Study on the Construction of English ICAI Course Based on BP Neural Network Algorithm

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Abstract. Artificial neural network is also referred to as neural network or connection model, it's a model animal neural network, the mathematical model of distributed and information processing algorithm. Because of its good abstract classification, Has been used in all aspects of life. And in recent years, the traditional English teaching mode in colleges and universities has been gradually replaced by CAI new teaching methods, much progress has been made, Increasing resources to open schools and curricula, effectively promote the sharing of quality teaching resources, it promotes the improvement of students' English listening, speaking, reading, writing and translation. But the general problems of English CAI teaching have gradually emerged, for example, curriculum design does not pay enough attention to individual differences, online teaching lacks interaction between teachers and students, lack of effective supervision and assessment of learning results. At present, the student-centered teaching concept based on the class-flipping classroom and the "online and offline" mixed teaching model is becoming popular, which has had a great impact on the traditional foreign language teaching model. Designing English intelligent computer-assisted teaching (intelligent computer-assisted teaching) can intelligently meet the individual needs of students according to the learning effect, realize the interaction between teachers and students through human-computer interaction, and facilitate the management and evaluation of the teaching process by managers. This is referred to as ICAI. It is an urgent problem in English teaching, especially in the teaching of college English public courses. This paper designs an English ICAI language curriculum system based on BP neural network algorithm and SSH architecture.

Keywords: BP Neural Network Algorithm, ICAI, Mu Class Construction, Research

1. System design and planning
We will focus on three aspects of user needs to carry out overall system planning. ICAI system adopts SSH framework, which is divided into user layer, Web service layer and database server. Its main function is to solve the problem, make the level between each structure clearer, easy to develop and make the system have good expansibility [1]. User layer students, teachers and managers can log on to the system, and different users have different operating rights. The website includes multiple learning
modules, such as listening test, vocabulary learning and so on, which can provide students with navigation and choice, so as to achieve personalized learning. Database server layer includes: knowledge base, word base, user information base and expert system library. In addition, all kinds of data should be analyzed in advance in database design. The data information used in foreign language teaching system includes: user, course, catalogue, knowledge point, key word, publication topic, reply topic, recommended knowledge point, learning record and so on. For example, Table 1 is a user information table. In the process of using the system, the user operation will produce a large number of operation data. In order to improve the efficiency and maintain the data-causality, the database query, modification, update and other operations are implemented in the form of storage process. This allows the administrator to modify the stored procedures of the data as needed without any impact on the source code, increasing the portability of the code. In fact, the people who use MOOC are quite wide, as shown in Table 1.

Table 1. User usage in various fields of online education.

| User usage in various fields of online education |
|-----------------------------------------------|
| College Student Education | Language training | Vocational skills training | Primary and secondary education |
| 10% | 20% | 35% | 40% |

2. Based on the characteristics and functions of ICAI learning model

Based on the ICAI system learning model is a new type of teaching model, which combines traditional classroom teaching, network teaching, autonomous learning, team learning and so on. It has the following typical characteristics:

2.1. Autonomy

Students are no longer the receiver of knowledge, but the master of learning, not only can choose the learning model, learning content, guidance teachers, but also can create learning teams, anytime and anywhere to carry out learning, so the students' interest time, space, emotion, interpersonal relations and other factors are integrated, which can give full play to the students' subjective initiative. By means of Internet, Wi-Fi, computers and mobile devices, students can be independent of organized teaching activities, can choose to study at any time, place, content, personality can be fully developed, can also join teaching activities or teams, and discuss with classmates and teachers on an equal footing [2]. The role of teachers has changed to become developers and service providers of learning resources.
2.2. Process and difference
Based on the system learning mode of ICAI course, the learning and exploration process of different learning contents is analyzed according to the cognitive law, and the emotional experience of students in the learning process is paid special attention to. Based on the ICAI system learning model, we first recognize the individual differences of students, follow the principle of teaching according to their aptitude, carry out stratified teaching and provide a variety of different learning routes or schemes. Students can choose according to their own situation and give play to their own strengths. Cultivate a sense of achievement [3].

2.3. Innovative
Each student is a unique self with distinct personality characteristics. A multi-learning model based on Web focuses on imparting learning methods to students, guiding students to be good at discovering and exploring in their study, cultivating students' ability to learn actively and carrying out positive and innovative ideas.

The teachers in this system can design the learning mode according to the learning content, set up new learning themes, develop learning resources, aggregate all kinds of teaching resources according to the learning themes, and provide them to the students. The system should provide powerful learning resource management and provide learning resource update, retrieval, extension and reorganization functions. Secondly, the system should provide learning team management function, allow teachers to group students, or allow students to set up learning teams spontaneously, giving the corresponding team the operation authority [4]. At the same time, the system also needs to provide learning process management or guidance function, for each student or team to provide a platform for collaboration, communication or discussion, to provide a wealth of interactive means to meet the barrier-free communication between team members. In order to facilitate teachers to guide the learning process, teachers should be given monitoring authority and provide corresponding interfaces or interfaces. The system has a good learning experience, provides learning style selection, content selection, creation of learning plans, knowledge point retrieval, online reading and bookmarking, online notes or summary functions, and provides the dynamic generation function of learning road map and the recording and statistical functions of learning activities. Finally, the system should provide students with online document editing and information release function.

3. BP neural network model
BP network is the most widely used network, which has been successfully used in the fields of image recognition, prediction and prediction, voice transformation, data compression, pattern recognition and automatic control. According to statistics, the neural network using BP algorithm is as high as 80. Therefore, this paper chooses it as the method of face recognition. BP network is a multilayer feedforward neural network composed of input layer, hidden layer and output layer. Figure 1 shows the topology of a typical three-layer BP network. The layer and layer are fully interconnected. There is no mutual connection between the same layer and the hidden layer can have one or more layers. There are two kinds of signals in circulation between layers: one is the working signal (expressed by solid line), which is the signal that propagates forward after applying the input signal until the actual output is produced at the output end, and is a function of input and weight. The other is the error signal (expressed by dashed line) [5]. The difference between the actual output and the expected output of the network is the error, which starts to propagate backward layer by layer from the output end. BP learning process of the network consists of forward calculation process and error back propagation process. In the forward calculation process, the input is calculated from the input layer through the hidden layer layer and transmitted to the output layer. The state of each layer of neurons only affects the state of the lower layer of neurons. If the output layer cannot get the desired output, it is transferred to the error backpropagation process, the error signal is returned along the original connection path, and the weights and reading values of each layer of the network are adjusted step by step until the input layer is reached, and then repeated to the calculation. These two processes are repeated, and the
weights and thresholds of each layer are constantly adjusted to minimize the network error or meet the desired requirements, and the learning process ends. As shown in Figure 1.

![Figure 1. Typical BP network model.](image)

### 4. Intelligent diagnosis of foreign language learning based on BP neural network

For the evaluation of the learning effect of foreign language courses, the traditional evaluation method is to adopt the fixed weight method, that is, each learning index is a fixed weight. However, the linear evaluation system is not scientific in most cases because it does not take into account the individualized factors and the weight of each index. The key of the intelligent learning platform is that it can accurately diagnose the students' mastery of knowledge points and select and push the appropriate learning content for the students. By introducing BP neural network into the evaluation of foreign language learning effect, we can achieve the purpose of output and input nonlinear mapping, find out the reasonable weight of each index, and make the evaluation more accurate. In the evaluation system of learners' foreign language learning effect, we can achieve the purpose of output and input nonlinear mapping, find out the reasonable weight of each index, and make the evaluation more accurate. In the evaluation system of learners' foreign language learning effect, the information related to learning can be divided into static information and dynamic information. Static information includes students' personal basic information, such as name, major, grade, etc. Dynamic information is mainly the information of dynamic changes in the process of learning and testing, including: course progress, difficulty of the course, learning efficiency, accuracy of answering questions, help rate, etc. The above information is collected as the input layer of the BP neural network, the BP neural network is used to diagnose, and the individualized heuristic teaching is carried out according to the output diagnosis results [6].

### 5. System architecture

The learning platform of English ICAI based on BP neural network should be designed with B/S architecture. Compared with the C/S architecture, the English learning platform is simple and easy to use, has good expansibility, low cost and is not limited by location. The following basic principles should be followed in the design:

1. The principle of openness. The platform should be an open platform, not a closed system. It must be open to the whole country like the websites of various fine courses in China, which can be used to assist classroom teaching within schools. It can also be used for inter-school teaching exchange or to provide learning opportunities for all people eager for knowledge and technology in society, so as to achieve the purpose of real sharing of teaching resources.
2. The principle of extensibility. The platform should have good expansibility and be able to easily add and update learning content or courses. It should have a good public extension interface, so that different learning systems can integrate with each other, and each teaching organization should strengthen cooperation and develop learning resources systematically.

According to the above principles, the English ICAI learning platform based on BP neural network should be composed of multiple subsystems. As shown in Figure 2.
Figure 2. The learning platform of English ICAI based on BP neural network has many subsystems. The system configuration subsystem provides the background management of the learning platform for the system administrator. It mainly includes the modules of learning mode configuration, curriculum configuration, file management, etc. It provides the functions of learning mode, course classification, news and announcement information construction, update, delete, search, audit, etc. The user management subsystem includes school management, teacher management, student management, authority management, communication record management and so on. It provides online registration, login password modification, information update, audit, delete, disable, user information retrieval, authority assignment and other functions; learning resource management subsystem provides teachers with background management, including syllabus, experimental outline, training program, learning roadmap, teaching PPT, teaching video cases, exercises, practical training tasks, test questions, various electronic document templates and other management templates, providing all kinds of teaching resources online editing, publishing, uploading, downloading, deleting, updating, auditing. Search and other functions; learning team management subsystem includes team category management, team building management, team member management, team activity management and other modules, provide team category add-delete and query functions, provide team registration, audit and delete functions, provide team members add, audit, exit functions, provide team activities release, update, delete, log records and other functions; interactive subsystem includes various interactive means management subsystems, such as online chat, forum, e-mail, SMS and other management subsystems, provide the corresponding management and control functions; The enhanced learning experience subsystem provides front desk services for students, including learning planning, learning resources, learning activity records, learning notes and other management modules.

6. Conclusion
The development of an English ICAI learning platform based on BP neural network is not
accomplished overnight. Meanwhile, in view of the problem that the traditional English CAI teaching system cannot meet the individualized needs of students, it is necessary to develop an ICAI course system which can determine the students’ learning content according to their own English level and their mastery of knowledge points. This paper analyzes the requirements and overall architecture of the ICAI system. By BP the neural network algorithm, some levels are set up to increase the interest and pertinence of learning, and the system is developed and implemented.

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