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Computer-Aided Design AND APPLICATIONS

Design and Implementation of a E-business Teaching Simulation System Based on Student Cognitive Model

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Abstract. Now the speed of economic globalization is accelerating, the economic structure has changed, and e-business has emerged as the times require, and many enterprises have begun to find e-business routes within their own enterprises. The faster the growth of e-business, the more talents are needed, but the problem of lack of e-business talents has always existed. To solve this problem, Relevant researchers have developed a teaching simulation system suitable for e-business personnel training. This article puts forward a method of establishing a cognitive student model in e-business CAI system based on reasoning engine, introduces the e-business CAI system based on cognitive student model, improves the effectiveness of the system. Most educators and learners say that the improved CAI system accurately, thus providing more targeted course content. The improved e-business CAI simulation system can adopt different instructional methods and strategies according to students' learning characteristics, learning history and learning style, and can diagnose learners' mistakes, judge the causes of mistakes and put forward corresponding correction strategies, so it can better meet the learning needs of learners with different characteristics.

Keywords: Students' Cognitive Model; Computer-Assisted Instruction; E-Business; Teaching Simulation System
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1 INTRODUCTION

E-business refers to all kinds of business activities carried out through computer networks. As a new mode of operation, it affects all walks of life and is carrying out an information revolution in the business model, the management model of the government and people's lifestyles. Alghamdi et al. [1] designed and implemented a computer-aided intelligent examination system. It combines database management, and data encryption, which can not only achieve functions such as automatic paper generation, automatic grading, and automatic exams, but also analyze and

evaluate exam results. Based on requirement analysis, the overall architecture of the system is designed, including database design, user interface design, module design, etc. According to the set rules. Implement online exams, including functions such as timing and automatic submission. According to the system design, use corresponding programming languages and tools to implement each module. Conduct comprehensive testing after system implementation, including unit testing, integration testing, system testing, etc., to identify and fix existing problems. At the same time, optimize and improve the system based on the test results. Compared with the traditional business operation mode, e-business is a fundamental change, breaking the previous business operation mode of purchasing, producing and selling single chain. E-business is the fastest growing and most active industry in modern service industry. Enterprises can reduce operating costs, open up product markets and improve management efficiency through e-business. Ismail et al. [2] established a professional knowledge structure in the field of e-commerce based on students' cognitive models and constructed an evaluation mechanism. Based on the designed teaching content and methods, a simulation system was constructed, which includes various scenarios and operational processes of e-commerce, as well as relevant knowledge and skills. At the same time, it is necessary to design interactive interfaces and intelligent prompts to help students better master professional knowledge in the field of e-commerce. According to the designed simulation system and teaching content, corresponding computer-aided teaching software needs to be developed. This software should be able to provide personalized teaching guidance and support based on students' cognitive models and performance, to help students better master professional knowledge in the field of e-commerce. After the design and development are completed, it is necessary to test and evaluate the simulation system and computer-aided teaching software. The effectiveness and reliability of the system can be evaluated through experiments, user feedback, and expert evaluation, and optimized and improved based on the evaluation results. With the continuous growth of e-business, the market demand for e-business talents is increasing, and the quality requirements for e-business talents are also increasing, which puts forward the task of cultivating e-business professionals for universities. The traditional process of environmental art design often requires a large amount of hand drawing work, which is not only time-consuming but also requires high requirements for the designer's painting skills. The introduction of CAD software allows designers to complete their designs by clicking and dragging the mouse, greatly improving design efficiency. At the same time, CAD software also supports layer management, and Jin and Yang [3] conveniently layer edit each element, making the entire design process more orderly. CAD software can help students quickly draw floor plans, stereoscopic views, perspective views, etc., and can easily construct and modify models. These tools can help the basic principles and techniques of design. Through rendering tools in CAD software, students can simulate real lighting and material effects, making design works more realistic and attractive. At the same time, this software can also generate 3D animations and virtual reality scenes, enabling students to better understand and evaluate the effects of design works in different environments and times. In short, computer-aided design software plays an important role in environmental art and design teaching, helping students better master design skills, improve design quality and efficiency. The growth of e-business has a direct impact on economy, commerce, finance and other fields, and it is one of the important models of the new world economic model in the future. Leading governments and global business circles to spare no effort to promote the growth of e-business.

The cultivation of e-business professionals must be combined with the development practice of e-business, and it is needed to have a corresponding network environment for teaching experiments and an e-business simulation system suitable for teaching experiments. In order to meet the needs of e-business teaching, it is needed to develop and integrate personalized e-business teaching experiment simulation system software. Jing and Jiang [4] use VB (Visual Basic) software to optimize the computer-aided English teaching system. This involves multiple aspects, including user interface design, learning content management, learning progress tracking, and interactive communication. A good user interface design can improve the user experience and make the system easier to use. You can use VB's graphics and layout tools to design a clear and

intuitive user interface, including course catalogs, learning progress bars, personal grades, and more. In addition, some animation effects can be added to make the interface more vivid and interesting. By using the database and file system functions of VB, an effective learning content management system can be established. This system can store and manage various learning materials, such as course videos, articles, exercise questions, etc. In addition, search and filtering functions can also be used to facilitate users to search and obtain the required learning resources. By using VB's recording and data binding functions, a real-time learning progress tracking system can be created. This system can record users' learning progress, test scores, and provide feedback and suggestions based on this data. In addition, learning progress can be visually displayed to users through charts and other means. By combining artificial intelligence and big data analysis, an adaptive learning system can be created using VB. This system can automatically adjust the learning content and difficulty based on students' learning situation, grades, and feedback, providing a personalized learning experience.

Leidy [5] explored how to effectively utilize computer-aided instruction (CAI) to improve learning outcomes in ESL language courses. Through a review of current research and practical experience, the article summarizes some key viewpoints and suggestions. Firstly, CAI tools can provide a personalized learning experience that adapts to different learning styles and rhythms. Secondly, CAI can provide rich learning resources, including voice, video, images, etc., which helps students better understand and master the language. In addition, CAI can provide real-time feedback to help students understand their learning progress and problems. Finally, the article proposes some future research directions, including how to better integrate traditional teaching methods with CAI, and how to design more attractive and effective CAI tools. The article discusses how to select and design suitable CAI tools, as well as how to integrate these tools into ESL language courses. The article also discusses how to evaluate and improve the effectiveness of these tools to better meet students' learning needs. Computer network technology is an important technical support to support the growth of e-business, but due to the rapid growth of e-business, the quantity of talents in this field is extremely short now. As a highly applied specialty, the application of e-business simulation instructional system provides educators and learners with a real trading environment for simulating e-business and reflects important significance in the practical teaching of e-business. CAI refers to the use of computers to assist teachers to complete some teaching tasks and directly serve students. The intelligent CAI produced by the combination of artificial intelligence (AI) and CAI overcomes many weaknesses of traditional CAI and provides a new learning environment for students. With the continuous development of computer technology and network management, the application of computer-aided teaching in network management has gradually become a trend in the field of education. Designing a computer assisted teaching network management system for college physical education can better achieve the scientific, information-based, and modern management of physical education teaching, and improve teaching quality and efficiency. In the system architecture design phase, Li et al. [6] adopted a hierarchical design approach, dividing the system into a presentation layer, a business logic layer, and a data access layer. This layered design can reduce the coupling of the system and improve its maintainability and scalability. The module is responsible for managing the basic settings of the system, including system configuration, permission management, data backup, etc. Through this module, administrators can make basic settings for the system to ensure its stability and security. The system design adopts a web-based architecture, using common web development and database technologies such as HTML, CSS, JavaScript, PHP, MySQL, etc. The design of the system also needs to consider user friendliness and ease of use. The interface design should be concise and clear, the operation should be simple and easy to understand, and detailed help documents and usage guidelines should also be provided to facilitate users' use of the system. CAI system of e-business is a comprehensive subject involving computer science, education, cognitive science, AI and other disciplines. By analyzing the student model, especially the cognitive student model, this article designs a student cognitive model of e-business CAI system, including student model base and student personality inference machine based on fuzzy comprehensive assessment, and implements the model in e-business CAI simulation system.

Lin et al. [7] developed an electronic learning platform that is aware of role model self-regulated learning behavior and requires knowledge from multiple fields, psychology, and more. Firstly, a large amount of online learning behavior data needs to be collected and analyzed. These data include students' learning time, learning content, learning progress, interaction, etc. By analyzing these data, we can understand students' learning habits, learning styles, and learning needs. Based on the collected data, multiple models can be constructed, including student behavior models, role model behavior models, self-regulation models, etc. These models can be used to predict students' learning behavior and alert them to potential problems. Through natural language processing technology, students' text input, such as notes and comments, can be analyzed to understand their self-regulation. In short, developing an electronic learning platform that is aware of role models' self-regulated learning behavior requires interdisciplinary collaboration and support. By utilizing artificial intelligence and machine learning technologies, students can better regulate and grow during the learning process. Like other information systems, the successful application of e-business simulation instructional system depends on students' experience, cognition and adoption behavior, so it is of great significance for system developers, professional managers, teaching staff and students to explore the important behavioral factors that affect students' adoption of simulation instructional system. CAI system of e-business has become an important research field of educational technology. As an important part of e-business CAI system, student model is a reliable data structure that represents students' cognitive characteristics, records students' mastery of knowledge, and reflects students' knowledge structure and cognitive ability. Its essence is to solve the intelligent problem in e-business CAI system. This article studies the design and implementation strategy of e-business CAI simulation system based on students' cognitive model.

⊖ This article introduces the design concept and implementation technology of an e-business teaching simulation system, studies and analyzes the key problems that should be solved in the simulation system, and implements the e-business teaching simulation system on this basis.

⊜ Design a student cognitive model for an e-business CAI system by analyzing student models, including a student model library, a student personality inference machine based on fuzzy comprehensive assessment, and implement the model in an e-business CAI simulation system.

This article analyzes the design concept and system characteristics of an e-business CAI system, and based on this, constructs a student cognitive model for the e-business CAI system; The model was implemented in an e-business CAI simulation system and the experimental results of the system were presented.

2 DESIGN IDEA AND SYSTEM CHARACTERISTICS OF E-BUSINESS CAI SYSTEM

Maaliw [8] has designed and implemented a personalized and an adaptive virtual learning environment. Firstly, it matches these styles with specific learning content. In addition, it is also necessary to consider how the system should adapt to learners' progress and abilities. Design a module that can recognize and understand learning styles. This may require collecting and analyzing learners' behavioral data, such as their interaction frequency, learning time, habits, etc. during the learning process. Design an algorithm or model to match the best learning content. This may include creating different learning paths or resource libraries. The system needs to be able to adjust learning content and difficulty based on learners' progress and abilities. This may require collecting and analyzing performance data from learners, such as their performance in completing courses or solving problems. Design a system that can receive and process feedback from learners in order to continuously improve and adjust their learning experience. Problem Based Computer Aided Instruction for Waste Materials (PBL-CMC) is a method that combines problem-solving learning and computer-aided teaching. Maspiroh and Subali [9] aim to help students solve problems using waste materials. This teaching method has received widespread attention and application in recent years, and has had a significant impact on students' problem-solving abilities. This teaching method has been widely applied and promoted. By solving practical problems,

students can learn skills such as analyzing problems, proposing solutions, implementing solutions, and evaluating results. Students can use waste materials for design and production, stimulate innovative thinking, and improve innovation ability. By collaborating with other classmates to solve problems, students can cultivate teamwork spirit and communication skills. Students can apply their knowledge to practical situations and improve their practical abilities. In short, PBL-CMC is an effective teaching method that can improve students' problem-solving skills, innovative thinking, and practical abilities. In the future, we can further study how to optimize this teaching method to better promote the comprehensive development of students.

Miller et al. [10] conducted best practices for teaching computer science students how to use paper prototypes. Paper prototypes should be used as tools for visualizing, simulating, and testing user interfaces, which can help teams quickly iterate and collect user feedback during the development process. Provide clear steps and guidance for your students before starting using paper prototypes. This can include how to create effective interface elements such as buttons, sliders, text boxes, and how to use paper prototypes for basic user interaction. Paper prototypes are an excellent communication tool because they can quickly convey design concepts and collect feedback from teams and users. Emphasize this and encourage students to use it as a means of communication within the team and with potential users. Require students to use paper prototypes to simulate user interaction and collect feedback. This not only helps them understand how the user interface works, but also helps them understand how to improve based on user feedback. Encourage students to collect feedback from users and apply it to the improvement of paper prototypes. This will help them understand how to iterate and improve during the design process. Remind students that paper prototypes are only part of the design process. They need to understand how to convert this prototype into a viable software product. Network resources have become an important pillar of modern education. Especially in the teaching of music appreciation courses, the application of network resources can not only enrich teaching content, but also provide more convenient teaching management methods. Pei and Wang [11] analyzed the computer-assisted teaching management system for music appreciation courses based on network resources and explored its positive role in improving teaching effectiveness. This system can utilize network resources to integrate various music appreciation courses, music works, literature materials, etc., forming a huge music knowledge base. In this way, students can access various music resources on one platform, making learning and research easier and faster. Through music software, teachers can conduct in-depth analysis of music works, helping students better understand the meaning of music; Through online testing and homework submission, teachers can easily grasp students' learning situation and provide timely feedback. Rosali [12] analyzed the impact of computer-aided teaching on high school physics academic performance. The application of computer-aided teaching in middle school physics teaching has gradually deepened, and has had a certain impact on students' physics learning performance. Physics is a subject that requires students to possess a certain level of abstract thinking and logical reasoning ability, so many students feel confused and afraid of physics. Computer assisted teaching can transform abstract physical concepts and laws into concrete and visible content through vivid images, animations, videos, and other means, thereby stimulating students' interest and enhancing their learning motivation. Computer assisted teaching can enable students to experience the process of physical experiments firsthand through simulation experiments, virtual laboratories, and other methods, deepening their understanding of physical concepts and laws. At the same time, computer-aided teaching can also facilitate teachers to grasp students' learning situations, adjust teaching strategies in a timely manner, and improve students' learning efficiency through online testing, homework assignments, and other methods. In summary, computer-aided teaching has a certain promoting effect on the improvement of middle school physics learning performance. However, when applying computer-aided teaching, it is necessary to pay attention to arranging the usage time reasonably and avoiding excessive reliance on computer-aided teaching to avoid affecting students' physical and mental health. Szyjewski [13] analyzed the use of independent ICT systems to extend open-source e-commerce. After selecting the appropriate e-commerce platform, it was configured with an independent ICT system to support the platform. This includes purchasing and

setting up servers, network devices, databases, and other necessary hardware and software. Next, it integrates the ICT system with the selected e-commerce platform. This involves setting up database connections, configuring web services, and other related settings. Customize and develop specific functions or integrate other services based on your business needs. Before proceeding with these developments, please ensure that you have a thorough understanding of the development documents and APIs for the selected e-commerce platform. Once your e-commerce platform runs on an independent ICT system, you need to adopt appropriate marketing strategies to promote your business. Please note that these steps are only a rough guide and may need to be adjusted according to your specific situation. Throughout the process, you may need to seek professional ICT consultants and developers to assist you in implementing these steps.

Wang et al. [14] designed and implemented talent cultivation. According to the requirements, it has designed a suitable database structure. Simultaneously create a case library for each type of Python application. Each case should include detailed steps, code examples, explanations, and questions. The difficulty of the case should be from simple to complex to adapt to students at different levels. Design the interaction between students and the case library. For example, students can choose cases, submit their solutions, see other students' solutions and evaluations, and obtain evaluations of their solutions. Design a management interface for teachers. Teachers can add new cases on this interface, view students' solutions and evaluations, and provide feedback to students. Ensure that all user data is secure and prevent any form of leakage or tampering. Yavich et al. [15] gradually mastered the core knowledge and skills of design by learning a large number of design samples, and were able to automatically generate design solutions. In order to improve the performance of the algorithm, reinforcement learning techniques such as policy gradients and deep deterministic policy gradients can also be introduced to optimize the quality and diversity of design solutions. Configurable intelligent design based on hierarchical imitation model is a design method that automates design tasks by imitating the decision-making process of human designers. This model can be configured with different parameters and rules to adapt to different design requirements and scenarios. In the hierarchical imitation model, the design process is divided into multiple levels, each level containing a set of design rules and decision-making processes. These rules and processes are formulated by human designers based on actual design problems. At each level, the model will apply corresponding rules and processes based on the given design requirements and constraints to generate design solutions. The characteristic of configurable intelligent design lies in its flexibility and scalability. By adjusting model parameters and rules, the decision-making process and output results of the design process can be changed. This allows the model to adapt to different design requirements and scenarios, and can be expanded and improved according to new design requirements. Zhao and Guo [16] utilize artificial intelligence technology to provide personalized learning resources and recommendations for each student based on their learning situation, grades, interests, and other data. For example, the system can recommend courses and learning materials that are suitable for difficulty levels based on students' learning progress and grades, or recommend related topics and resources based on students' interests. The system should provide real-time online interaction functions, including text, voice, and video communication between students and teachers, as well as between students and students. This interaction can occur at the class, group, or individual level, allowing students to receive guidance and assistance at any time. The system should have powerful teaching resource management functions, including uploading and downloading course resources, publishing and retrieving learning tasks, and correcting and providing feedback on student assignments. Teachers can easily manage the teaching process and improve teaching efficiency through the system. The system should collect data on students' learning behavior, such as learning duration, learning content, grades, etc., and use big data analysis technology to evaluate and predict students' learning situation. This evaluation can not only provide students with learning suggestions and feedback, but also provide teachers with a basis for teaching adjustments. Zhou [17] constructed a deep learning model based on the extracted features. This can be a neural network model, such as a convolutional neural network (CNN) or a recurrent neural network (RNN). The goal of the model is to predict the level of user interest in the product

based on the characteristics of the user and the product. Train the model using a large amount of data and adjust its parameters to improve its prediction accuracy. This can be achieved through optimization methods such as backpropagation algorithm and gradient descent. Firstly, you need to collect a large amount of data, including user behavior data, product descriptions and characteristics, and the relationship between users and products. These data can come from e-commerce platform logs, user surveys, purchase records, etc. The collected raw data usually requires preprocessing, including cleaning, standardization, filling in missing values, etc., in order to facilitate the subsequent use of deep learning models. Through feature engineering, the characteristics of products and user behavior are transformed into features that can be used by machine learning models. By calculating the similarity between the user model and the product model, find the most suitable product for user interest and recommend it. This can be achieved by calculating cosine similarity between user and product features or using more complex deep learning models such as neural networks.

3 COGNITIVE MODEL OF STUDENTS IN E-BUSINESS CAI SYSTEM

E-business is the product of the combination of new economy and scientific development. It is an economic model that uses modern communication technology and computer network technology to establish a virtual network transaction chain and gradually scale up. E-business is a commercial operation mode based on the computer internet, in which enterprises or individual merchants create shops in product areas on the Internet, and other enterprises or individual consumers search for needed goods on the platform and conduct electronic payment transactions. Because the training period of talent resources is long, and there are many disciplines involved in e-business, the talents on e-business platform are required to master a large amount of knowledge, and because of the rapid update of e-business, e-business talents have been in short supply.

At present, the established student model can't reflect the learners' cognitive ability and at what stage, which is very important for educators and learners. The stage of student assessment model is shown in Figure 1.

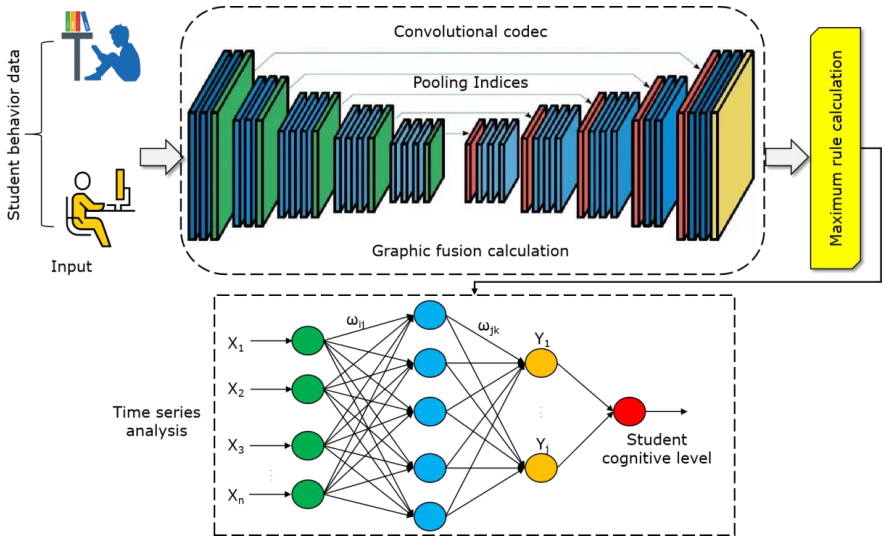

Figure 1: Student cognitive assessment model.

The experimental simulation system of e-business teaching takes shopping malls, enterprises and consumers as the main body, abstracts the general e-business framework model, and simulates

the actual complete stage of the new e-business supply chain management activities integrating supply, sales and storage among shopping malls and enterprises. The experimental simulation system of e-business teaching adopts modular design. According to the teaching plan of e-business specialty formulated by the school and the requirements of the Ministry of Education for the research of e-business, each functional sub-module is designed. Through modularization, the e-business teaching experiment simulation system is reasonably decomposed, and each module completes a specific sub-function, and then these modules are assembled according to the real processing flow of e-business to complete a whole.

Let X,Y be a pair of random variables. The conditional probability $P(Y|X)$ refers to the probability that one random variable Y takes a certain value when another random variable X has a known value:

$$P(Y|X)=\frac{P(X,Y)}{P(X)}=\frac{P(X|Y)P(Y)}{P(X)} \tag{1}$$

The learning level of students in different knowledge fields is:

$$\begin{gathered} P\left(X_{ji}=1\middle|\theta_{j,s_i,g_i}\right)=g_i^{1-\pi_{ji}}s_i^{\pi_{ji}} \\ \pi_{ji}=\prod_{k=1}^{K}\theta_{jk}^{q_{ik}} \end{gathered} \tag{2}$$

The approximate solution with metric $m(x)$ is found to satisfy:

$$\frac{m(x)}{m^*(x)}\le\left(2-\frac{1}{p}\right) \tag{3}$$

Where $m^*(x)$ is the measure of the optimal solution.

E-business teaching simulation system is a platform for teaching simulation, and at the same time, it should maintain the quality, data integrity, security and timeliness of the experimental system. Teachers' and students' data should be complete, teachers' information should conform to the identity of management operation, and students' major and class information should be complete, which directly affects whether students can enter the system to complete the course tasks. E-business simulation instructional system is a simulation of the real environment of e-business and belongs to the application mode of information technology. Therefore, we can learn from the technology acceptance model as the basic research framework, that is, the main factors affecting students' use of e-business simulation instructional system include perceived usefulness and perceived ease of use. It is not only the basis for students to learn reasoning, but also the basis for domain knowledge module to solve problems. The topology diagram of the instructional system is shown in Figure 2.

$$\min\sum_{i=1}^{a}f_{mi}d_{mi} \tag{4}$$

The optimal layout model of independent modules is:

$$\min\sum_{i=1}^{8}\sum_{j=1}^{8}\sum_{k=1}^{8}\sum_{l=1}^{8}C_{ijkl}X_{ik}X_{jl} \tag{5}$$

$$\min\sum_{i=1}^{8}f_{mi}\sqrt{(x_m-x_i)^2=(y_m-y_i)^2} \tag{6}$$

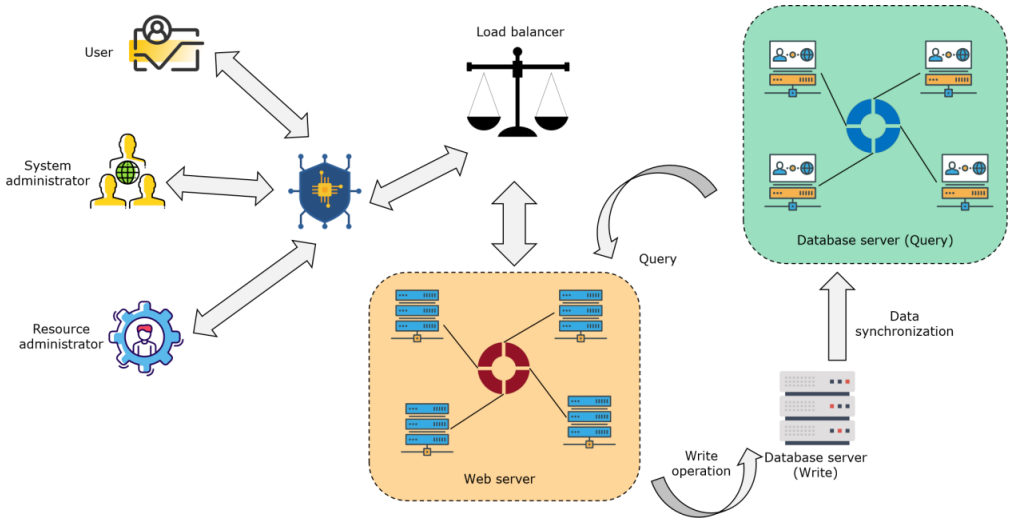

Figure 2: Topology diagram of instructional system.

In the model, trust is regarded as the antecedent variable of perceived usefulness, while perceived ease of use is regarded as the antecedent variable of trust. Because it is voluntary for students to use the e-business simulation instructional system to make online shopping, there is a certain internal motivation. In addition to its efficacy, online shopping can also bring users a happy, fashionable and fresh experience. The overall design of e-business simulation system is mainly composed of basic platform and application platform. The basic platform is the basic platform for the whole system to run, and the operation of e-business simulation system is on this platform, while the application platform is mainly composed of database, e-business simulation system, auxiliary systems and client applications. See Figure 3 for the operation flow of students' cognitive model.

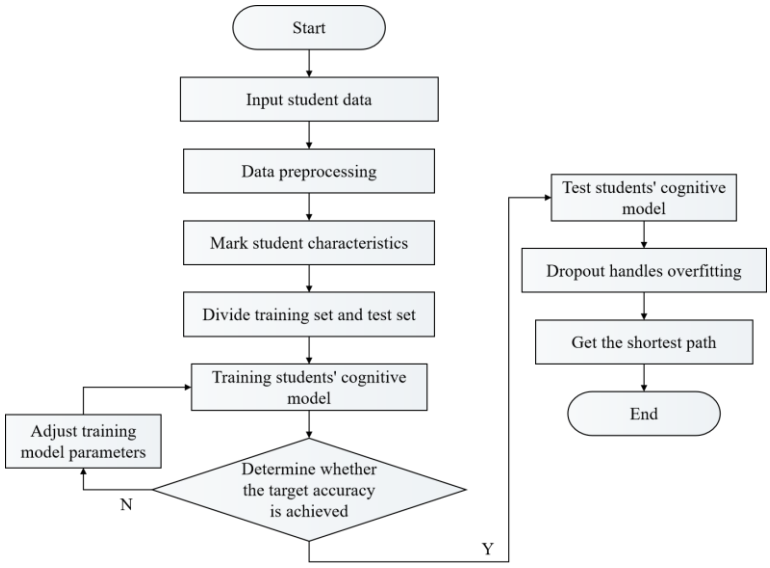

Figure 3: Running stage of students' cognitive model.

For association rule $R: X \Rightarrow Y$, where: $X \subset I, Y \subset I$, and $X \cap Y = \varnothing$. The confidence $Conf$ of the rule R is defined as:

$$Confidence(R) = \frac{Support(X \cup Y)}{Support(X)} \tag{7}$$

For each strength set L, in order to generate association rules, all non-empty subsets of L need to be found. For each subset $S \subseteq L$, if the ratio:

$$\frac{Support(L)}{Support(S)} \geq \min iConfidence \tag{8}$$

Generally speaking, the matrix of students' cognitive assessment is represented by a matrix $R(m,n)$ of $m \times n$ order, with m rows representing m students and n representing n courses. The element $r_{i,j}$ in row i and column j indicates the cognitive assessment of student i in course j. Intimacy $p(i,j)$ between student i and student j is:

$$p(i,j) = \sum \lambda \cdot m(i,j) \cdot \alpha T \tag{9}$$

$m(i,j)$ is the intimate behavior produced by students i and j, λ is the weight coefficient of behavior, T is the time difference between the occurrence of behavior and the current time, and α is the time attenuation factor.

By calculating the intimacy degree between each student and other students, and then selecting the k students with the highest intimacy degree, the recommendation coefficient $\vec{r}(i,j)$ of friends for the course is calculated according to the situation of these k students:

$$r(i,j) = \sum_{n=1}^{k} p(i,n) \cdot r(n,j) \tag{10}$$

Finally, according to the students' cognitive assessment of the course, the e-business teaching simulation system is comprehensively assessed.

The student model should be able to simulate the students' mastery of the teaching materials in the current situation. Students may have a correct understanding of the teaching materials, or they may form some wrong concepts due to incorrect understanding. If they systematically understand the students' wrong concepts, they will point out or correct them in some way.

4 MODEL SIMULATION TEST

With the integration of the world economy, e-business is more and more widely used in the economic and trade fields of enterprises, and the continuous growth of e-business has promoted the demand for talents in e-business for enterprises. The quality of database design has a great influence on the function and efficiency of the whole system. How to establish a good database structure and organization form so that users can find the required data quickly and accurately is one of the main indicators of the growth of e-business teaching experiment simulation system. When designing a Web database, we should fully consider the consistency and integrity of data, the reliability and robustness of the system, and the hidden elements such as user's convenience. Figure 4 is the curve of the optimal solution of the algorithm.

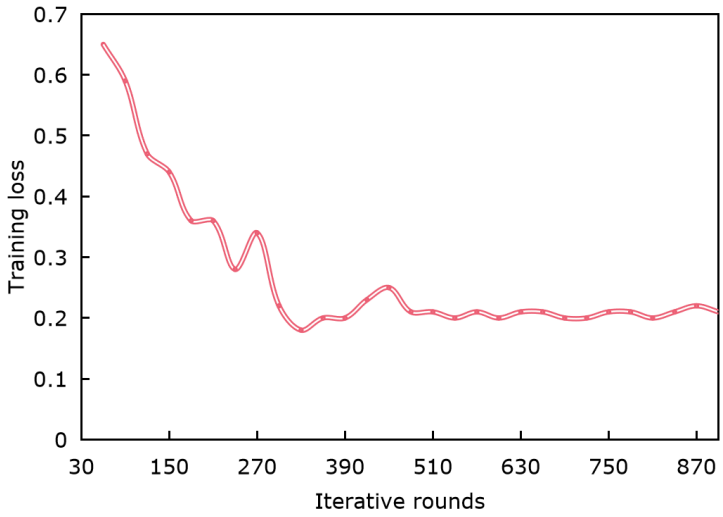

Figure 4: Variation curve of optimal solution.

Figure 4 shows that the whole stage of students' cognitive recognition is smooth and rapid, and it can quickly approach the optimal solution. The main body of e-business teaching simulation system is educators and learners, and the orderly operation of the system is promoted through the operations of teachers making experiments, selecting experimental students, supervising experiments and scoring comments. Students also enter the system by participating in experiments and complete the operation of the system in actual combat. The working principle of encrypt and decrypt. Each user can set a set of symbols as the private key he knows, and use it to decrypt and sign; At the same time, a set of symbols is set as a public key, which is made public by myself and shared by a group of users for encrypting and verifying signatures.

The user role is played by students logging in with corresponding identities; The automatic role is assumed by the system, which automatically sends information and instructions according to the set rules and parameters; The system administrator role can set the rules, business parameters and business processing flow of the automatic role, and can observe the processing status of the automatic role in the form of information platform. E-business simulation system involves the interests of finance, enterprises, merchants and other aspects, and effective management measures must be taken to ensure its safe operation. The response time of the platform under different learning resource inputs obtained through simulation experiments is shown in Figure 5.

As can be seen from Figure 5, when the quantity of course data input of the platform is less than 300, the response time of resource output of the two platforms is not much different. When the quantity of course data input on the platform is more than 400, with the increase of resource input, the output response time of the reference platform increases slowly, while the output response time of this platform decreases rapidly.

This e-business CAI system adopts the improved decision tree algorithm of data mining to realize the generation of instructional resources for students' cognitive ability, which is used to realize the corresponding instructional resources according to students' cognitive ability. The specific learning process is that when students register and log in, they are asked to fill in their own assessment of cognitive ability. Figure 6 shows the change of Recall index with the nearest neighbor K between this algorithm and other algorithms with reference to time weight factor.

Under different quantity of neighbors, the algorithm recommended in this article is better than traditional algorithm in student cognitive recognition. Most computer users use a technical solution to solve every problem, but we are looking for a program that can solve network security problems. Few people are willing to write network security policies and processes on paper.

However, a well-thought-out security plan will help you decide what needs protection, how much you are willing to invest in protection, and who will be responsible for implementing the protection.

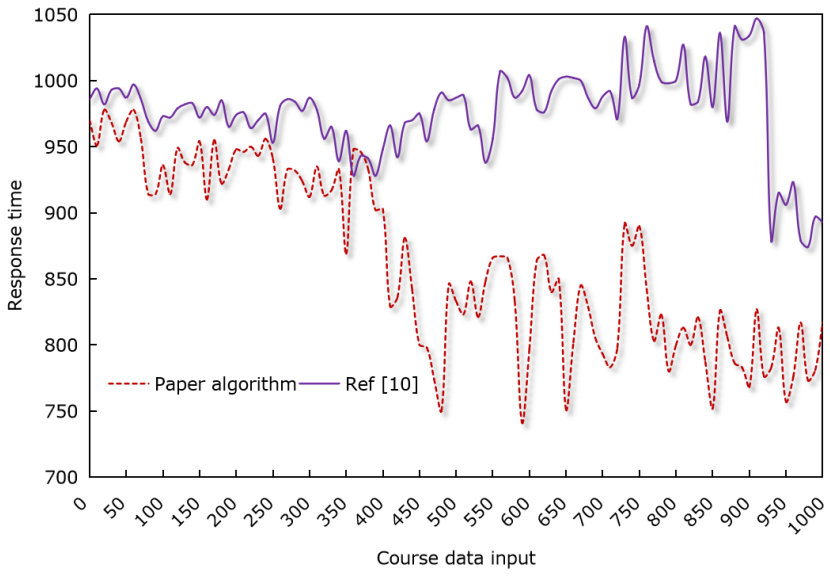

Figure 5: Platform response time.

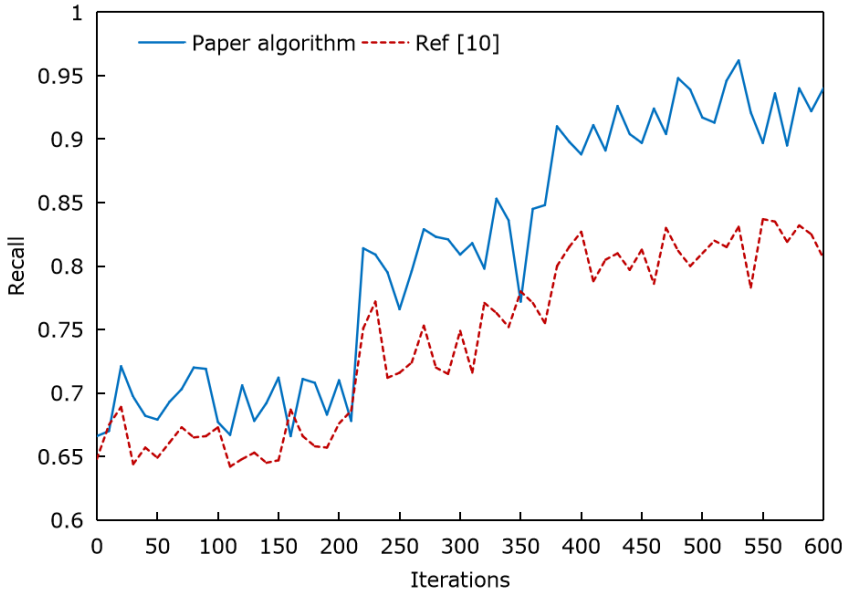

Figure 6: Recall of the algorithm under different quantity of neighboring users.

E-business simulation experiment system is designed to cooperate with the teaching of e-business in universities. This system simulates several indispensable roles in the e-business process, and each role independently completes the business process by using the e-business model to form a business cycle together. Figure 7 shows the subjective assessment results of educators and learners on the traditional teaching simulation system method and the improved system.

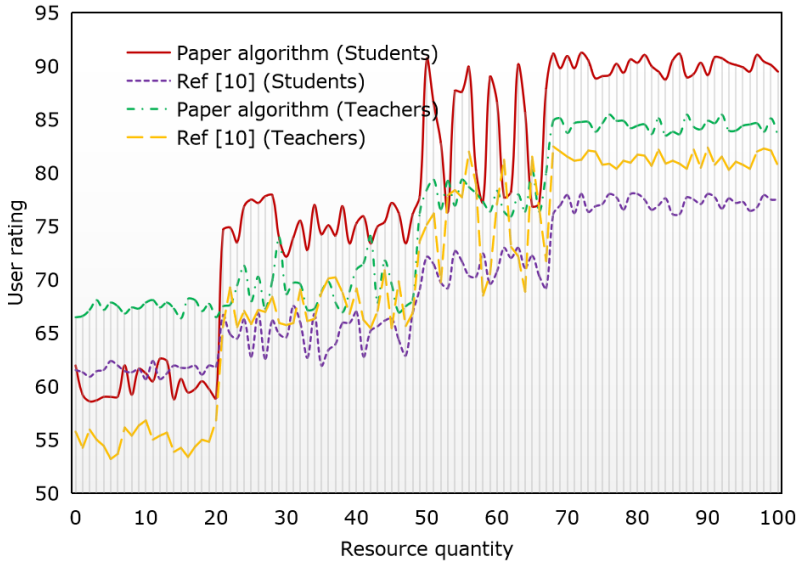

Figure 7: Students' subjective score.

Most educators and learners said that the improved CAI system can help them locate the information they need accurately, thus providing more targeted course content. According to the assessment, we choose instructional resources that conform to students' own cognitive characteristics, and test students in the stage of teaching to assess their cognitive abilities and comprehensive cognitive abilities, and further adjust instructional resources according to the assessment results. In this way, the teaching strategy based on students' cognitive ability is closer to perfection. The more intelligent this instructional system is, the better it will be. The closer to students' cognitive characteristics, the better the learning effect. With the continuous growth of e-business teaching, more and more schools and training bases offer e-business courses, and the requirements are getting higher and higher. This system will certainly promote the growth of e-business teaching and lead e-business teaching into a brand-new era.

5 CONCLUSIONS

E-business simulation experiment system is designed to cooperate with the teaching of e-business in universities. By analyzing the student model, especially the cognitive student model, this article designs a student cognitive model of e-business CAI system, including student model base and student personality inference machine based on fuzzy comprehensive assessment, and implements the model in e-business CAI simulation system. The results show that the students' cognitive recognition effect obtained by the algorithm recommended in this article is better than the traditional algorithm under different quantity of neighbors. The simulation experiment runs in a unified standardized environment. The main body of e-business teaching simulation system is educators and learners, and the orderly operation of the system is promoted through the operations of teachers making experiments, selecting experimental students, supervising experiments and scoring comments. Students also enter the system by participating in experiments and complete the operation of the system in actual combat. Taking an enterprise or a sales company as the simulation core entity, the smooth transmission and integration of e-business data can be realized, and the immediacy and accuracy of management and trade can be achieved, so that students who enter the laboratory for training can learn to deal with various possible problems in practical work by using the data collected by teachers from the actual operation of enterprises and comprehensively using computer information processing technology,

and form an all-round e-business business philosophy. At present, the system only emphasizes a simulation demonstration of the whole stage of e-business transaction. In the future, the system can encrypt the transaction information through encryption algorithm to ensure the integrity of information transmission.

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