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Research Article

Optimization Method of University English Guidance Based on Enhanced Decision Tree Model in the Context of Big Data

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The development of economy has propelled the university's English guidance system to pay attention to students' development which further impacts the development of the country because students are the future of any nation. The college English function is rather complicated, and thus, reunderstanding and positioning of the university's English guidance plays a significant role in the field of education. The existing teaching guidance system puts more emphasis on teaching content and teaching mechanism resulting in lack of application of the knowledge gained. Thus, it is extremely important to clarify and highlight the objectives of college English learning and on the basis of these design personalized curriculum which could convert the skilled talents into compound ones. The present paper explores the evaluation model of the University English Guidance effect based on an enhanced decision tree algorithm. The model has the potential to improve accuracy and efficiency of University English Guidance effect evaluation system and meet the requirements of University English Guidance effect evaluation. The framework constructs a multi-index University English Guidance effect evaluation system constituting of teachers and students as the main entities. It considers the University English Guidance effect evaluation index data as the input sample and implements the least squares support vector machine to realize the University English Guidance effect evaluation. The effectiveness of this model is verified by experiments, which lays a foundation for the optimization of University English Guidance.

1. Introduction

In recent years, China's economy has been developing rapidly, and universities are paying more attention to English education. Improving college students' ability to use English is the fundamental goal of current University English Guidance so as to ensure that students' English level can meet the requirements and work better in their future jobs. Therefore, the university stage is the critical period for college students to learn English well [1]. Universities in China have successively reformed English guidance in various forms and degrees, taking students as the starting point and changing the traditional English guidance mode and philosophy from imparting knowledge to guiding students to learn independently. As far as the current practical development is concerned, it is essential to adopt modular teaching in University English Guidance [2]. Module-based teaching is based on a systematic and holistic view, and special attention should be paid to the organic connection between the factors within the module. Reasonable arrangement of module-based teaching plays an essential role in helping college students to use English proficiently and enhance basic language skills such as listening, speaking, reading, writing, and translating [3]. The framework of University English Guidance significance is shown in Figure 1.

At present, the level of University English Guidance has been greatly improved with the educational reform. Both teachers and students pay more attention to the main subject of English. Many students even think that as long as they pass the English level examination in college, they can complete their English learning goals. With the development of economic globalization, the development space for English is

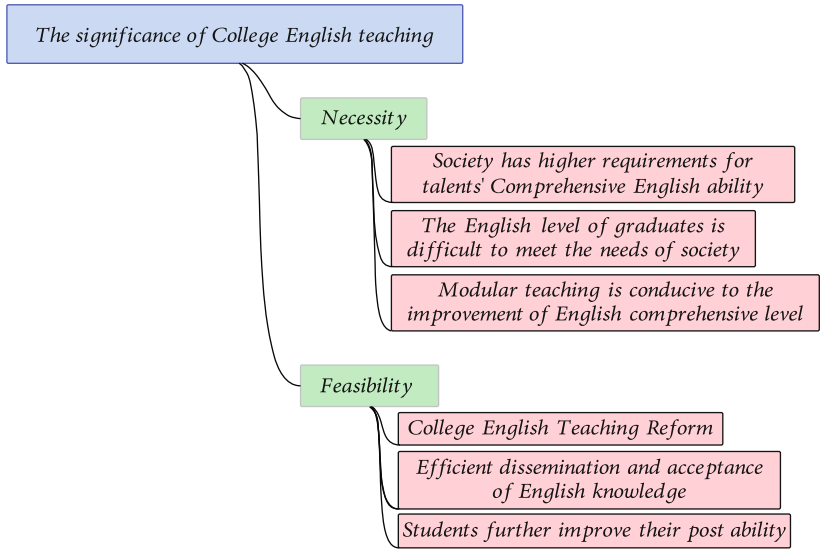

Figure 1: The framework of University English Guidance significance.

also broader [4]. English is widely used in work and life. Colleges and universities are also constantly strengthening students' ability to learn English, and the score of the English grade examination is also related to whether students can obtain a degree. In this way, students can take the initiative to learn English [5]. At present, although the contents of the teaching materials have been updated and improved accordingly, the traditional teaching methods are still used in the actual teaching, which leads to the students' double and half effort in learning English current affairs. Exploring perfect teaching reform measures is an important task in University English Guidance. However, the concept of University English Guidance is relatively backward and has not been updated in time, so it still stays in the past. As the main body of teaching, teachers spend most of their time in class on text explanation and after-school practice [6]. Therefore, students are always passive acceptance and even have no time to think. Even if students have the opportunity to make reasonable arrangements for classroom activities, English teachers should still strictly control the participants, topic content, and time. This shows that the teaching concept followed by English teachers is relatively traditional, but the modern teaching concept is not strong, and there is no real understanding of the characteristics of modern language learning and educational thought [7]. The result will inevitably lead to a serious impact on the effect of University English Guidance, which is inconsistent with the needs of social development.

Middle school English Guidance and University English Guidance should be interconnected and inseparable. A full understanding of middle school English Guidance is very beneficial to University English Guidance. In the process of teaching, we will also find that some English Guidance contents in universities and middle schools are repeated, which makes it difficult for college English education to meet the different needs of society, economy, and culture for talents [8]. Because University English Guidance is not connected with middle school English Guidance, the disconnection is very obvious, resulting in long time-consuming foreign language teaching and no high teaching efficiency. In addition, University English Guidance has not been combined with the actual situation to determine the teaching content, and there is no classified guidance, which is difficult to meet the social demand for talents [9]. Combined with students' basic English and the actual needs for cross-cultural communication, the curriculum should include two courses, namely, English compulsory courses and English elective courses. For colleges and universities, the important measure of the success or failure of university curriculum construction is whether they can cultivate a group of excellent students with solid professional knowledge and proficiency in foreign languages [10]. According to the relevant theories, this paper constructs a multi-index University English Guidance effect evaluation system with teachers and students as the main body and takes the University English Guidance effect evaluation index data as the input sample of the least squares support vector machine to realize the University English Guidance effect evaluation.

Thus, the unique contribution of the paper includes the following:

(i) Exploration of an evaluation model of the University English Guidance effect based on an enhanced decision tree algorithm

(ii) The model has the potential to improve accuracy and efficiency of University English Guidance effect evaluation system and meet the requirements of University English Guidance effect evaluation

(iii) Development of a multi-index University English Guidance effect evaluation system constituting of teachers and students as the main entities

(iv) The University English Guidance effect evaluation index data is used as the input sample and least

squares support vector machine to realize the University English Guidance effect evaluation

(v) The effectiveness of this model is verified by experiments, which enables optimization of University English Guidance

The organization of the paper is as follows. Section 2 discusses the related work, Section 3 presents the design of the application model, Section 4 describes the experimental results, and Section 5 includes the conclusion.

2. Related Work

2.1. Research Status of University English Guidance. Each teaching stage should have a clear goal to guide the subsequent teaching content design. If there is no clear goal at the beginning, the subsequent learning will be scattered and disordered. Today's students have been exposed to English learning since they received an education, but there are differences in why they learn English and what their learning objectives are at each stage [11]. The English learning objectives in the stage of compulsory education mainly include an introduction, familiarity, and examination. Entering the university stage, taking exams is no longer the main goal of English Guidance. It has gradually changed from theoretical learning to practical application, so the goal of teaching should be to cultivate more applied talents [12]. However, from the current University English Guidance, the fuzzy cognition of the concept of teaching objectives is a common problem. Without a goal, it is easier to fall into the misunderstanding of going through the motions. Although all sectors of society are strongly condemning exam-oriented education, at least this stage is highly targeted. University is the last link between school and society. Therefore, we should pay attention to the application and actual needs of students in society and English and formulate teaching objectives in combination with reality. Finally, the teaching results are assessed according to the teaching objectives so that the whole process of learning can be traced [13]. The vague goal of English Guidance and the single teaching content lead to the failure of University English Guidance to play its role effectively. The current situation of University English Guidance is shown in Figure 2.

The biggest difference between the objectives of college education and compulsory education is the role of learning English. There are two main objectives of English learning in the stage of compulsory education: one is to cultivate students' interest in English, and the other is to pass the examination at all stages [14]. However, college English learning is more for its wide application in work and life in the future. According to the different teaching objectives, we should adjust the teaching content appropriately, but at present, the University English Guidance content is still too single, even more, single and boring than the learning method in the compulsory stage. In the stage of college education, except for English majors, other majors generally pay less attention to English Guidance [15]. Without the pressure of examination, English has become a phased task discipline, and students and teachers pay less attention to English learning. Therefore, we can deduce the monotonicity of the current University English Guidance content. At the beginning of college entrance, many students will be tested in different classes, and students with different scores will enter different classes, which is one of the plans for English Guidance [16]. However, after the end of this stage, it did not continue to deepen the teaching content. Different classes have no obvious differences in teaching methods and rhythm except for different teaching materials. In addition to textbook learning, there are almost no other innovative forms of college English. Some teachers will use demonstrations for classroom teaching [17].

The design of the teaching plan is carried out under the guidance of the teaching goal. The unclear goal will inevitably lead to a lack of scientificity in the teaching plan. The goal of University English Guidance is to cultivate practical talents who can use English as a language tool in work and daily life [18]. Therefore, the design of the teaching scheme should be based on specific applications, not limited to the content of textbooks. Modern society is changing rapidly. No matter how fast books are compiled and updated, they cannot fully adapt to the culture. Therefore, in the design of the teaching scheme, we should optimize and improve the teaching situation in combination with the actual situation so that students can feel the charm of English application in daily learning, rather than regard English learning as a phased learning task [19]. English learning in many universities does not run through the whole stage of college education, which is also the lack of teaching scheme design. English Guidance should be carried out continuously during the whole undergraduate stage, graduate stage, and doctoral stage [20]. At different stages, the teaching scheme should be designed according to the needs to make English Guidance run.

2.2. Research Status of University English Guidance Reform. In order to adapt University English Guidance to the needs of the development of the times, we must update ideas and improve teaching methods so as to make the reform of University English Guidance present a new leap. English Guidance reform should take the transformation of teaching ideas as the fundamental starting point and pay attention to the ideological transformation in five aspects [21]. First of all, the guiding ideology of education has changed from examination-oriented education to quality education. Secondly, the teaching content should change from the teaching of language points to the cultivation of students' communicative competence. Third, the status of teachers should be changed from the imparter of knowledge to the instructor and quality monitor of practical ability [22]. Fourth, the classroom teaching mode has changed from teacher-centered to student-centered. Teaching should change from vocabulary, grammar, and sentence level to discourse level. At the same time, in the process of changing teaching ideas and concepts, we should focus on dealing with the relationship between foreign language cultural quality and foreign language examination and the relationship between students' language foundation and comprehensive application

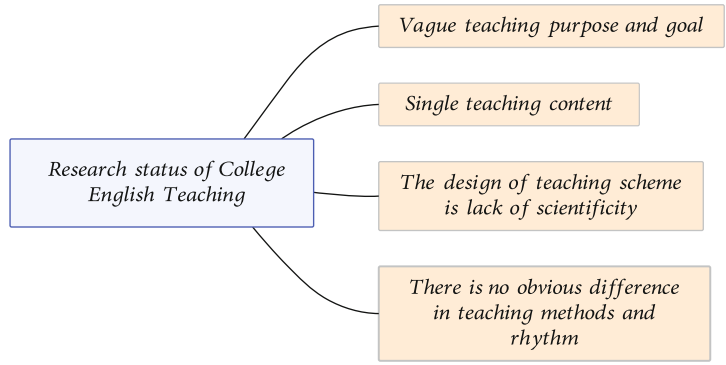

Figure 2: The current situation of University English Guidance.

[23]. Pay attention to making students have not only high cultural literacy but also excellent language application ability and have not only solid basic knowledge but also have strong comprehensive quality. The analysis of the current situation of University English Guidance reform is shown in Figure 3.

Reforming the teaching content and optimizing the curriculum system is the focus of the whole teaching reform. University English Guidance includes imparting language knowledge, training language skills, and developing language communicative competence. Its goal is to cultivate students' ability to communicate in English through English language teaching [24]. And finally, tap the creative potential of students to the greatest extent, and take the curriculum as the supporting system to help complete this teaching content and achieve this teaching goal. The teaching goal of college English requires students to have certain language communicative competence, and the improvement of communicative competence is based on listening and speaking ability. The author believes that listening and speaking classes should be combined with each other and complements each other [25]. The so-called reading process is the process wherein readers seek information and prepare to answer various questions, and answering questions itself is the process of understanding and digesting reading materials. Therefore, the combination of reading and speaking is beneficial for cultivating reading comprehension ability and oral expression ability. Many studies have shown that reading ability is closely related to listening. Therefore, listening training should run through reading teaching from beginning to end. It is helpful for teachers to read in a communicative environment and create a multilingual teaching environment. Reading is the foundation of writing and the source of writing knowledge and skills. Writing a text summary is one of the effective methods of reading and writing [26]. Its advantage is that it provides students with dual training in reading and writing, which can help students improve their understanding of discourse structure, sentence structure, and lexical meaning. In the reform of education and teaching, the reform of teaching methods is an effective way to achieve the purpose of teaching. We should change the traditional teaching mode and change the focus of University English Guidance from the cultivation of language ability to the cultivation of pragmatic ability.

2.3. Research Status of Enhanced Decision Tree Algorithm. The decision tree is an important data mining technology, which is often used in classification prediction, rule extraction, and many other fields. The decision tree adopts a greedy strategy and is constructed from top to bottom by recursion. In 1979, Quinlan proposed the ID3 algorithm, which was further refined and developed in 1983 and 1986. Through his tireless efforts, Quinlan not only made ID3 the classical decision tree algorithm but also made it successfully into the application by starting a company. In 1986, Schlimmer and Fisher proposed the scalable incremental decision tree algorithm ID4 based on ID3 by creating buffers [27]. In 1988, Utgoff proposed the more efficient ID5 algorithm based on ID4. In 1993, Quinlan proposed the C4.5 algorithm, which broke through the limitation that the ID3 algorithm could only handle Boolean function samples. In 1993, Quinlan proposed the C4.5 algorithm, which broke the bound of the ID3 algorithm to take only Boolean function samples [28]. The IBLE method uses the channel capacity as a measure of the target attributes of the samples and is a quantity that does not depend on the proportion of positive and negative examples. Moreover, an important difference between this method and the ID3 algorithm is that a set of relatively important attributes is selected at a time and the rules built according to them are used as nonleaf nodes of the decision tree, which is more efficient.

For the self-optimization of the decision tree, there have been some research results in academia, and some approximate or heuristic algorithms have been proposed. However, these algorithms still have some shortcomings, such as easy falling into local optimization, high time cost, and low accuracy of classification and prediction. Due to the quantum coherence characteristics of quantum computing, it can effectively avoid some heuristic algorithms falling into local optimization, the immune algorithm is easy to realize the distributed storage of data, and the clonal algorithm has a strong adaptive ability [29]. Therefore, the optimization of the decision tree should also be combined with quantum computing, immune algorithm, clonal algorithm, and other related technologies in order to realize complementary advantages. Because decision tree technology requires attribute values to be discrete values, continuous values need to be discretized before use [30]. According to the usual practice, the continuous value is generally discretized into less

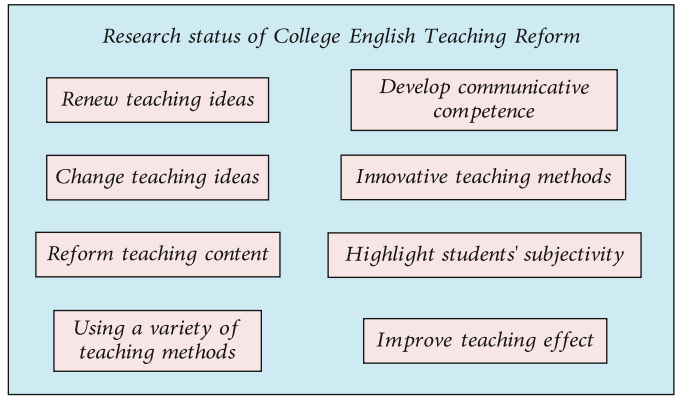

Figure 3: The analysis of the current situation of University English Guidance reform.

than 7 discrete values. The number of discrete values and their specific values directly affects the classification quality and efficiency of the decision tree. Scientific value selection and scientific determination of the number of discrete values is a subject worthy of in-depth research [31]. The IBLE method has the advantages of simplicity of implementation, high correctness of learning, and high consistency of the resulting knowledge with the expert knowledge in terms of representation and content, but the performance is poor in the case of handling small samples. Support vector machines, on the other hand, are particularly suitable for dealing with small samples, and better performance can be expected by combining them. Although various studies have been conducted on improving the teaching-learning process of English, minimal emphasis has been given to evaluate the English guidance effect considering the role of teachers and also the impacts on students. The present study thus focuses on multi-index University English Guidance effect evaluation system constituting of teachers and students as the main entities.

3. Design of Application Model

3.1. Evaluation System. In addition to the optimization of teaching ideas, teaching objectives, and curriculum design, the whole process of feedback is also very important, among which the teaching evaluation method is one of the most important feedback methods. In view of this situation, we must optimize the teaching evaluation method, so as to improve the whole process and truly optimize University English Guidance. In addition to the inconsistency of objective needs, the difference in students' subjective needs also has a great impact on curriculum design. Students are the users of English and cannot be completely divorced from their subjective needs for curriculum design. If the overall progress of students is ahead of expectations in the learning process, it can also appropriately increase the difficulty of learning rather than continue to advance on the original plan. Evaluation in the learning process can not only optimize the teaching content itself but also timely adjust teachers' teaching style and teaching rhythm. Therefore, only by paying full attention to evaluation and adjusting accordingly can we give birth to students' subjective initiative.

The scientific analysis of post evaluation is an important step to optimize teaching. After the collection of feedback content is completed, it is necessary to conduct a scientific and effective analysis, finally, output important views, and carry out corresponding reform, which is a completed process. At present, the reason why it is difficult to carry out large-scale reform in University English Guidance lies in the failure of the feedback system. Because the feedback system does not produce information difference in time, both sides have not obtained their own satisfactory teaching results. There are many theories about the evaluation system of the University English Guidance effect. According to relevant theories, build a multi-index system with teachers and students as the main body. The evaluation index system of the University English Guidance effect is shown in Figure 4.

In Figure 4, the evaluation index system of University English Guidance effectiveness includes English Guidance evaluation indexes from students and English teachers' teaching evaluation indexes. Among them, teachers' responsibility and English grades are important evaluation indexes of University English Guidance effectiveness. The data of University English Guidance effectiveness evaluation indexes are used as the input samples of the least squares support vector machine to realize the evaluation of University English Guidance effectiveness. Once again, three transformation tasks of University English Guidance are summarized to further guide the reform and development of University English Guidance. The first is that the design of teaching programs should be shifted from singularity to diversity. Currently, English learning in universities is not divided into diverse talent training programs based on different classifications. The regression function for least squares support vector machine is a popular approach which is implemented in various domains and verticals. The use of support vector machine often has its associated challenges pertinent to time and space consumption. The use of least square support vector machine for regression helps to overcome such shortcomings [32]. The regression function for least squares support vector machine evaluation in a high-

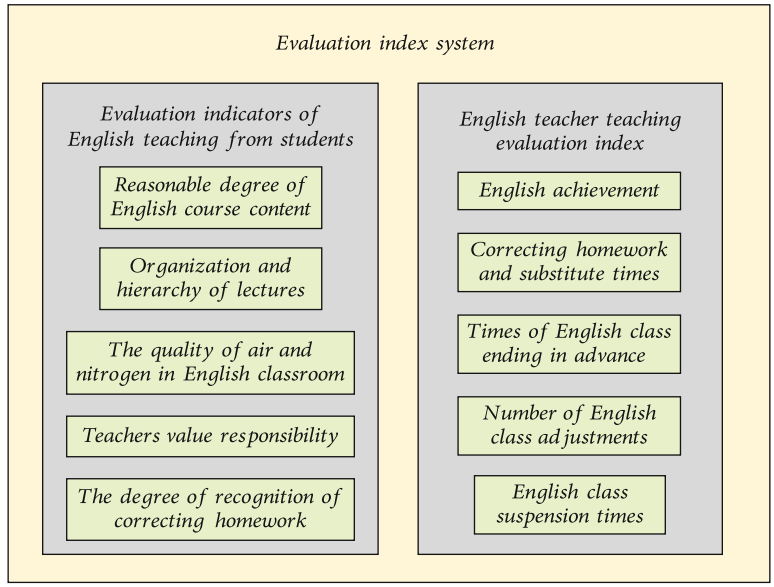

Figure 4: The evaluation index system of the University English Guidance effect.

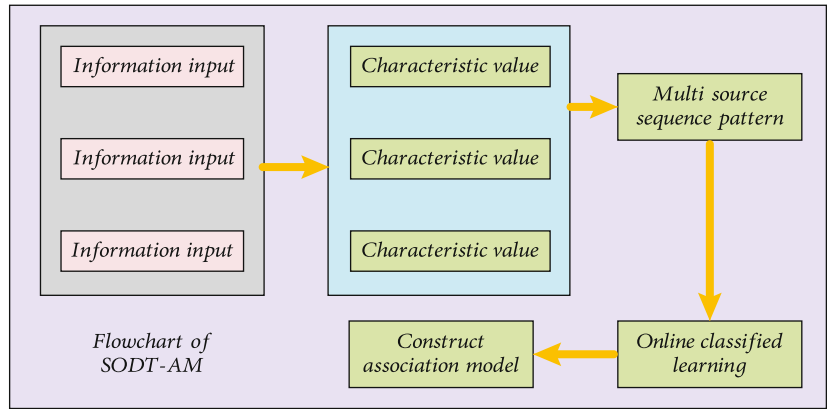

Figure 5: The SODT-AM flow chart.

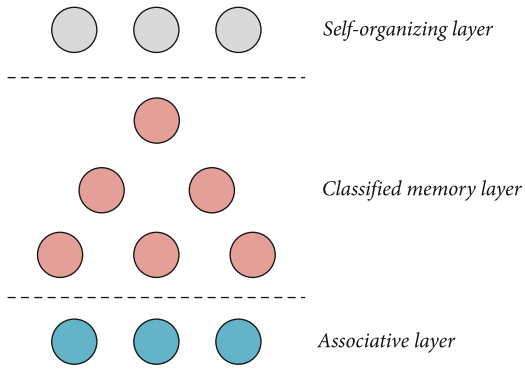

Figure 6: The online learning steps of SODT-AM.

dimensional feature space is as follows [32, 33].

$$f(x) = \omega^{\mathrm{T}}\varphi(x) + b. \tag{1}$$

The optimization objective function of the least squares support vector machine is as follows.

$$\min = \frac{1}{2}\|\omega\|^2 + \frac{1}{2}c\sum_{i=1}^{l} e_i^2. \tag{2}$$

The constraints are as follows.

$$\text{s.t.}\omega^{\mathrm{T}}\varphi(x_i) + b + e_i = y_i, i = 1, 2, \cdots, l. \tag{3}$$

The Lagrange multiplier is introduced to transform the constrained optimization into an unconstrained optimization problem to achieve the solution of the optimization problem with the following equation.

$$\min J = \frac{1}{2}\|\omega\|^2 + \frac{1}{2}c\sum_{i=1}^{l} e_i^2 - \sum_{i=1}^{l}\lambda_i\left(\omega^{\mathrm{T}}\varphi(x_i) + b + e_i - y_i\right). \tag{4}$$

The kernel function in the original space, the expression

Table 1: Comparison of price accuracy results.

Dataset number	Our method	BP neural networks	SVM
1	96.25%	90.22%	75.52%
2	97.86%	89.66%	76.12%
3	95.68%	88.23%	74.53%
4	97.68%	87.69%	74.78%
5	96.88%	89.66%	73.92%
6	95.66%	90.26%	76.25%
7	96.77%	89.69%	75.31%
8	96.88%	88.69%	75.88%
9	95.23%	90.23%	74.52%
10	96.66%	91.26%	77.61%

of the regression function of the least squares support vector machine is obtained as follows.

$$y = \sum_{i=1}^{l} \lambda_i K(x_i, x_j) + b. \tag{5}$$

The radial basis kernel function commonly used in least squares support vector machines is introduced to replace the inner product operation in high-dimensional feature spaces. The formula is as follows.

$$K(x_i, x_j) = \exp\left(-\frac{\|x - x_i\|^2}{\sigma^2}\right). \tag{6}$$

3.2. Enhanced Decision Tree Algorithm. Different from the traditional associative memory model based on an artificial neural network, this paper proposes an associative memory online learning model based on a self-organizing decision tree. Various studies have implemented self-organizing maps (SOM), associative memory model (AMM), and artificial neural network for hybrid classification of speakers. Text-dependent closed-set speakers, text-independent closed set speakers, and Turkish speakers of TIMIT database were considered for the study [34, 35]. Similarly, associative memory using self-organizing incremental neural network (SOINN) was used in robotic path planning for seamless robotic navigation [36]. The self-organizing decision tree is used for robust classification modeling of noisy data, and the association relationship is modeled between the classification modeling outputs to realize online pattern association learning and obtain high decision efficiency and noise robustness. A kernel bidirectional associative memory model based on BAM is proposed by using the kernel method. The mathematical expression is as follows.

$$\begin{aligned} X &= (x_1, x_2, \cdots, x_m), \\ Y &= (y_1, y_2, \cdots, y_n). \end{aligned} \tag{7}$$

The number of neural nodes in the hidden layer is consistent with the number of memory pattern pairs. Then, the recall rules of KBAM are shown below.

$$Y' = H\frac{\sum_{i=1}^{k} Y_i f(X_i, X)}{\sum_{i=1}^{k} f(X_i, X)}, \tag{8}$$

$$X' = H\frac{\sum_{i=1}^{k} X_i f(Y_i, Y)}{\sum_{i=1}^{k} f(Y_i, Y)}, \tag{9}$$

where H is the vector step function, defined on each component as shown below.

$$H(x_r) = \begin{cases} 1, & x_r < 1, \\ p, & x_r > q, \\ \left\lfloor \frac{p}{q} x_r + 0.5 \right\rfloor, & \text{otherwise.} \end{cases} \tag{10}$$

p is the step function level and q is the step function interval. KBAM can accurately achieve bidirectional association by using kernel function to replace the inner product. However, it uses a network neuron node fully interconnected structure, which may produce dimensional catastrophe when the input vector dimension is high and the amount of data is large, and the computation increases rapidly. For the extension of bidirectional associative memory, this paper proposes a GAM model supporting association between multiple sources of patterns based on self-organizing neural networks. GAM uses a sample pattern algorithm to fuzzify the data, which has the characteristics of strong noise resistance and easy to understand

$$w_i(t) = \begin{cases} w_i(t-1) + \eta(x - w_i(t-1)), & w_i \text{ win}, \\ w_i(t-1), & \text{otherwise.} \end{cases} \tag{11}$$

However, because gam uses node similarity to identify test samples, the model is not stable enough and its applicability is limited. In summary, in order to achieve incremental associative memory with noisy data quickly and efficiently, this paper proposes an online learning model for associative memory with self-organizing decision trees, which is essentially a multilevel reinforcement learning algorithm. The network topology is first formed by self-organized learning for the source dataset using a constrained competition strategy. Then, determine the decision attribute boundaries of each category based on the principle of information gain maximization until the network feature space is completely divided into mutually exclusive decision regions, and assign a node identity to each subdomain. Finally, the association between nodes is modeled based on the directed graph structure to realize the associative relationship modeling between different data. The SODT-AM flow chart is shown in Figure 5.

The online learning steps of SODT-AM are shown in Figure 6, and the model includes a self-organization layer, a classification memory layer, and an association layer. The self-organization layer maps the data to the corresponding

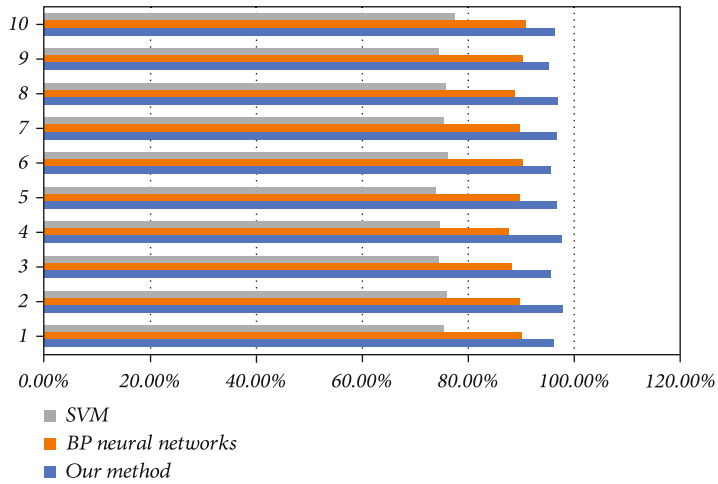

Figure 7: Comparison of price accuracy results.

Table 2: Performance comparison results.

Dataset number	Our method	BP neural networks	SVM
1	93	81	88
2	91	80	86
3	85	72	81
4	87	75	83
5	89	78	85

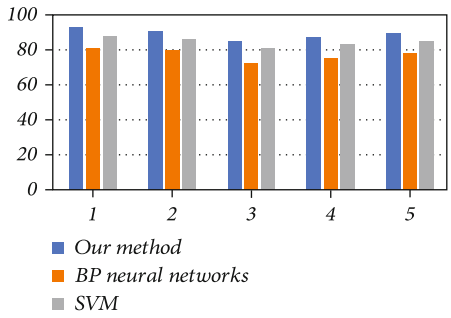

Figure 8: Performance comparison results.

set of feature expressions according to the distribution of different data types. The classification memory layer further divides the set of expressions using information entropy, and each division region corresponds to a node representing the identity. The association layer dynamically establishes a generic sequence association memory mechanism among multiple nodes and finally produces a complete association relationship of multisource schema data.

4. Experiments and Results

This paper selects the English classroom teaching effect of a computer major in a university as the research object, collects sample data according to the evaluation index of University English Guidance effect, obtains the grade value of college English course paper teaching quality through the actual situation of University English Guidance and the evaluation of University English Guidance effect by experts, and obtains 200 data samples tested, which are divided into 10 groups of datasets with 20 data samples in each group. Three methods are used to test the experimental dataset, and the accuracy calculation results of the three methods are obtained, as shown in Table 1 and Figure 7.

As can be seen from Table 1, the average evaluation accuracy of this paper's method is 96.56%, which is 7% and 18.68% higher than the average evaluation accuracy of the BP neural network's teaching quality evaluation model method for colleges and universities and the average evaluation accuracy of SVM teaching evaluation method, respectively. Therefore, the evaluation accuracy of the method in this paper is the highest. In order to further verify the effect of this method, three methods are applied to the college English classroom teaching of the computer major of the university, and the monthly college English test scores of 5 students of the computer major are counted, as shown in Table 2 and Figure 8.

From the results, we can see that the students' monthly college English test scores using this paper's method are more effective than the other two methods. The average student English score of this paper's method is 95, which is 16 and 9 points higher than the average student English score after using BP neural network's college teaching quality evaluation model method and the average student English score after category-weighted gray target decision making's teaching evaluation method. The highest students' English scores after using this paper's method of evaluation show that this university English teacher has the best teaching effect.

5. Conclusion

The complex relationship of quantitative nonlinear functions between University English Guidance effectiveness and each evaluation index leads to subjectivity in obtaining evaluation scores, which affects the objectivity and fairness of evaluation. In order to accurately evaluate the effectiveness of University English Guidance and improve the overall level of University English Guidance, this paper studies the evaluation model of University English Guidance effectiveness

based on an enhanced decision tree algorithm. The experimental results show that this paper's method has the highest evaluation accuracy, short evaluation time, and the best evaluation effect. The method in this paper can improve the English learning performance of college students, which is of great practical significance to the improvement of University English Guidance level.

Due to the limited time and effort, there are still some shortcomings that need further improvement and refinement. The future research directions to continue are as follows. (1) In order to improve the generalization of the study, it is necessary to try to apply better methods to the evaluation index system of University English Guidance in depth in future research towels, so as to make it more complete and scientific. (2) Implement more experimental data tests on the method of this paper, and keep optimizing in the tests. (3) We hope that the in-depth study will apply better methods to University English Guidance to make the evaluation accuracy and efficiency better. We focus more on language and skill development in English education, and this training model has been more advantageous for a long time. But the requirements of the times for talent are not static, so we need to change that.

Data Availability

The datasets used during the current study are available from the corresponding author on reasonable request.

Conflicts of Interest

The author declares that he has no conflict of interest.

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