



## Effect Evaluation Model of Computer Aided Physical Education Teaching and Training Based on Artificial Intelligence

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**Abstract.** Computer aided instruction also has a certain degree of blocking. The use of CAI makes students learn passively, without targeted education and guidance. The knowledge content is mainly presented by means of optical disks and other carriers. The process is somewhat mechanized, and the students are not completely active in learning. In addition, students lack the supervision of teachers, and may also have some inertia. If students have problems, they cannot get answers in time. In teaching, teachers can better understand all aspects of students and their habits, personalities and learning methods. The use of computer - assisted instruction may only be able to achieve the exquisite courseware. The form is single, and the teaching cannot be changed according to the students' emotional fluctuations. These problems will also be the place where we need to continue to develop in computer assisted instruction. Combined with the network environment, the computer aided instruction system developed to study the characteristics and process of students' learning thinking, seek the mode of learning knowledge, enable students to obtain individualized adaptive learning methods, truly teach according to people, so that students can learn faster and more effectively, and create a learning environment suitable for individual characteristics for students. At the same time, solve the problem that the existing education software is not highly targeted, improve the "intelligent" level of the computer aided instruction system, and combine the learning menu according to the students' knowledge base, ability base and learning history, provide appropriate learning methods and training strategies to help students learn.

**Keywords:** Artificial Intelligence; Computer Aided System; Physical Education.

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### 1 INTRODUCTION

At present, the experimental assistant teaching system lacks openness, human-computer interaction ability. The intelligent experiment aided teaching system uses the information of

"Internet+" and combines the expert system of artificial intelligence with the decision support system (DSS), which makes the decision support system unable to express the limitations of the complex decision-making process [1]. The combination of the two can organically combine qualitative and quantitative analysis, which can make the experimental mathematics aided system more intelligent [2]. However, the artificial intelligence "knowledge base" has a "bottleneck" problem. Although the expert system can effectively solve practical problems, it is difficult to express knowledge, systematize knowledge and express logical thinking, which greatly restricts knowledge acquisition [3]. Therefore, it is necessary to further study how to solve this problem and make the auxiliary system more intelligent [4]. There are more theoretical research and technology development teaching in China, but less research on practical application [5]. The research on adaptive learning support of intelligent experiment assistant teaching system is not deep enough; There are few researches of real intelligent teaching environment in China, which need us to improve in the future research.

Guan et al. [6] analyzed the AI innovation in education in the past. Computer adaptive testing (CAT) has been widely used in the following years. With the emergence of online teaching platform systems, the Internet has broken through the time and geographical restrictions. Huan and Zhen [7] analysis is a kind of artificial intelligence fuzzy system for improving physical education teaching methods. Jaliaawala et al. [8] transmit the teaching content to individuals or groups scattered in different regions at a certain distance in order to solve the problem of loneliness. NTU distance education is a famous tutorial education institution, which realizes "distance education", "online training" and "online learning". Kuleto et al. [9] explores the opportunities, challenges and sustainability of AI and machine learning in higher education institutions.

Li et al. [10] uses machine vision methods to perform review intelligence scoring for pathological image analysis. Automatically generate test papers, especially for subjective questions based on difficulty; In terms of evaluation, you can view scores, analyze students' operational errors, give correct answers, sort all scores, and submit and review homework. Maksymchuk et al. [11] believes that in addition to the automatic scoring of the system, teachers can also manually score students' evaluations on the Internet according to the actual situation, and finally automatically upload and store the results in the database. Artificial intelligence training in medical education needs to update the database and online questions at any time. Teachers can supplement and modify the question bank according to teaching tasks and requirements, and provide online question settings for the evaluation of non-professional knowledge to meet the needs of different teachers. Intelligent monitoring: teachers can monitor each student's experiment, find problems and communicate through screen dialogue, such as monitoring students who violate discipline and miss exams.

Intelligent attendance: evaluate students' attendance. In terms of application, the combination of "Internet+" artificial intelligence is adopted. AI is mainly expert system and decision support. The "knowledge base" is the application center of knowledge points in the whole project. The main task of knowledge extraction is to build the relationship between the knowledge map and the nodes generating the map. The project will focus on selecting simple, effective and scalable methods. In addition, it is important to attach appropriate weights to the nodes and edges of the knowledge graph of the upper application. The design of inference engine is also one of the difficulties of this subject. Finding a practical and effective reasoning algorithm is the key to solving the problem. The accuracy of uncertainty reasoning can be improved by using weighted uncertainty reasoning, using weighted factors to represent the relative importance of evidence, and modifying the confidence value of knowledge in real time according to the reliability of evidence.

First, determine the score evaluation module, homework module, etc., and then design the environmental scheme. The structure is here. Multi-tier B/S structure is very superior at present, with advanced Internet construction technology. It is particularly suitable for building Internet application systems. It is the first choice for performance, scalability, and cost. The last is the network design scheme. The system program is installed on the designated server. Users can

access the WEB server on the client to complete their own work. Remote users can access the WEB server through the Internet to complete all required operations. Database design. Developing databases is very important. DB2 can be used because it applies to all platforms. Although the price is the highest, it has scalability, parallelism and security. At the same time, the connection between various information systems can be realized in the later stage.

## **2 RELATED CONCEPTS AND THEORETICAL BASIS**

### **2.1 Artificial Intelligence**

Artificial intelligence includes informatics, which is a very comprehensive discipline. It has a wide range of uses and can simulate the behavior of experts with computers. As AI is closely related to all aspects of engineering design, different theoretical analysis is required when developing new products. Explore the development mode of science through a simple theoretical basis of human brain thinking. Numerous research results show that it is correct to regard AI as a multi developer research in the development of computers. This technology solves many problems about reasoning, logic, mathematics, algorithms and biology. Therefore, it is not only a simple development in the human brain. At the same time, it provides a certain reference value in solving science and technology.

### **2.2 Computer Aided Instruction (CAI)**

The meaning of CAI is to use computers to replace some teaching tasks, provide students with a personal learning space, and use multimedia and other computer technologies to enrich teaching methods, thus efficiency and the use of CAI can increase the number of students' exercises, consolidate after class, have flexible and free dialogue and consultation with computers, simulate the experimental process, and other teaching modes. It greatly enriches the classroom content and completes many contents that cannot be completed. CAI is mainly conducted in the form of courseware. Students can learn according to their own conditions, so that teaching can better adapt to each student's learning situation. Computer aided instruction has occupied a very important position in education, widely used in school teaching, and has had good results. Computer aided instruction (CAI) has developed rapidly in China. Forty years ago, many colleges and universities listed this teaching model as one of the key research topics.

### **2.3 Artificial Intelligence and Computer Assisted Instruction System**

The combination for system, namely intelligent computer assisted instruction system, allows students to choose their own learning content with the help of intelligent computers, which makes students' learning more targeted and autonomous, and enables students to have higher learning efficiency. This requires computer teaching to have teachers' rich experience and professional knowledge, and to build a teaching oriented expert system. By introducing CAI system into the idea of artificial intelligence, all knowledge can be recorded in a unified knowledge base, which can be used as the construction environment of intelligent CAI system, and students' learning needs can be inferred, and students can interact freely to automatically form corresponding teaching methods.

Intelligent computer aided instruction needs the following characteristics:

- ⊖ Students can automatically generate corresponding exercises.
- ⊖ The teaching can be adjusted according to the students' learning level and progress.
- ⊗ It can automatically generate corresponding answers to questions.
- ④ Have certain natural language ability and understanding ability, and can interact freely with students.
- ⑤ Can explain the student's consultation.

- ⑥ Be able to judge whether the students have errors, analyze the causes and give correction methods.
- ⑦ Have the ability to evaluate and evaluate students' learning.
- ⑧ Be able to evaluate teachers' teaching.

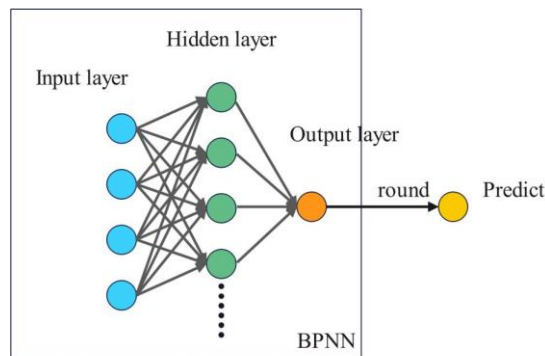
## 2.4 Auxiliary Sports Training

Many domestic scholars have sports assisted training based on Kinect motion capture technology. Including Ansai waist drum, golf, dance, badminton and other projects. Kinect is applied to golf swing training, and the urgent animation is reproduced by repairing the occluded bone point information data processing; By studying the flashing color of LED bars around the basket to analyze the quality of basketball into the frame, an entertaining basketball assistant training system was developed; Collect the standard movements of professional dance coaches, as a template for the comparison of the movements of trainers, and design a dance assisted training system under Kinect; By comparing the teaching mode with the traditional mode, the module of action collection and action evaluation is established, and the yoga auxiliary training system under Kinect is obtained; In the literature, the method of analyzing badminton action by depth map was used, and the mapping relationship between experts and learners was matched by dynamic time planning algorithm.

## 3 RELATED TECHNOLOGIES

### 3.1 Back Propagation Neural Network

BPNN will be listed in Figure 1.



**Figure 1:** BPNN network structure.

The training process of BPNN will be in the ones:

Step1: Such variables  $X=(X_1, X_2, \dots, X_n)$  and output variables  $Y=(Y_1, Y_2, \dots, Y_m)$  of BPNN layers of output nodes of BPNN, which are represented by  $n$ ,  $l$ , and  $m$ , respectively.

Step 2: This is the sample;

$$H_j = f\left(\sum_n^{i=1} w_{ij} x_i - a_j\right), j = 1, 2, \dots, l \quad (1)$$

In formula (1), weight value corresponding to the lock between the one is here:

$$f(x) = 1 / (1 + e^{-x}) \tag{2}$$

Step3: Calculate output layer output. Such BPNN and the connection weight  $w_{jk}$  of neurons to calculate the predictive value  $O$  of BPNN;

$$O_k = f\left(\sum_l H_j w_{jk} - b_j\right), k = 1, 2, \dots, m \tag{3}$$

Step 4: there is the one;

$$e = Y_k - O_k, k = 1, 2, \dots, m \tag{4}$$

Step 5: Update the weight value;

$$w_{ij} = w_{ij} + \eta H_j (1 - H_j) x(i) \sum_{k=1}^m w_{jk} e_k, i = 1, 2, \dots, n; j = 1, 2, \dots, l \tag{5}$$

$$w_{jk} = w_{jk} + \eta H_j e_k, j = 1, 2, \dots, l; k = 1, 2, \dots, m \tag{6}$$

Step6: Update threshold;

$$a_j = a_j + \eta H_j (1 - H_j) \sum_{k=1}^m w_{jk} e_k, j = 1, 2, \dots, l \tag{7}$$

Step7: if not, return to Step 2.

### 3.2 Quality Evaluation Model

GoldenSA-BPNN of paper is shown in Figure 2.

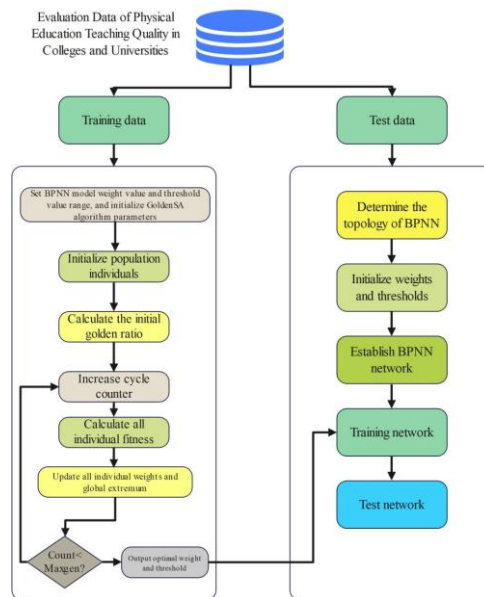


Figure 2: Evaluation flow chart.

In this paper, we first use the weight of the model to analyze the threshold of the system. Through the data collection of the optimized BPNN, the evaluation model of teaching results is established. Carry out model operation test on the obtained weight data set/the results are as follows:

Step 1: divide the training set into different evaluation data, and standardize the data for evaluation. Standardize the model of the optimized dataset.

$$b_k = b_k + e_k, k = 1, 2, \dots, m \quad (8)$$

In Formula (8),

Step 2: The first parameter should be restarted and also the golden cycle iteration times Tmax and BPNN.

Step 3: Set each individual of each population.

$$st \begin{cases} C \in [C_{\max}, C_{\min}] \\ g \in [g_{\max}, g_{\min}] \end{cases} \quad (9)$$

In Formula (9), we can draw the listed ones.

Step 4: Calculate the golden section coefficients x1 and x2 according to equation (10).

$$E(A) = \sum_v \frac{s_{ij} + \dots + s_{mj}}{S} I \quad (10)$$

$$\max ACC(C, g) = \frac{\sum_{k=1}^K acc_k}{K} \quad (11)$$

$$Gain(A) = I(s_1, s_2, \dots, s_m) - E(A) \quad (12)$$

In equation (12),  $t, t+1 \forall V_i$ , respectively,  $i^{\text{th}}$  iteration;

Step 7: If  $ACC_{\text{new}} > ACC_{\text{best}}$  occurs, you need to update the optimal fitness value to obtain the latest fitness value for this iteration, and record the latest position of the individual. Otherwise, keep  $ACC_{\text{best}}$  and do not update.

Step 8: To evaluate the former ones, and otherwise, skip to Step 3~Step 7 to continuously optimize iteration.

Step 9: In line with the ones in the form, and it is necessary to evaluate the quality of college P.E. teaching.

### 3.3 Basic Elements of Algorithm

The earliest work to be completed is to transform the solving problem from the set of all problems to the search space that can be solved by genetic algorithm, that is, coding. On the contrary, its decoding is the process of realizing the transformation from the search space to the solution space. The coding mode has a great influence on the genetic evolution speed of the population. The following is a detailed introduction to the coding methods commonly used nowadays.

(1) Binary encoding

Decoding: If the code of an individual is, the corresponding decoding formula is

$$\begin{cases} x_i = y_i \\ x_j = x_j \oplus y_{j+1} \end{cases} \quad (13)$$

### (2) Real number encoding

The variable of a problem can be directly transformed from the set of all solutions to the search space by using real number coding. Its chromatin shape is as shown in Formula 14:

$$\mathbf{X} = (x_1, x_2, x_3, \dots, x_n), \quad x_i \in \mathbf{R}, \quad i = 1, 2, \dots, n \quad (14)$$

### (3) Gray code coding

Compared with the code corresponding to two uninterruptible integers, only one code point is different, and the other code points are all the same. The conversion formula from binary code to Gray code is:

$$\begin{cases} x_i = y_i \\ x_j = y_j \oplus y_{j+1}, \quad j = i-1, i-2, \dots, 2, 1 \end{cases} \quad (15)$$

## 4 EXPERIMENTAL RESULTS AND ANALYSIS

### 4.1 Algorithm Evaluation

This paper takes part of the P.E. courses of a university in Xi'an in the 2017-2018 academic year as experimental data to complete the arrangement of P.E. courses. Now the population size is set as 100, and the iteration times are 50, 100, 150, 200, 280 respectively. According to the requirements of course scheduling, based on genetic algorithm and chaotic genetic algorithm respectively, test programs are designed according to the algorithm ideas in Chapter 2 and Chapter 3 for testing. The test results are shown in Figure 3.



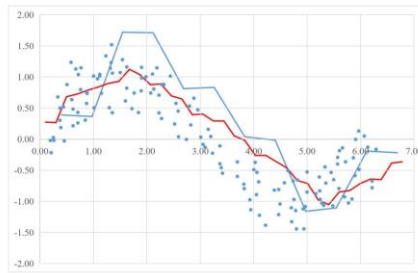
**Figure 3:** Iterations and maximum operation time.

From the aspect of running time, it is found that with the increase of times, let alone the average running speed.

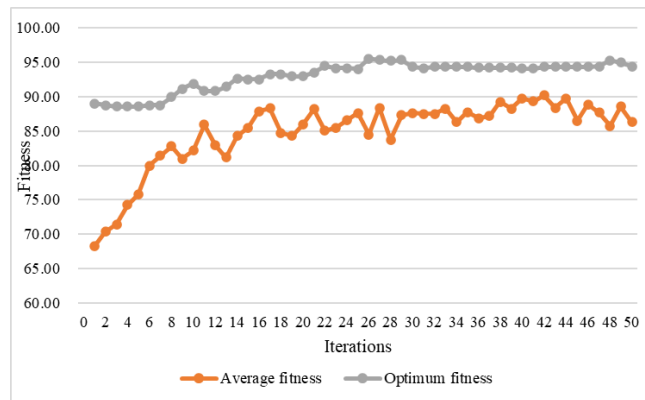
According to the established decision tree type, partial codes of the decision tree results are obtained, as shown in Figure 4.

### 4.2 Evaluation of P.E. Teaching Quality

The BPNN model of it is set. Figure 5 shows the convergence speed comparison. GoldenSA-BPNN has the fastest one and the point will be as equal as 5.

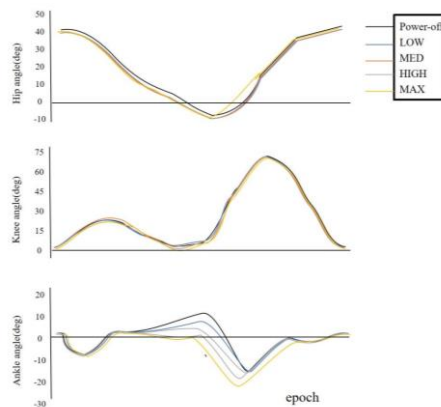


**Figure 4:** Decision results of settlement samples.



**Figure 5:** Comparison of convergence rates of different algorithms.

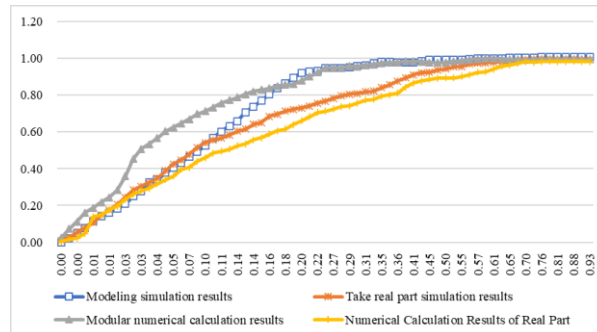
The sensitivity index of teaching quality evaluation is obtained by comparing different test results. The results are as follows.



**Figure 6:** Comparison diagram of different testers doing the same action angle.



Figure 6 shows the comparison of different testers performing the same action angle. The above right elbow joint of two trainers doing the same action. It can be seen that there are differences in time and angle between the two trainers, and there is some deviation in the corresponding curve. Therefore, it is necessary to match the standard sequence with the action sequence, and compare them according to the pre designed threshold to guide the tester's action posture. Therefore, testing the system is an indispensable step and the most important step before the system is put into use. The P.E. curriculum arrangement system is mainly designed to better manage the P.E. curriculum, reduce the working time of the staff and improve their work efficiency. Therefore, this section mainly adopts integration test and unit test for the system. As shown in Figure 7.



**Figure 7:** Comparison of course scheduling performance evaluation.

## 5 CONCLUSION

Different from the previous auxiliary teaching system, it increases the intelligence of software. Through the inference engine of artificial intelligence, knowledge selection, judgment and processing can be carried out, and various problems and exercises can be automatically generated. Use "Internet+" artificial intelligence to realize intelligent classroom teaching management, improve teaching quality, increase students' interest in learning, and make a historic change in teachers' teaching methods. This study proposes an evaluation model by optimizing the BPNN model (GoldenSA – BPNN) of indicators, thus providing a new idea and way for them.

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