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Construction of College English Teaching Effect Evaluation Model Based on Artificial Intelligence and Output-Oriented Approach

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In order to improve the accuracy and efficiency of teaching effect evaluation results, this paper proposes a model design method for college English teaching effect evaluation based on output-oriented method in artificial intelligence environment. The standard deviation transformation and range transformation are used to standardize the English teaching data, and the fuzzy similarity matrix is established. The data are preliminarily classified and clustered according to the results of data standardization; Support vector machine is used to classify English teaching data to solve the problem of data imbalance; This paper evaluates the effect of college English teaching based on POA theory, follows the construction principle of evaluation index, constructs the evaluation index system of college English teaching effect, establishes the teaching effect evaluation model based on fuzzy comprehensive evaluation method, and improves the traditional fuzzy evaluation model with the idea of minimum membership weighted average deviation method to obtain the weight of evaluation index, so as to realize the evaluation of college English teaching effect. The experimental results show that the output-oriented method can effectively improve the level of English teaching, and the evaluation efficiency of this method is higher and the evaluation results are more accurate.

Povzetek: Predlagan je model za ocenjevanje učinkovitosti poučevanja angleščine z uporabo metode umetne inteligence.

1 Introduction

In recent years, colleges have explored how to scientifically evaluate teachers' teaching quality in evaluation practice. If products are the life of enterprises, teachers' teaching quality is an important guarantee for the survival and development of colleges [1, 2]. However, due to the fuzziness, diversity and uncertainty of teachers' teaching quality evaluation information, as well as the influence of various factors such as different perception of the importance of various factors in the evaluation problem, different personal preferences and different knowledge structure by each expert, the actual teachers' teaching quality evaluation usually has uncertainty and fuzziness. Technically, some evaluation indexes cannot be expressed by certain values, it is common to express the index value by interval number [3, 4]. However, in the actual decision-making process, the decision-making results often do not reach a certain degree of consensus and are very scattered, resulting in the final evaluation results are not convincing. Therefore, it is of certain practical significance to study a scientific evaluation method of college English teaching effect [5, 6].

Reference [7] designed a university theoretical and experimental teaching quality evaluation model based on RVM machine learning method, improved the kernel function and parameter determination method of RVM, established a new MK - RVM model for university theoretical and experimental teaching quality evaluation by using the MK - RVM model optimized by genetic algorithm, and constructed a result reliability analysis method based on confidence interval. The experimental results show that the confidence of the evaluation results obtained by this method is high, indicating that the evaluation results of teaching quality have high reliability, but this method has the problem of long evaluation time. Reference [8] designed a university teaching quality evaluation model based on data mining algorithm. Firstly, the model studied and analyzed the relevant literature of current university teaching quality evaluation, and established the influencing factors of university teaching quality evaluation; Then, collect the data of influencing factors of college teaching quality, determine the grade of college teaching quality through experts, and establish the learning sample of college teaching quality evaluation; Finally, the BP neural network of data mining technology is introduced to train the learning samples to form the university teaching quality evaluation model, and the advantages of the university teaching quality model are analyzed through specific examples. The experimental results show that the data mining algorithm can describe the differences between the teaching quality grades of colleges and universities and obtain high-precision teaching quality evaluation results, but the evaluation results of this method are subjective and the evaluation error of teaching quality is large. Reference [9] designed an auxiliary teaching quality evaluation model based on

active learning support vector machine, comprehensively considered various actual situations, and constructed the evaluation index system of classroom teaching quality. The active learning support vector machine is used to establish the classroom teaching quality evaluation model, experiment the collected data set related to the teaching quality of a university, and analyze the results. The experimental results show that the model has certain advantages in efficiency and can quickly obtain the evaluation results of teaching quality in colleges and universities, but the evaluation results are subjective and unreliable. Reference [10] proposed a course teaching quality evaluation method based on hidden Markov algorithm. Taking the learning data of MOOC + SPOC of a university learning a professional course as a sample, using hidden Markov algorithm and data mining technology, the evaluation model of students' learning behavior state is established to evaluate students' learning behavior in real time. Teachers adjust the teaching content according to the evaluation results and interfere with students' learning behavior, so as to improve the teaching quality. Empirical analysis shows that this method is effective. The analysis results have certain reference.

Through the above analysis, it can be seen that although the existing methods have improved the teaching evaluation effect to a certain extent and played a certain role in promoting the improvement of teaching quality, due to the large number of teaching data, the diversity of teaching objects and other reasons, there will be some errors in the teaching effect evaluation and do not have high efficiency. In order to improve the accuracy and reliability of college English teaching effect evaluation, with the support of artificial intelligence technology, this paper puts forward a college English teaching effect evaluation model based on output-oriented method in artificial intelligence environment, in order to provide a new and effective way for college teaching quality evaluation.

2 Application of artificial intelligence technology in the evaluation of college English teaching effect

With the development of machine learning [11, 12] and big data, how to use artificial intelligence technology to optimize teaching process and improve teaching evaluation has become a common topic of concern for education authorities, researchers, education technology companies and educators. In recent years, billions of learners carry out formal and informal learning anytime and anywhere on various learning platforms, forming a specific activity track and a large amount of learning data. The application of artificial intelligence technology to analyze the massive learning data in the digital learning environment and provide automatic feedback and evaluation to students has been widely recognized. Therefore, using artificial intelligence technology [13] and big data analysis to improve the efficiency and effectiveness of education evaluation has also attracted more and more attention of researchers. In the above context. In this paper, data mining, support vector machine and other technologies are applied to the evaluation of English teaching effect, and the teaching data are processed scientifically, so as to improve the efficiency and accuracy of teaching effect evaluation.

2.1 English teaching data mining

After years of school running, a school must have a large amount of classroom teaching evaluation data. These data have become a valuable resource for school management and decision-making. Finding valuable information from these data has become a very arduous task. In fact, it is impossible and unnecessary to classify these data accurately in the process of mining. Practical classification is often accompanied by fuzziness, so using fuzzy theory to cluster analysis, and then teaching evaluation, will appear more natural and more in line with the objective facts [14]. The specific steps of data mining using fuzzy theory are as follows:

2.1.1 Data standardization

In the case of collecting a large amount of classroom teaching quality data, establish the overall data records of the teaching evaluation data warehouse, and establish the sample sets S to be classified, $S = \{s_1, s_2, \ldots, s_n\}$, where n represents the number of samples. The quantified attribute data of specific qualitative teaching evaluation indicators are called sample indicators, and there are M indicators. This can be described by an m -dimensional vector, which is represented by a set as $S_i = \{s_{i1}, s_{i2}, \ldots, s_{im}\}$, and the original data matrix is obtained as:

$$S = \begin{bmatrix} s_{11} & s_{12} & \cdots & s_{1n} \\ s_{21} & s_{22} & \cdots & s_{2n} \\ \vdots & \vdots & \cdots & \vdots \\ s_{n1} & s_{n2} & \cdots & s_{nm} \end{bmatrix} \quad (1)$$

Since the collected data is often not the data of [0,1] closed interval, according to the requirements of fuzzy matrix, the data transformation is compressed to the interval [0,1] through standard deviation transformation and range change.

(1) Standard deviation transformation

$$s'_{il} = \sqrt{s_{il} - \overline{s_{il}}} \quad (2)$$

Among them: $i = 1,2,\ldots,n,\ l = 1,2,\ldots,m,\ s_{il}$ represents the standard deviation, $\overline{s_{il}}$ represents the mean value.

The normalized data s'_{il} obtained at this time is not necessarily within the [0,1] interval, therefore, the following transformation is required.

(2) range transformation

$$s_{il}^{''} = \frac{\sqrt{s_{il} - \overline{s_{il}}}}{\max\limits_{1\le i\le n}\left(s_{il}^{'}\right) - \min\limits_{1\le i\le n}\left(s_{il}^{'}\right)} \tag{3}$$

2.1.2 Establish a fuzzy similarity matrix

In teaching data mining, in order to improve the efficiency of data mining, the data will be preliminarily classified according to the results of data standardization [15]. In this process, a statistic h_{ij} is obtained by measuring the similarity between the classified objects. Set up a universe of discourse $W = \{w_1, w_2, \ldots, w_n\}$, where each element is a sample, and establish a fuzzy similarity matrix on W:

$$H_{ij} = \begin{bmatrix} h_{11} & h_{12} & \ldots & h_{1n} \\ h_{21} & h_{22} & \ldots & h_{2n} \\ \vdots & \vdots & \ldots & \vdots \\ h_{n1} & h_{n2} & \ldots & h_{nm} \end{bmatrix} \tag{4}$$

Among them: $0 \le h_{ij} \le 1$, $i = 1,2,\ldots,n$, $j = 1,2,\ldots,n$.

There are many ways to calculate h_{ij}, this paper uses the number product method to calculate it:

$$h_{ij} = \sum_{k=1}^{m} s_{ik} + s_{jk} \tag{5}$$

Among them: s_{ik} and s_{jk} both represent the vector dot product in the high-dimensional feature space, and k represents the selected constant, which satisfies the following conditions:

$$k \ge \min_{i\ne j} \sum_{k=1}^{m} s_{ik} + s_{jk} \tag{6}$$

2.1.3 Cluster analysis

According to formula (4), the standardized data is clustered and analyzed. The commonly used clustering analysis methods mainly include the transitive closure method, the maximum tree method and the netting method. The transitive closure method is relatively easy to implement with a computer. This method generates a clustering graph based on the similarity matrix. The fuzziness of the clustering process is mainly reflected in the similarity matrix, which can be measured by fuzzy information entropy, which is beneficial to improve the efficiency of data mining. Therefore, use the square method to find the transitive closure $H_{ij}(x)$ of the fuzzy similarity matrix H_{ij}:

$$H_{ij}(x) = H_{ij}^{k} - R_{ij}^{k} \tag{7}$$

Among them: H_{ij}^{k} and R_{ij}^{k} both represent fuzzy information entropy. This forms a dynamic clustering diagram of the teaching data, as shown in Figure 1.

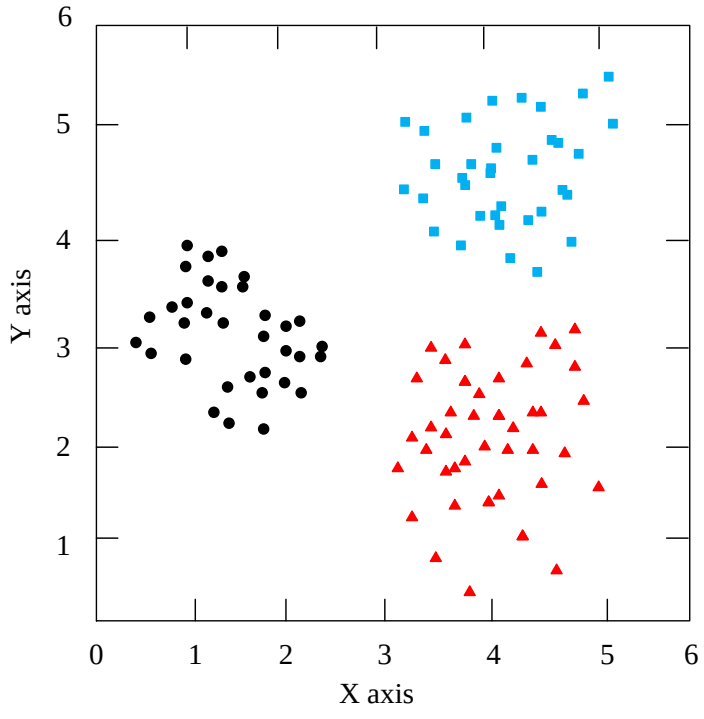

Figure1: Data dynamic clustering diagram

2.2 Classification of English teaching data

Because the teaching process is complex and there are many types of data, data classification processing is carried out on the basis of data mining. Support vector machine has the functions of classification, prediction, clustering, anomaly detection and density estimation. It is a general learning machine. As one of the mainstream technologies of machine learning, the English teaching data classification method constructed according to this technical scheme has good universality, so this method is selected for data classification processing [16].

2.2.1 Support vector machine

Support vector machine belongs to the category of computational learning in artificial intelligence. It is a machine learning technology developed in the mid-1990s. Compared with traditional learning technology, it has a solid theoretical foundation. From a large number of applications, its performance is superior. It has created and maintained the best records on many specific problems such as handwritten numeral recognition and text classification, involving pattern recognition, regression estimation, data mining, information retrieval Intelligent signal processing, intelligent control, nonlinear mode reconstruction and other fields [17, 18].

The theoretical basis of support vector machine is statistical learning theory, which has a strict mathematical basis [19]. The research of this theory began in the late 1960s. In the past 30 years, although a large number of scholars have done pioneering and foundational work, the work in this period is mainly purely theoretical. According to this principle, it cannot fit the known training data well, and the generalization ability is not strong. Therefore, based on the existing support vector machine theory, support vector machine with quadratic penalty term is used to classify English teaching data [20, 21].

Let y_k represent the input vector, E is the feature space, in which, there are a large number of feature vectors $e_k \in E$, ϕ is the feature map, then there is a kernel function $K(y_k)$:

$$K(y_k) = \phi(y_k) \times G_x \tag{8}$$

Among them: G_x represents the inner product in E. Let $\{f_{ab}\}_k$ be the training set, where a and b are the set of indicators for class 1 and 2, respectively, $a \cup b = \{1,2,\ldots,m\}$. The optimization problem associated with support vector machines when e_k is linearly separable is:

$$min\frac{1}{2}\|e\|^2 \tag{9}$$

Among them:

$$\begin{cases} w \cdot e_i + d \geq 1 \\ \forall a \in A \\ w \cdot e_j + d \leq -1 \end{cases} \tag{10}$$

When e_k is nonlinearly separable, a quadratic penalty is used to optimize the support vector machine:

$$min\frac{1}{2}\|e\|^2 - \sum_{k=1}^{m}\eta_k^2 \tag{11}$$

Among them:

$$\begin{cases} w \cdot e_i + d \geq 1 - \eta_k^2 \\ \forall a \in A \\ w \cdot e_j + d \leq -1 + \eta_k^2 \end{cases} \tag{12}$$

Let λ_i be the solution of the above dual problem, if $\lambda_i \neq 0$, call the corresponding y_i a support vector, then the discriminant function is called a support vector machine.

The support vector machine is characterized by training samples and kernel functions. The schematic diagram of the support vector machine is shown in Figure 2.

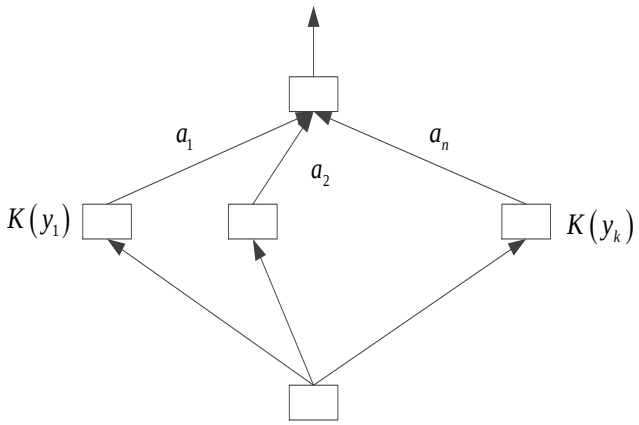

Figure 2: Schematic diagram of the structure of support vector machine

2.2.2 Classification of English teaching data based on support vector machine

According to the above theory, given a sample set (x_i, y_i), a hyperplane $w \cdot \phi(x) + f = 0$ is used to divide two types of samples, and its classification function can be expressed as:

$$f(x) = sgn[w \cdot \phi(x) + f] \tag{13}$$

Among them: $\phi(x)$ maps the sample set to a high-dimensional space to make it linearly separable. The goal of SVM is to determine w and f according to the training samples, so as to maximize the classification interval between the two types of samples [22, 23]. Standard SVM determines w and f by solving the optimization problem in Equation (13):

$$min\, Z\,(w, f) = Z\eta_i + \frac{1}{2}\|f\|^2 + D\frac{1}{2}\left(\sum_{i=1}^{n}\phi_i\right) \tag{14}$$

Among them: In the objective function, $\|f\|^2$ represents the reciprocal of the interval between the two types of samples, D represents the penalty factor, which controls the balance between the empirical error and the classification interval, and η_i represents the training error of the i -th sample. Since equation (14) is a convex quadratic optimization problem [24, 25] it can be transformed into its dual problem to solve:

$$max\, W\,(\varepsilon) = \sum_{i=1}^{n}\varepsilon_i - \frac{1}{2}\sum_{i=1}^{n}\varepsilon_i\varepsilon_j\beta_i\beta_j \tag{15}$$

Among them: ε_i and ε_j represent the finite kernel function; β_i and β_j represent the quadratic objective function.

Solving Equation (15) yields the optimal ε_i, therefore, w is expressed in the form of Equation (16):

$$w = \int_{i=1}^{n}\varepsilon_i\,\beta_i\phi_i \tag{16}$$

Convert the classification function to:

$$f(x) = sgn\sum_{i=1}^{n}\sum_{i=1}^{m}\varepsilon_i\beta_i\phi_i \tag{17}$$

Since it is very difficult to perform dot product operations in high-dimensional space, sometimes it is even impossible, so SVM uses the idea of the kernel function, and uses the kernel function $K(x_i, y_i) = \phi(x_i) \cdot \phi(x_j)$ that satisfies the Mercer condition to replace the high-dimensional space dot product operation. Therefore, the classification function is transformed into is formula (18):

$$f(x) = sgn\sum_{i=1}^{n}\sum_{i=1}^{m}K(x_i, y_i) + f \tag{18}$$

SVM can achieve better classification effect under the condition of balanced distribution of sample set. However, when the sample set is unbalanced, the classification effect of a small number of samples is poor. At present, the processing methods for unbalanced data classification can be roughly divided into three categories. One is oversampling a small number of samples, that is, increasing the number of small samples through replication or interpolation, but this method follows a hypothesis: There are still many classes between multi class samples and few classes near few class samples. This assumption is related to data characteristics and sometimes does not hold. Therefore, this method is highly dependent on data characteristics. The second category is the use of multiple sample pruning methods, that is, the number of samples is reduced. The third kind of method is the algorithm level method, which mainly includes moving the classification hyperplane in the high-dimensional feature space, assigning different penalty coefficients to different categories of samples, and modifying the form of kernel function according to the characteristics of samples. According to the characteristics of many types and large quantities of college English teaching data, this paper selects the third method to further process the classified data in order to solve the problem of data imbalance [26].

3 Model design of college English teaching effect evaluation based on output-oriented method

3.1 Output-oriented approach

Output oriented approach (POA) is an advanced teaching method with strong practical application function. It is a bold attempt to the classroom teaching mode and has achieved good teaching results. POA theory, namely output oriented method, mainly includes three main links: teaching theory, teaching hypothesis and teaching process, which are connected and supported by each other. POA theory emphasizes teaching output, that is, it is necessary to clarify the teaching results you want to obtain before the beginning of teaching activities, organize teaching ideas and assumptions centered on learning, design teaching processes and promote teaching development.

The theoretical system of Poa consists of three parts, among which "teaching concept" is the guiding ideology of the other two parts; "Teaching hypothesis" is the theoretical support of "teaching process"; "Teaching process" is the realization of "teaching concept" and "teaching hypothesis". At the same time, the intermediary role of teachers is reflected in all links of "teaching process".

3.2 Design of evaluation model of college English teaching effect

This paper evaluates the effect of college English teaching based on POA theory, and makes an objective evaluation of the effectiveness of POA. In this paper, the fuzzy comprehensive evaluation method is used to design the evaluation model of college English teaching effect. Unlike the traditional comprehensive evaluation method, this method can be expressed by some simple numerical values, and then use the sum or weighted average method to get a total score and sort the best. Instead, a complete evaluation index system is constructed, and the evaluation index weight is solved for this system. According to the weight calculation results, the evaluation results of college English teaching effect are obtained. According to the characteristics of college English classroom teaching, this paper designs the following evaluation process of college English teaching effect.

3.2.1 Principles of teaching effect evaluation

The establishment of a college English teaching effect evaluation system should follow the following principles:

(1) The principle of scientific orientation: The ultimate goal of conducting classroom teaching quality assessment is to improve teaching quality.

(2) Consistency principle: The evaluation index should be adapted to the current teaching management system of colleges.

(3) Integrity principle: The evaluation indicators should comprehensively and comprehensively reflect the teaching objectives, and provide comprehensive teaching information for teaching management.

(4) Independence principle: each index is independent of each other, neither will it affect the scientific of the evaluation results due to overlapping indicators, nor will it increase the evaluation workload and reduce the feasibility of evaluation due to redundant indicators.

(5) The principle of plasticity: teachers can clearly recognize their own strengths and weaknesses through evaluation indicators and evaluation results, so as to take targeted measures to improve their work.

(6) The principle of operability: The design of indicators adopts a combination of quantitative and qualitative methods. When expressing the teaching effect evaluation indicators, try to be as clear and unambiguous as possible. At the same time, try to be detailed in the design. The connotation of the indicators requires that there be realistic and available materials as a basis, and can be measured objectively, so as to minimize the errors caused by subjectivity.

3.2.2 Evaluation index system

Based on the above principles, the evaluation index system of college English teaching effect is constructed, as shown in Table 1

Table 1: The evaluation index system of college English teaching effect

	First-level indicator	Secondary indicators
The evaluation index of college English teaching effect	S_1 teaching attitude	S_{11} Be serious and responsible, be a teacher
		S_{12} Seriously teach, not perfunctory
		S_{13} Rigorous teaching and self-discipline
	S_2 teaching method	S_{21} Flexibility and variety of teaching methods
		S_{22} Reasonable allocation of class hours and moderate progress
		S_{23} Emphasis and difficulty
		S_{24} Focus on cultivating students' language communicative ability
	S_3 language of instruction	S_{31} pronunciation standard
		S_{32} well organized
		S_{33} language specification
	S_4 Teaching effect	S_{41} Active classroom atmosphere
		S_{42} Students are highly cooperative
		S_{43} Classroom is in good order
		S_{44} After-school review effect
		S_{45} Excellent test scores

3.2.3 Evaluation model design

Fuzzy comprehensive evaluation method is an evaluation method that uses fuzzy mapping and fuzzy linear transformation to make comprehensive decisions. Because college English teaching is a complex process of information exchange between teachers and students, it has the characteristics of multiple factors, ambiguity, effectiveness and dynamics, using the fuzzy comprehensive evaluation method as the basis to establish a teaching effect evaluation model, and using the idea of the minimum membership degree weighted average deviation method to improve the traditional fuzzy evaluation model, the improved multi-layer fuzzy comprehensive evaluation steps are as follows:

(1) Determine the factor set $Z = \{z_1, z_2, \ldots, z_n\}$ of the evaluation object, where $z_i = \{z_{i1}, z_{i2}, \ldots, z_{im}\}$ is the i -th factor in the upper layer determined by the m factors in the lower layer.

(2) Establish an evaluation set $J = \{j_1, j_2, \ldots, j_m\}$.

(3) Establish the single-factor evaluation matrix E_i of the next layer:

$$E_i = \begin{bmatrix} e_{i11} & e_{i12} & \cdots & e_{i1l} \\ e_{i21} & e_{i22} & \cdots & e_{i2l} \\ \vdots & \vdots & \ddots & \vdots \\ e_{in1} & e_{in2} & \cdots & e_{inp} \end{bmatrix} \quad (19)$$

The weight set is obtained according to formula (19):

$$V_i = \{v_{i1}, v_{i2}, \ldots, v_{in}\} \quad (20)$$

Among them: $\sum_{i=1}^{n} v_i = 1$.

(4) Carry out a comprehensive evaluation of the lower level

$$C_i = V_i \times E_i \quad (21)$$

(5) Carry out the fuzzy comprehensive evaluation of the upper layer, and form the upper layer fuzzy matrix according to the comprehensive evaluation results of the sub-targets obtained in step (4):

$$E = \begin{bmatrix} c_1 \\ c_2 \\ \vdots \\ c_m \end{bmatrix} \quad (22)$$

According to formula (22), the weight corresponding to the index of this layer is obtained, and then the comprehensive evaluation result of this layer is obtained.

(6) Calculate the comprehensive evaluation value, and use the double weight method to convert the above comprehensive evaluation results into the corresponding comprehensive evaluation value, thereby obtaining the specific weight of each evaluation index.

3.2.4 Weights of evaluation indicators

According to the above steps, the specific weights of the evaluation indicators of college English teaching effect are calculated, and the results are shown in Table 2.

Table 2: Weights of evaluation indicators of college English teaching effect

	First-level indicator	Secondary indicators
The evaluation index of college English teaching effect	S_1 teaching attitude 0.23	S_{11} Be serious and responsible, be a teacher 0.37
		S_{12} Seriously teach, not perfunctory 0.33
		S_{13} Rigorous teaching and self-discipline 0.30
	S_2 teaching method 0.31	S_{21} Flexibility and variety of teaching methods 0.15
		S_{22} Reasonable allocation of class hours and moderate progress 0.22
		S_{23} Emphasis and difficulty 0.34
		S_{24} Focus on cultivating students' language communicative ability 0.29
	S_3 language of instruction 0.17	S_{31} pronunciation standard 0.34
		S_{32} well organized 0.29
		S_{33} language specification 0.37
	S_4 Teaching effect 0.29	S_{41} Active classroom atmosphere 0.12
		S_{42} Students are highly cooperative 0.19
		S_{43} Classroom is in good order 0.20
		S_{44} After-school review effect 0.21
		S_{45} Excellent test scores 0.28

4 Evaluation effect research

In order to verify the effectiveness of the evaluation model of college English teaching effect based on the output-oriented method in the artificial intelligence environment, the application effect is tested by a combination of qualitative and quantitative methods, and the teaching quality is evaluated and analyzed.

4.1 Scheme design

(1) Research objects

This study took students from two teaching classes (Class A and Class B) of a university in 2018 as the research objects, with 36 students in each class.

(2) research proposal

This study takes one semester as the investigation period, and the investigation object is mainly the teaching class of students. English teaching is a whole and organic system. Therefore, we should regard the distribution of each English achievement of the whole teaching class as a developing complete system, and regard each student's achievement as the result of a random experiment. The specific test methods are as follows: in the process of quantifying the effect index of English teaching, based on two tests, divide the score of an investigation object from high to low into eight grades, and then calculate the proportion of the number of students at each grade in the total number; After a certain stage, continue to analyze the

grade changes of each of the above students, so as to obtain the effect of English teaching.

(3) Research methods

In this study, SPSS 15.0 statistical analysis software was used for data processing of the English scores of students in two classes.

4.2 Analysis of results

Table 3 and Table 4 are the changes in the scores of students in classes A and B before and after the output-oriented English teaching. The traditional method is to divide the grades of students in a class into five grades: excellent, good, medium, pass and fail. Since students' physical education scores are normally distributed, students' scores should be divided into eight grades, namely, excellent, excellent, good, medium, pass, fail, poor, and very poor.

Table 3: Before teaching the output-oriented method

class	excellent	very good	good	medium	pass	fail	poor	very poor
A	2	5	4	15	5	3	2	0
B	1	7	5	10	8	2	3	0

Table 4: After teaching the output-oriented method

class	excellent	very good	good	medium	pass	fail	poor	very poor
A	5	9	7	6	6	2	1	0
B	3	10	8	5	5	4	1	0

It can be seen from the data in Table 3 and Table 4 that after using the output-oriented method, students' English scores have been significantly improved, which is specifically reflected in the increase in the number of high-level students, indicating that the output-oriented method can effectively improve the quality of college English teaching. This is because the output-oriented method takes into account the students' original English foundation and pays attention to the investigation of the students' progress in English learning. It can effectively mobilize the students' enthusiasm in English class and give full play to the students' main role in English learning. According to the above experimental results, it can be concluded that this method can scientifically and objectively evaluate the effect of college English teaching, which is conducive to teachers' teaching feedback and teaching summary, continuously improve the teaching level, give full play to the leading role of teachers in the teaching process, and better improve the teaching quality.

(2) Application effect analysis

In order to further verify the effectiveness of this method, reference [7] method and reference [8] method are used as comparison methods to compare the evaluation effects of different methods from the perspective of evaluation efficiency and evaluation error. The comparison results of evaluation efficiency are shown in Figure 3 and Figure 4.

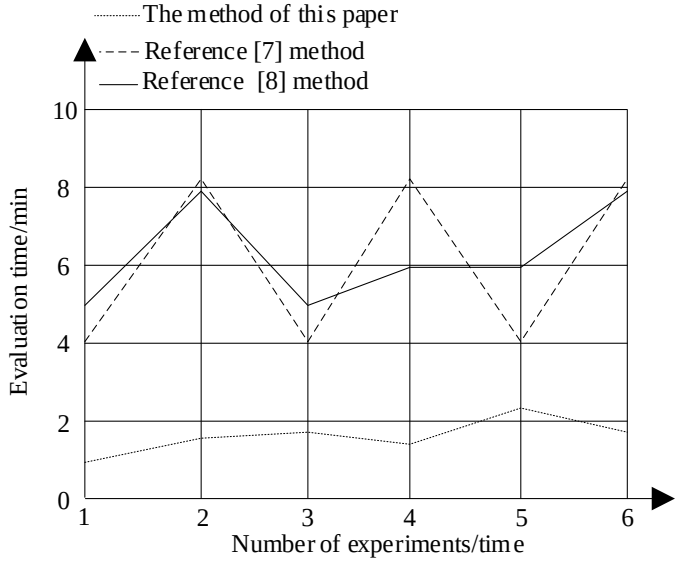

Figure 3: Comparison results of evaluation efficiency of class A

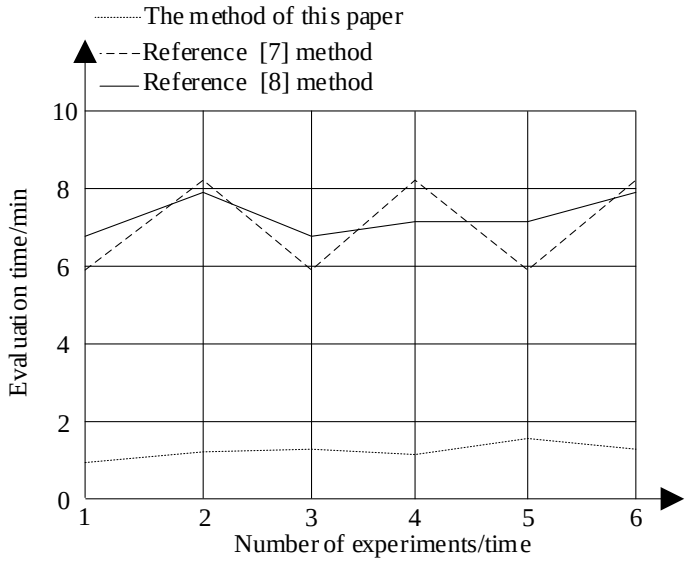

Figure 4: Comparison results of evaluation efficiency of class B

From the data in Figure 3 and Figure 4, it can be seen that during the experiment, the evaluation time required for the evaluation of teaching effect by using the method of reference [7] and reference [8] is higher than 4 minutes, while in the same experimental environment, the evaluation time required for the teaching effect evaluation using the method in this paper is all less than 2.5min. It can be seen that the method in this paper effectively improves the efficiency of teaching effect evaluation, and also improves its application performance in practical work.

Figure 5 and Figure 6 show the comparison results of teaching effect evaluation errors of different methods in class A and class B respectively.

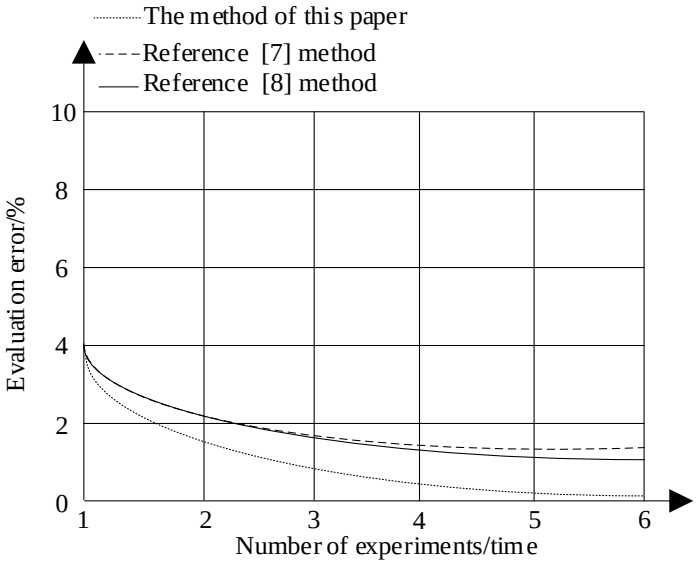

Figure 5: Comparison results of evaluation errors of class A

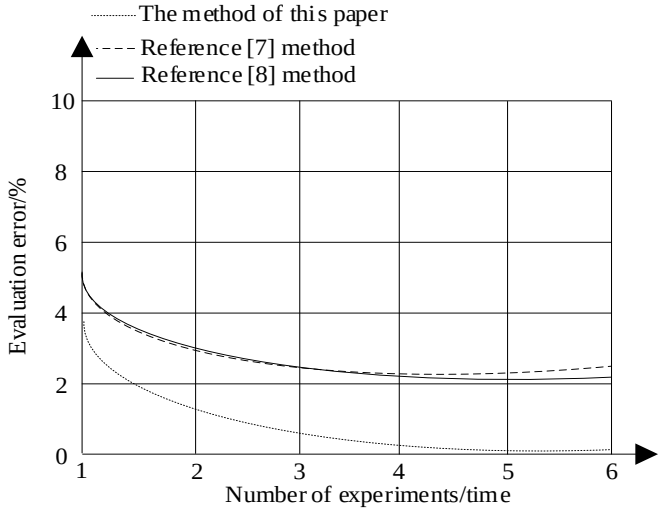

Figure 6: Comparison results of evaluation errors of class B

It can be seen from Figure 5 and Figure 6 that the teaching effect evaluation error gap between the method of reference [7] and the method of reference [8] is small and basically maintained at the same level, while the teaching effect evaluation error of this method is significantly lower than that of the method of reference [7] and the method of reference [8]. It shows that the evaluation result of this method is more reliable and feasible.

5 Conclusion

Under the environment of artificial intelligence, this paper puts forward the design method of college English teaching effect evaluation model based on output-oriented method, establishes a set of index system suitable for college English teaching effect evaluation, and introduces the methods of data standardization and data classification into college English teaching effect evaluation. The experimental results show that this method has the advantages of high evaluation efficiency and more accurate evaluation results. This is because this method fully considers the fuzziness of English teaching information and makes the evaluation results closer to the objective reality. This study not only provides the corresponding basis for the guidelines and decision-making of the education management department, but also provides a direction worthy of thinking and efforts for teachers to improve their teaching level.

Data Availability

The raw data supporting the conclusions of this article wi ll be made available by the authors, without undue reserv ation."

Conflicts of Interest

The authors declared that they have no conflicts of intere st regarding this work."

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Declarations

Not applicable

Refrences

[1] Noben I, Deinum JF, Hofman WHA (2022) Quality of teaching in higher education: reviewing teaching behaviour through classroom observations. *International Journal for Academic Development* 27:31–44. https://doi.org/10.1080/1360144X.2020.1830776

[2] Veza O (2021) Quality of teacher learning implementation plan and its implementation in preparing vocational school students for ready to work. *Technical and Vocational Education International Journal* (TAVEIJ) 1:41–48

[3] Putri NR, Sari FM (2021) Investigating English teaching strategies to reduce online teaching obstacles in the secondary school. *Journal of English Language Teaching and Learning* 2:23–31

[4] Sun Z, Anbarasan M, Praveen Kumar D (2021) Design of online intelligent English teaching platform based on artificial intelligence techniques. *Comput Intell* 37:1166–1180. https://doi.org/10.1111/coin.12351

[5] Rozal E, Ananda R, Zb A, et al (2021) The effect of project-based learning through YouTube presentations on English learning outcomes in physics. AL-Ishlah: *Jurnal Pendidikan* 13:1924–1933. Doi:10.35445/alishlah. v13i3.1241

[6] Zou C, Li P, Jin L (2021) Online college English education in Wuhan against the COVID-19

pandemic: Student and teacher readiness, challenges and implications. *PLoS One* 16: e0258137. https://doi.org/10.1371/journal.pone.0258137

[7] Wei C, Tsai S-B (2022) Evaluation model of college English teaching effect based on particle swarm algorithm and support vector machine. *Math Probl Eng* 2022: https://doi.org/10.1155/2022/7132900

[8] Li Y (2020) Design of university teaching quality evaluation model based on data mining algorithm. *Modern Electronics Technique* 43:119–122

[9] Zhang Y (2019) Assisted teaching quality evaluation model based on active learning support vector machine. *Modern Electronics Technique* 42:112–114

[10] Xiao LP, Tian ZJ, Tian JW (2022) Research on curriculum teaching quality evaluation based on hidden Markov algorithm. *Heilongjiang Higher Education Research* 40:151–155

[11] D'Amour A, Heller K, Moldovan D, et al (2022) Underspecification presents challenges for credibility in modern machine learning. *The Journal of Machine Learning Research* 23:10237–10297. Doi:10.5555/3586589.3586815

[12] Greener JG, Kandathil SM, Moffat L, Jones DT (2022) A guide to machine learning for biologists. *Nat Rev Mol Cell Biol* 23:40–55. https://doi.org/10.1038/s41580-021-00407-0

[13] Lee D, Yoon SN (2021) Application of artificial intelligence-based technologies in the healthcare industry: Opportunities and challenges. *Int J Environ Res Public Health* 18:271. https://doi.org/10.3390/ijerph18010271

[14] Vrontis D, Christofi M, Pereira V, et al (2022) Artificial intelligence, robotics, advanced technologies and human resource management: a systematic review. *The International Journal of Human Resource Management* 33:1237–1266. https://doi.org/10.1080/09585192.2020.1871398

[15] Dogan A, Birant D (2021) Machine learning and data mining in manufacturing. Expert Syst Appl 166:114060. https://doi.org/10.1016/j.eswa.2020.114060

[16] Laoli A, Dakhi O, Zagoto MM (2022) The Application of Lesson Study in Improving the Quality of English Teaching. *Edukatif: Jurnal Ilmu Pendidikan* 4:2238–2246. https://doi.org/10.31004/edukatif.v4i2.2434

[17] Li N (2021) A fuzzy evaluation model of college English teaching quality based on analytic hierarchy process. *International Journal of Emerging Technologies in Learning* (iJET) 16:17–30. https://doi.org/10.3991/ijet.v16i02.19731

[18] Syafiq AN, Rahmawati A, Anwari A, Oktaviana T (2021) Increasing speaking skill through YouTube video as English learning material during online learning in pandemic covid-19. Elsya: *Journal of English Language Studies* 3:50–55. https://doi.org/10.31849/elsya.v3i1.6206

[19] Li M, Zhang Q, Yu Z (2021) Integrating educational games into college English learning. Educ Res Int 2021:1–9. https://doi.org/10.1155/2021/6403034

[20] Kurani A, Doshi P, Vakharia A, Shah M (2023) A comprehensive comparative study of artificial neural network (ANN) and support vector machines (SVM) on stock forecasting. *Annals of Data Science* 10:183–208. https://doi.org/10.1007/s40745-021-00344-x

[21] Zhang D, Perez-Paredes P (2021) Chinese postgraduate EFL learners' self-directed use of mobile English learning resources. *Comput Assist Lang Learn* 34:1128–1153. https://doi.org/10.1080/09588221.2019.1662455

[22] Álvarez-Alvarado JM, Ríos-Moreno JG, Obregón-Biosca SA, et al (2021) Hybrid techniques to predict solar radiation using support vector machine and search optimization algorithms: a review. *Applied Sciences* 11:1044. https://doi.org/10.3390/app11031044

[23] Nurkholis A, Abidin Z, Sulistiani H (2021) Optimasi Parameter Support Vector Machine Berbasis Algoritma Firefly Pada Data Opini Film. *Jurnal RESTI (Rekayasa Sistem Dan Teknologi Informasi)* 5:904–910. https://doi.org/10.29207/resti.v5i5.3380

[24] Liang K, Hao Y, Zhao J (2021) An empirical study on the effect and quality of situational English teaching. *International Journal of Emerging Technologies in Learning* (iJET) 16:74–86. https://doi.org/10.29207/resti.v5i5.3380

[25] Putra RWP (2021) Improving the students' motivation in learning English through Google Meet during the online learning. *English Learning Innovation (englie)* 2:35–42. https://doi.org/10.22219/englie.v2i1.14605

[26] Marasri S, Thongdee V, Homsombat P, et al (2021) CLM English Teaching and Learning Guidelines for Undergraduate Students in Social Studies at Phutthachinnarat Sangha College, MCU. *Online Submission* 5:277–286. https://doi.org/10.21744/lingcure.v5nS3.1606