

# Educational Development Technology in Artificial Intelligence Era

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**Abstract.** In order to effectively combine the traditional educational mode with Artificial Intelligence (AI), the Bayesian conditional probability prediction model was adopted. Basing a knowledge map and a knowledge database, the answer to the student's mathematical subjective question was judged. Through the research and application of key technologies for error type positioning, the error knowledge points of each line were accurately found. A comprehensive feedback evaluation system for the complete error type was implemented. Therefore, the application of inference knowledge base technology saves teachers' time and improves the efficiency of marking.

**Keywords:** Educational Development Technology; Artificial Intelligence; Innovation.

## 1. Introduction

AI era has coming. It has revolutionized education. A new round of technology change education will be guided by smart education. This injects new ideas into education and teaching, and provides new methods and tools. The teaching model has been fundamentally transformed. The teaching effect has been improved.

In recent years, AI technology at home and abroad has developed rapidly. People are moving from the information age to the intelligent age. From intelligent robots, smart homes, smart medical care, smart cars, to various smart application Apps in smart mobile terminals, work and life are increasingly influenced. The field of education is no exception. The technology related to AI is being integrated with "Big Data"+" Learning Analysis"+" "Computer Vision"+" "Human-Computer Interaction", which affects all aspects of teaching and learning. The generation and flow of knowledge, the form and interaction of learning, the form and construction of learning resources, the organization and implementation of teaching content, and the evaluation and management of teaching performance have undergone earth-shaking changes [1].

According to the "New Generation AI Development Plan" issued by the State Council, smart technology should be used to promote the reform of the talent training model and teaching methods. A new education system that includes intelligent learning and interactive learning is built. In this era, the field of education should follow the development of AI to promote teaching change and innovation. An educational system of personalized learning and lifelong development was built. Education has changed from low-level and extensive to high-level and precise.

## 2. Research Status

Countries around the world are all concerned about teaching reform, because education is closely related to the development of economy, society and culture. People hope to promote teaching reform through technology. Foreign researchers recognize that the Internet will create new ways for the education system [2]. Customization theory is applied to the development of online education platforms, online education systems and distance education. Therefore, the education platform or education system can adapt to the individual needs of learners. In the absence of face-to-face interaction, each learner is provided with relatively appropriate learning resources to ensure and improve the quality of online education.

Truong puts forward the customization theory to improve the application of intelligent system in distance learning [3]. Through empirical research, Yang has shown that the customized interface on the MOOC platform is conducive to enhancing learners' willingness to use the MOOC platform [4].

In the course teaching resource integration platform, the research focused on the customization function of the platform resources.

In addition, there is also research about the purpose of customization. Koole has established a multimedia teaching environment based on the VDI model. The goal of the platform is to effectively improve the utilization of teaching resources, optimize the multimedia teaching environment, and realize the customization of complex teaching resources [5]. Sarrab proposes to build a lifelong vocational education platform to provide learners with customized learning services that meet the needs of individual lifelong learning.

### **3. Advanced Educational Development Technology**

#### **3.1 Big Data Technology**

AI based on massive and high-quality application scenario data. Compared with traditional data, big data has the characteristics of unstructured, distributed, large amount, and high-speed flow. Big data, through data collection, data storage, and data analysis, enables the discovery of inter relationships between known variables for scientific decision making. Big data has been used in various fields such as financial industry, urban traffic management, e-commerce, and medical care. It has broad application prospects. In the field of education, with the development of educational information, a large amount of data is generated in the teaching process. Big data provides a method for scientific decision-making based on data, which will have a profound impact on education and teaching. The value of big data lies in the scientific analysis, based on the analysis, data mining and intelligent decision making are applied. In other words, the owners of big data can make full use of the advantages of big data by building effective models and tools based on big data.

#### **3.2 Pattern Recognition**

Pattern recognition is the process of recognizing a given thing by a computer and assigning it to the same or similar pattern. It mainly studies how computers recognize natural objects, images, speech, and so on. Computer simulation realizes human pattern recognition capabilities such as visual, auditory, tactile and other intelligent perception capabilities. According to different theories, pattern recognition technology can be divided into template matching method, statistical pattern method, neural network method, etc. The algorithm used in the early stage is mainly statistical pattern recognition. In recent years, deep learning and deep neural networks developed on the basis of multi-layer neural networks have become popular methods for pattern recognition. Moreover, with the development of deep learning algorithms and big data technology, the accuracy in pattern recognition such as voice, image and emotion are greatly improved. The pattern recognition system is mainly composed of four parts: data acquisition, preprocessing, extraction feature and selection, and classification decision.

#### **3.3 Machine Learning**

With the rise of AI, machine learning has become the mainstream algorithm based on big data. Through data feature extraction, modeling and training, abstract things are quantified and analyzed to achieve accurate prediction results and decision-making methods. Through the implementation of algorithms, human behavior and ways of thinking are studied. The parameters of the training model are constantly adjusted and optimized to capture new cognitive abilities. Machine learning is not only the core of AI, but also the key to computer-realized human intelligence. Currently, it is applied to various fields such as precision medicine, autonomous driving, and genetic engineering. The automatic extraction system in this study establishes the entity extraction and automatic segmentation in natural language processing. The supervised learning, confrontation training, LSTM and other machine learning algorithms are used. Bayesian network model prediction technology also classifies and predicts the knowledge in the database, which makes the system have more powerful learning and prediction ability in the case of simulating human brain thinking.

## 4. Process and Discussion

### 4.1 Automatic Judgment Technology based on Knowledge Base and Automatic Reasoning

The error type locating technique firstly makes a correct judgment on the student's answer, and the knowledge of the falsification error is specifically positioned in the wrong type. Therefore, the common way is to compare the student's answers with the standard answers. If the student's answer does not match the standard answer, it is determined to be an error. However, mathematics is a highly logical subject. A correct conclusion can be inferred in different ways. The correct answer to the same topic can be obtained through different ideas. Therefore, in the judgment, the intermediate steps of the student's answer are not fixed, and the single comparison with the standard answer does not satisfy the judgment request.

In order to correctly identify the various ways of solving problems, all possible generation paths need to be considered. The rule base and rule inference engine are used to construct a forward reasoning knowledge network. If an entity relationship that matches the target conclusion is produced, the reasoning ends. The entire reasoning step describes the problem-solving mode of students. If there is no match, the newly generated knowledge is put into the knowledge base, and the rule matching continued as a known condition until all the matching rules cannot generate new knowledge. All rule paths and intermediate steps that can infer the target conclusions are the correct way to solve problems. It can be seen that the reasoning technology of the knowledge base realizes the function of judging the problem of multiple questions without following the standard answer. This is an extension of the method of judgment. Figure 1 shows the process of generating new knowledge by forward reasoning.

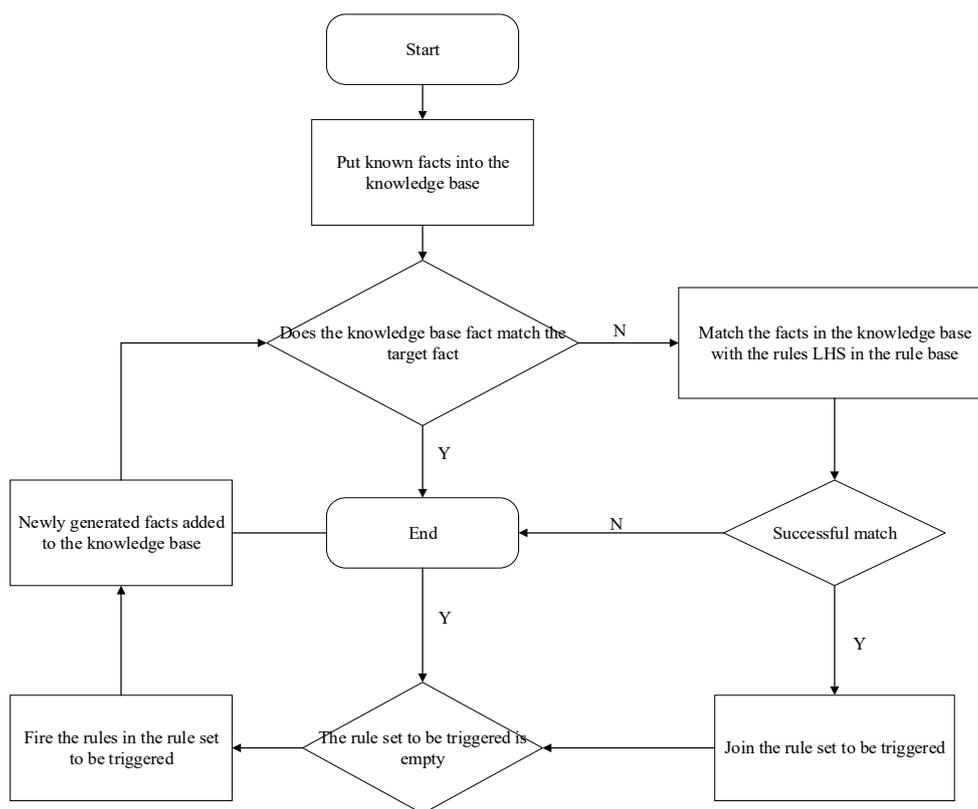


Fig. 1 The process of generating new knowledge by forward reasoning

### 4.2 Combination of Knowledge Base Reasoning Technology and Maths Judgment

The logical reasoning topics in the math's part mainly include the proof of the equation, the solution of the complex equation, the simplification of the complex math's formula, and the transformation proof of the series of questions. The answers to such questions are not unique. Each student's thinking mode is different, and the intermediate process obtained through different inference

transformations. However, as long as the reasoning of the intermediate process is correct and the final conclusion is correctly obtained, the student's answer is determined to be correct.

As a sub-module of the knowledge base reasoning, when the knowledge base does not find the equivalent knowledge that matches the student's answer, the verification method is performed. This ensures the accuracy of the judgment and reduces the error rate.

### **4.3 Result Analysis**

The system tests samples. The failure condition of the error type location is analyzed. First, the location of the error type depends on the outcome of the judgment. This is the wrong positioning of the knowledge point line of the wrong judgment result. The system first tested the results of the positive and false judgment accuracy of one thousand samples, and compared the results with the expected results. The study showed that when knowledge base reasoning technique was applied, the number of misjudged lines was one thousand, the correct rate of positive and false judgment results was 85.6%. The different modes of thinking are accurately identified. Therefore, the application of inference knowledge base technology saves teachers' time and improves the efficiency of marking.

## **5. Conclusion**

The error type localization technique in mathematical automatic judgment is studied. An automatic judgment system capable of locating the type of error is established to perform natural language understanding of the student's answer. The text language is transformed into a mathematical relationship that the computer can understand. Compared with the standard answer, the knowledge base automatically judges the student's answer. The application of knowledge base reasoning technology is a breakthrough in today's intelligent teaching assistant system. Compared with the standard answers in the database, the traditional teaching assistant system judges the student's answer.

In fact, only the final conclusion of the student is judged, and the problem-solving process is not analyzed. However, knowledge base reasoning technology breaks through the constraints of standard answers. The relationship of the problem is reasoned and the correct knowledge is stored. Therefore, the entire knowledge base can be seen as a powerful automatic problem-solving system. The system's semantic recognition and automatic reasoning have covered all the knowledge points of elementary mathematics. The different ideas and methods of the students' answers are included. After testing, the accuracy of the system judgment reached 85.6%.

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