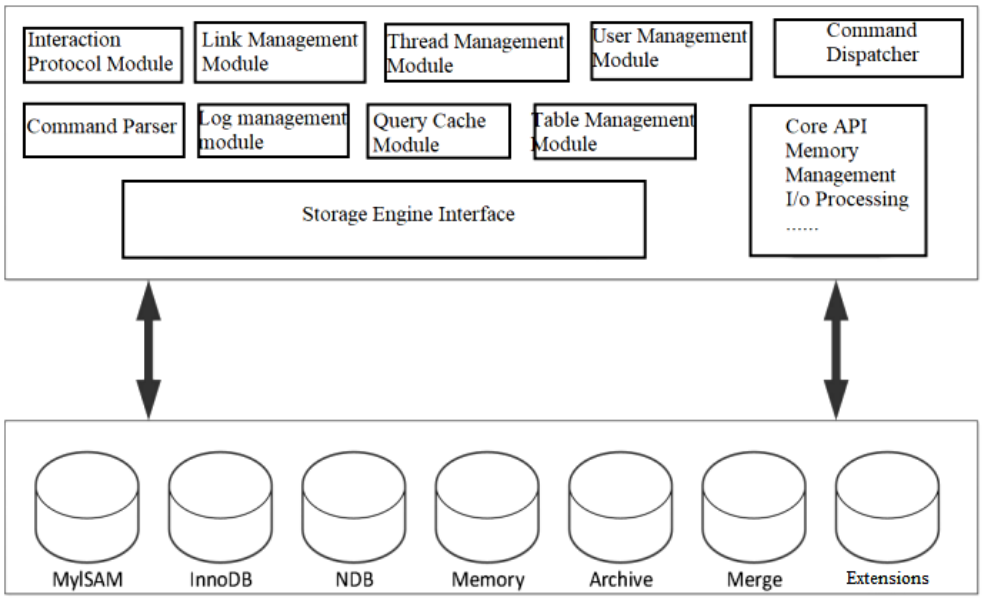


**Figure 3.** MySql database architecture

## 5 CONCLUSION

To sum up, with the continuous development of artificial intelligence technology, the intelligent teaching mode has become a hot spot in today's education field. Traditional colleges and universities have been using computer as an auxiliary tool for subject construction, in this case students' learning efficiency is low, the course content is old and other problems are gradually revealed, while modern society pays more and more attention to the cultivation of talents whose comprehensive quality ability level and comprehensive literacy requirements are higher. In addition, there is a general lack of information resources in China's higher education institutions, which makes it difficult for students to obtain a complete and effective knowledge structure and skills system in the teaching process, which makes it impossible for students to think and innovate independently when they encounter various problems in the learning process. The online teaching mode based on artificial intelligence technology platform can effectively solve the above problems.

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