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Research Article

Evaluating English Language Teaching Quality in Classrooms Using OLAP and SVM Algorithms

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Currently, the existing techniques of evaluating quality of teaching quality colleges and universities within China are based on classical and statistical methods. However, these methods are unable to accurately reflect the real and actual evaluation of teaching quality. Furthermore, in this era of computerization, education has also revamped itself and is not limited to the conventional lecturing approach. Nowadays, English has become one of the most important skills for foreigners as countries move toward internationalization resulting in a huge amount of data being collected in educational databases, which remains unused. Powerful tools are required to improve the quality of English teaching and reap the benefits of big data generated in classrooms. In this paper, online analytical processing (OLAP) in combination with a support vector machine (SVM) classification algorithm is adopted, and then the algorithm constructs the linear optimal decision function in the feature space. Through the training of sample data by the SVM algorithm, relatively high-quality classification results can be obtained on the target object, especially for high-dimensional cases. The proposed approach has an extremely efficient application value. Compared with the existing methods, the error of evaluation results can be greatly improved, which leads to further improvement of accuracy in terms of evaluation results.

1. Introduction

In today's society, universities and colleges have to give close attention to the quality of education in line with the demand for resources of high-quality education as well as the requirements of colleges and universities for their development. Furthermore, to focus on the teaching process, teachers can demonstrate the ability and level they can achieve in the service of colleges and universities and increase the quality of teaching goals and requirements. The openness of external communication is becoming increasingly important as the social economy develops. As a result, learning English has become one of the essential abilities for communication [1]. In comparison to conventional English teaching, current management of English teaching is constantly introducing data mining examination technology for multiscale and multidimensional analysis, elasticity, and English teaching science [2, 3]. However, because numerous factors affect English teaching quality, evaluating English teaching quality with a particular component is difficult and useless; thus, a suitable method for English teaching evaluation is chosen [4, 5]. Because English is now a required course in both compulsory and postsecondary education, improving the quality of English instruction is critical [6].

Although the current database systems can achieve data entry, modification, statistics, query, and other functions, the hidden value of these data has not been fully mined and utilized, information waste is serious. How to reuse these data, transform the existing management data into usable knowledge, and enhance the decision-making of school management are a problem that many colleges and universities are considering. In addition, the computing data management system is composed of user interface and teaching evaluation environment. It collects data such as students' online evaluation, students' online data statistics and management

decision-making. However, there are problems in the construction, use and analysis of evaluation results of the teaching quality evaluation system. There are still some problems in the process, such as the study of evaluation theory, the use of evaluation means, and the update of evaluation methods [7]. While these methods can make sense of the assessment of English teaching quality, there are some shortcomings such as ambiguous comprehensive assessment method of assessment results and actual deviation major issues, analytical ranking process (AHP) thematic factors, and hard work affected by the nervous network. Storage in the reduction of local maximum and slow training speeds and the performance of the SVM is severely affected by the choice of its parameters. A golden Sine algorithm based on the SVM model performance affected by parameter selection was proposed to increase the correctness of English teaching excellence evaluation in colleges and universities [8].

We cannot build an innovative country without higher education. As a base for cultivating high-quality talents, the teaching quality of universities is closely related to the quality of talents and the development of the whole higher education. Therefore, the teaching quality is the foundation of universities, the source of development and the core of higher education. [9]. It has become a new topic for many scholars and experts to explore how to strengthen the construction of teaching quality to improve the quality of talent cultivation and to realize the coordinated and supportable development of the higher education ecosystem. The opportunities for higher education are unique and the challenges unprecedented. Higher education has some characteristics of a market economy, the competition between schools is becoming more and fiercer, and the comprehensive strength is uneven. When examinees and parents choose schools, the first concern is the quality of teaching, which is also one of the inherent attributes of colleges and universities. Therefore, grasp the profound connotation of classroom teaching, strengthen the effective evaluation of teaching quality, and achieve the goal of survival by quality and development by innovation [10–13].

Due to the limitation of time and conditions, the evaluation results of leaders and supervisors may not reflect the most concerned issues of students and society. As a university itself, it must find a way to assess real, objective, and long-term teaching standards with a wide range of diagnostic subjects. College teaching evaluation mainly adopts the combination of students' evaluation of teaching, the evaluation of teachers by teaching supervision group, peer evaluation and teachers' self-evaluation. Students are the direct participants in classroom teaching and the direct beneficiaries of teaching quality. Therefore, students' evaluation is the most objective, supplemented by other evaluation methods, and the evaluation results are more fair. There are many problems in the current teaching quality evaluation system. It is often to sum the evaluation results of the evaluation subject by weight, get a result, and rank according to the result.

To accurately and effectively calculate quality of English class teaching, directing at the restrictions of the existing evaluation, our work intends to use data mining technology to evaluate teaching quality and excavate useful information and knowledge in these data to provide a reference for teaching evaluation.

The following contributions are made as a result of this research.

(i) For the first time, this study employs the OLAP and SVM algorithms to evaluate quality of English classroom teaching

(ii) We establish the evaluation technology by data warehouse technology and OLAP technology

(iii) As compare with other methods, we greatly improved the error of evaluation results, which leads to the further improvement of the accuracy of evaluation results

The rest of this paper is planned as follows: Section 2 explains the multi-index evaluation system of English teaching quality, Section 3 explains our proposed online analytical processing (OLAP) and SVM algorithm for the evaluation of English classroom teaching quality, Section 4 discusses the simulation and experimental analysis of our proposed method, and lastly, Section 5 concludes our work.

2. Multi-Index Evaluation System of English Teaching Quality

In the assessment of English teaching quality, the quality evaluation of English teaching have assessment indicators of English teaching quality to reproduce particular diagnostic elements of dissimilar fields, improved orientation, and supervision for teaching of English. In English education, stress must be located on testing practical English teaching associations, distinctive among imaginary sequences and applied exercise courses, and reflecting both the objectives of course and speech features of the course and the research. Because English is an open elementary liberal arts course, the English teaching quality evaluation method must include course features as well as particular evaluation pointers.

Furthermore, there is an absence of technical and sensible quantification of pointers, as well as a poorly defined idea of evaluation. As a result, it will have an impact on the objective and reasonable assessment of English teaching quality to some extent. The assessment of teachers' English teaching procedure must evaluate the design of English teaching, approaches of English teaching, and attitudes of English teaching, with a focus on the teachers' talent to demonstrate scholars' occupational excellence and production English, which is a unique characteristic of English teaching. Lastly, to improve the cultivation and practice of students' language proficiency, the directory of assessment of teachers guiding pupils to contribute in the competitions of English language talent can be more to the evaluation of the English teaching result.

2.1. Principles of Teaching Quality Evaluation. Teaching is a complicated, diverse exercise that frequently requires us as instructors to juggle multiple tasks and aims at the similar

period and in a flexible manner. Some teaching methods can help us create a real environment that helps students master knowledge, and create operable and well-organized teaching activities.. While putting these principles into action takes time and determination, it frequently protects time and energy in the lengthy run. At present, there are many original principles of teaching quality evaluation. The main principles are explained in Figure 1.

2.1.1. Objective Principle. According to this, an organization's commercial declarations must be based on solid indication. Its aim is to keep management team of an entity and department of accounting from producing commercial declarations that are slanted by their opinions and prejudices. This standard is based on the objective facts, seeking truth from facts and not subjective assumption.

2.1.2. The Unified Principle of Scientific and Feasibility. The Unified Education and Science Strategy will run from 2017 to 2021. Within the following five years, the document's goal is to outline basic state priorities and long-term goals in the fields of education and science development. Seek truth from facts based on objective facts rather than subjective beliefs. The assessment method of college English teaching must be feasible and operable, and the scientific method should stand up to scrutiny.

2.1.3. Highlight the Basic Principles of Teaching Quality Evaluation Subjects. The procedure by which the University evaluates its students' information, sympathetic, and abilities is known as assessment. As a result, Durham's valuation rules and techniques must be a keystone of the university's method to ensuring the educational values of its grants. The valuation also plays an important part in the pupil learning procedure and, as a result, is critical to the quality of the learning chances that the university delivers to its pupils. The object of teaching assessment has the characteristics of subject-object consistency, so we should give consideration to the subjectivity of teaching quality evaluation.

2.1.4. The Evaluation Process Should Be Consistent and Flexible. When students notice a consistent, expected approach from you, consistency is developed. When you adjust your technique in reaction to a situation or a certain student's needs, you are demonstrating flexibility. The evaluation index and evaluation method should carry out the principle of consistency as well as flexibility. Based on the literature [14, 15], this paper constructs a set of multi-index evaluation systems, as shown in Figure 2.

First of all, the content of teaching quality assessment is rigid and has not kept pace with *The Times*. The focus of assessment is on teacher "teaching." Assessment activities are carried out with teachers as the center, highlighting the social function of "preaching and teaching," which is mainly reflected in the attention to teachers' teaching skills, classroom discipline, and the completeness of lesson preparation. Second, there is a lack of diversity in the assessment indicators. The research shows that there are important changes in the evaluation results of dissimilar disciplines. For example, the comparison results show that the evaluation results are

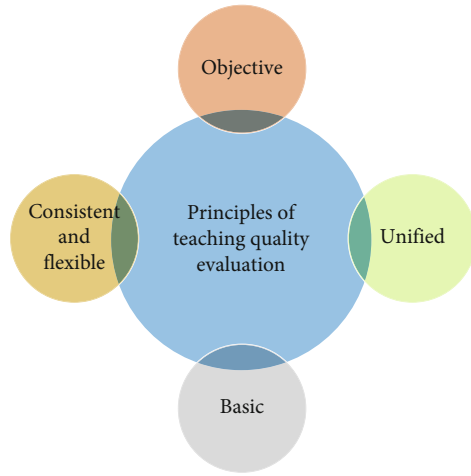


Figure 1: Principles of teaching quality evaluation.

different according to the different disciplines, the different course schedules, and the different course nature. Therefore, factors such as subject attributes and characteristics should be fully considered when designing evaluation indexes. Finally, the evaluation content is not comprehensive enough, and the structure design of the questionnaire is not reasonable. In many colleges and universities, the evaluation indicators are not subdivided; only a few major items and students can only choose predesigned categories for scoring, which lacks relative fairness.

First, students lack awareness of the importance of teaching evaluation. Under normal circumstances, when students make a value judgment, they will first adopt a preconceived attitude; that is, they will make perceptual judgments mainly based on their feelings. Therefore, the evaluation results often depend on students' subjective knowledge and psychological state factors, resulting in the evaluation deviation. Correcting this bias requires the participation of a sufficient number of impartial evaluators. Second, the evaluation of teaching time arrangement is not good. Most of the teaching evaluation activities are arranged at the end of the semester, and the feedback of teaching evaluation information is delayed, which is not helpful to improve the teaching quality of teachers. In addition, some universities have taken compulsory measures to ensure that all students take part in the evaluation, such as choosing courses or checking grades only after they have evaluated their courses first. In this case, some students are not able to objectively evaluate the teacher's teaching. Third, data analysis has limitations. At present, teaching quality evaluation in China adopts manual and automatic methods, namely, supervision evaluation, peer evaluation, self-evaluation, and online systematic teaching evaluation by students. We should make use of modern scientific and technological means to distinguish between qualitative and quantitative treatment, get rid of the inherent concept of "to judge heroes by scores," analyze and evaluate data, and make the evaluation results objective and accurate.

2.2. Functions of Teaching Quality Evaluation. Classroom evaluations can serve a variety of goals, including gathering

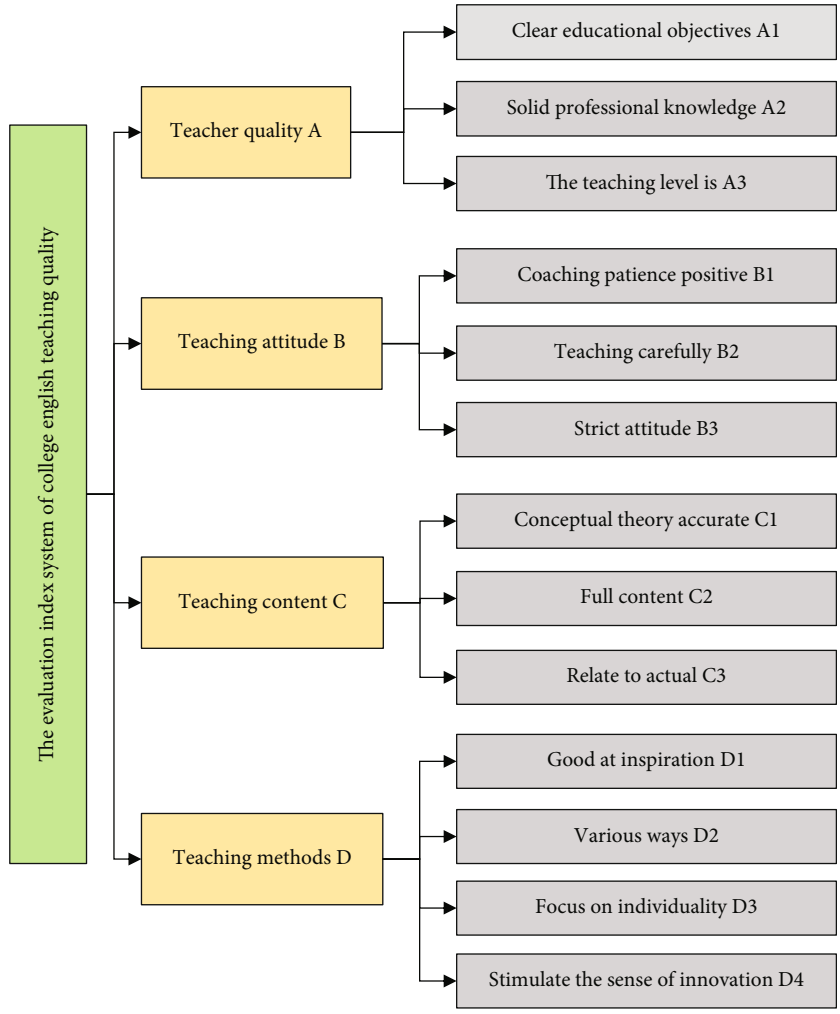


Figure 2: English teaching quality evaluation index system.

response for teaching enhancement, establishing a portfolio for work requests, and collecting information for personnel choices like endorsement, upgrade, and tenure. In addition, teaching quality evaluation has the following functions [16]:

2.2.1. Guidance and Feedback Function. Through the evaluation of teaching effect by students, teaching quality evaluation can make teachers strong about the achievement of goals and adjust teaching practice activities appropriately. The guiding and feedback function of teaching quality evaluation refers to guiding and regulating the behavior actions of teachers and pupils through the response info of assessment subjects. The other is the encouragement and reinforcement of students' learning. Through teaching evaluation, teachers can understand the real condition of pupils, discover difficulties, and improve their teaching methods [17].

2.2.2. Management Function. Pupils are the subjects of teaching assessment, the participants of teaching practice, and the direct experiencers of teaching effect, so the evaluation has reliability [18]. The results of teaching evaluation can be used as a reference for university administrators to the teaching quality and level of teachers and even as one of the bases for teachers to make personnel decisions.

2.2.3. Guiding Effect. The popular teachers who emerge will become the learning objects of other teachers, and their successful teaching methods may be popularized and applied, playing a guiding role in the teaching work of university.

2.2.4. The Role of Scientific Research. As a touchstone to examine the teaching process, teaching quality assessment can make an objective judgment on teaching methods and teaching effects. Especially in the compilation of teaching materials, curriculum system setting, learning ability, teachers, and other aspects of the investigation, teaching quality assessment is indispensable [19].

2.2.5. Guiding Principle. We should emphasize the respect and understanding of students and create fair opportunities for students to perform. For teachers, it should be highlighted that teachers should have modern educational concepts and professional qualities and try their best to meet the various needs of students in learning knowledge. In the curriculum design, centering on students, the curriculum

should be close to the students' living world and needs [10, 20].

2.2.6. Scientific Principles. According to the scientific principle, evaluating teaching quality should be as objective and accurate as possible. The characteristics should be used to design the evaluation system. The evaluation content should be of a certain height, reflect actual teaching quality, and be objective and moderate. First, there must be consistency between the assessment index and the target, with the specific requirement that the evaluation index is created to appropriately reflect the educational target's criteria. The second is each index's relative independence, which means that no two indexes in the same system can be the same or equivalent. Third, the gestures' compatibility necessitates the absence of any contradicting phenomena between the gestures, which should express distinct parts of the situation and complement each other [21].

2.2.7. Feasibility Principle. The feasibility principle refers to that the teaching steps involved are easy to implement, and the whole index system is easy to operate as far as possible. Due to the particularity of the research content, the education phenomenon is a multidimensional and complex structure, so when evaluating index designers, if the index is too few, it cannot truly reflect the current teaching quality level, and if too many, it will be repeated and complicated. As a result, when creating an assessment index system, we should choose an index that is general, representative, and compelling. Rather than requiring all components of school quality, we must emphasize the most important aspects. The measurement principle states that the diagnostic index should include some measurable elements while avoiding conflicts caused by some extreme indicators. As a result, in the design of the diagnostic indicator question, as much as possible, vague answers should be avoided, and the goal of direct measurement and evaluation should be achieved. In this way, the unified standards in the implementation of evaluation can reflect fairness, and the essential problems can be grasped through in-depth analysis.

In evaluating the index system, we should consider the overall situation, and important indexes should not be omitted or neglected to reflect the overall requirements. Only by lengthily considering various factors and highlighting key indicators, can we accurately reflect the overall goal; otherwise, there will be a large deviation, affecting the effect of evaluation. But it should be emphasized that the principle of uniformity does not preclude the removal of some details but achieves simplification and focus of the whole system.

3. OLAP and SVM

3.1. Online Analytical Processing (OLAP). Online analytical processing (OLAP) is a method that analyzes data in a multidimensional way and flexibly provides roll-up, drill-down, and pivot operations to present integrated decision information. All successful decisions are built on a solid foundation of knowledge. Effective industries constantly plan, examine, and report on trades and effective actions to maximize efficacy, decrease costs, and rise share of market. An organization that can yield benefit of this and turns it into collective information precisely and rapidly will undoubtedly be in an improved position to make effective business choices and increase above the competition.

3.1.1. Multidimensional Analysis. It refers to the data organized in multidimensional form by slicing, cutting, drilling, rotating, and other analysis actions. To analyze the data, users can look at the data in the database from various viewpoints and perspectives, allowing them to have a better understanding of the information contained in the data and develop a more effective business model. The basic operations of OLAP are divided into slicing, cutting, rotating, and drilling [22]. An example of its multidimensional structure is shown in Figure 3.

3.2. Support Vector Machine (SVM). Support vector machines (SVM) were developed by Vapnik and his Bell Labs research group based on years of statistical learning theory to propose an alternative best design criterion for linear classifiers. Because of its excellent learning performance, this technology has developed a warm theme in the universal machine learning field. The principle is also extended from linearly separable to linearly indivisible cases.

We have deleted the "dirty data," but it is still impossible to avoid the existence of errors, incomplete, or inconsistent data, so we need to clean the selected data to eliminate heterogeneous data, in order to greatly improve the quality of data mining. Data cleaning methods mainly include mean method and prediction method.

3.2.1. Mean Value Method. If an attribute value of the data in the sample is missing, it can be replaced by the average value of other valid data of the attribute except this item; that is, the average value of the effective value of the sample with the same attribute is used to replace the missing value by

$$s_{ki} = \frac{1}{m+n}\left[\sum_{j=i-k}^{i-1} s_{ki} + \sum_{j=i+1}^{i+n} s_{kj}\right], \tag{1}$$

where S_{ki} is the current missing data.

Data is distributed into a huge amount of sample classes (data classification, also known as sample classification), which follows the basic process of data mining. For a composed dataset, that is, a training set, each sample may have multiple attributes, which can be continuous or discrete. The goal of organization is to create a classification model that can predict the classification of each attribute in the training sample based on the known analysis and the degree of approximation between attributes.

$$g(X) = WX + b. \tag{2}$$

According to Equation (2), the classification plane equation is deduced as

$$WX + b = 0. \tag{3}$$

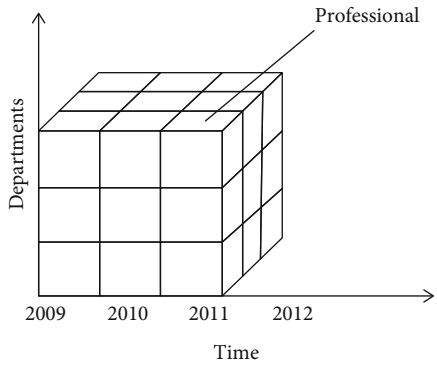


Figure 3: Multidimensional structure.

Normalized the discriminant function equation (3) , adjust the coefficient W and b so that both types of samples can meet | g | 1 or more (X), and the classification interval is equal to 2 | | W, so as to transform the maximization problem into the minimization problem of interval o | | W.

Thus, the problem of optimum organization plane is distorted into an optimization problem as

$$\min \phi(W) = \frac{1}{2}\|W\|^2 = \frac{1}{2}(W \cdot W). \tag{4}$$

The duality problem is further transformed into

$$\begin{aligned} \min Q(\alpha) &= \frac{1}{2}\sum_{i,j=1}^{n} \alpha_i \alpha_j y_i y_j (X_i \cdot X_j) - \sum_{i=1}^{n} \alpha_i \\ s.t \quad & \alpha_i \geq 0 (i = 1, 2, \cdots, n) \\ & \sum_{i=1}^{n} y_i \alpha_i = 0 \end{aligned} \tag{5}$$

The matrix form of Equation (5) is

$$\begin{aligned} \min Q(\alpha) &= \frac{1}{2}\alpha^T A \alpha - b^T b \\ s.t \quad & \alpha_i \geq 0 (i = 1, 2, \cdots, n) \\ & y^T \alpha = 0 \end{aligned} \tag{6}$$

where $\alpha = (\alpha_1, \alpha_2, \cdots, \alpha_n)^T$, $b = (1, 1, \cdots, 1)^T$, $y = (y_1, y_2, \cdots, y_n)$.

According to Equation (6), the optimal classification function can be deduced as

$$f(x) = \operatorname{sgn}\left\{\sum_{i=1}^{n} \alpha_i^* y_i (X_i \bullet X) + b^*\right\}. \tag{7}$$

The process of SVM physical education teaching quality assessment founded on OLAP is as follows:

(Step 1) Normalize the evaluation index data and construct the physical education teaching quality judgment matrix

(Step 2) Calculate the weights w1 and W2 of OLTP and OLAP

(Step 3) Calculate OLAP comprehensive weight a

(Step 4) Divide the evaluation index data into training set and test set

(Step 5) Establish SVM prediction model with training set data

(Step 6) Test set data and test OLAP SVM physical education teaching quality assessment model

To summarize, Figure 4 depicts the working process of SVM physical education teaching quality evaluation based on OLAP.

Read the college English teaching quality evaluation data, complete the differentiation of exercise set and test set as per the ratio, and use Equation (8) to complete the normalization of the data to reduce the diversity of data:

$$x_{\text{new}} = La + \frac{x - x_{\min}}{x_{\max} - x_{\min}} \times (Lb - La). \tag{8}$$

In Equation (8), x represents original data, and x_{new} represents processed data. La represents the minimum value in the data processed, and Lb represents the maximum value; $X_{\max}$, $X_{\min}$ and La, Lb correspond to upper and lower limits of unprocessed original data.

According to Equation (9), population individuals of Golden SA algorithm are initialized, and a single individual in the population corresponds to penalty factor and kernel width (C,g) of SVM model.

$$V_i = lb_i + \text{rand}\,(0, 1) \times (ub_i - lb_i). \tag{9}$$

In Equation (9), UBI and LBI are the upper limit and lower limit of search for the ith individual, respectively. V_i is the initial value of the ith individual.

Golden section coefficients X_1 and X_2 are calculated as follows:

$$\begin{aligned} x_1 &= a \times (1 - \tau) + b \times \tau, \\ x_2 &= a \times \tau + b \times (1 - \tau). \end{aligned} \tag{10}$$

The fitness ACC of each individual in the population was obtained by using Equation (11), and the best individual V was retained.

$$\begin{aligned} \max ACC(C, g) &= \frac{\sum_{k=1}^{K} acc_k}{K} \\ s.t & \begin{cases} C \in [C_{\max}, C_{\min}] \\ g \in [g_{\max}, g_{\min}] \end{cases} \end{aligned} \tag{11}$$

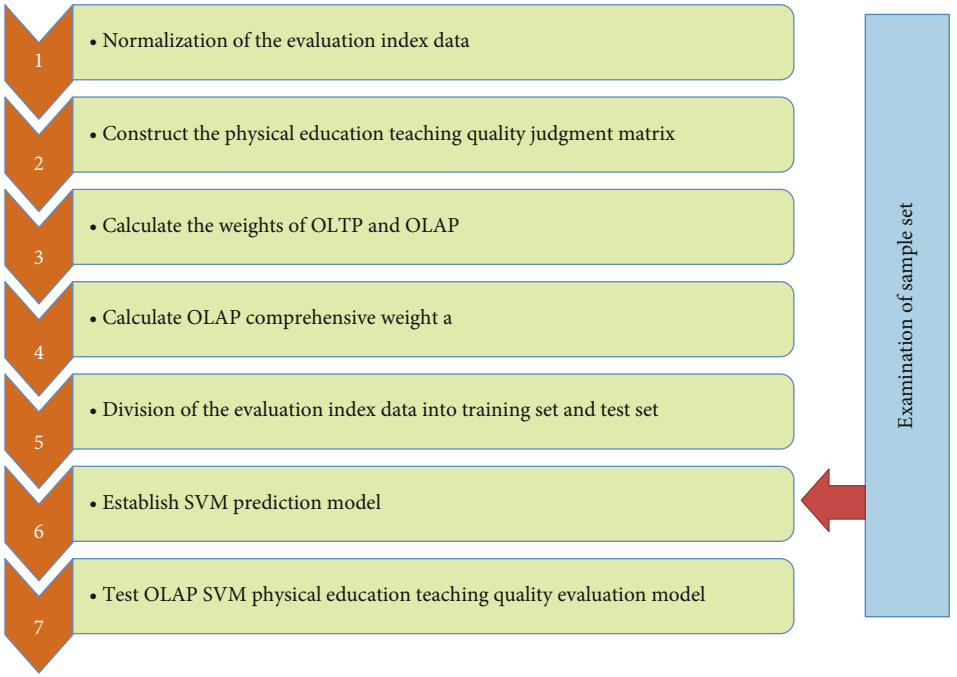


Figure 4: Working process of SVM physical education teaching quality evaluation.

Table 1: Score of English teaching quality evaluation index.

Year	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
A1	0.0304	0.0331	0.0400	0.0004	0.02	0.0201	0.0103	0.1024	0.1303	0.1428
A2	0.1148	0.1311	0.1410	0.1213	0.1480	0.131	0.1014	0.1213	0.3001	0.3113
A3	0.120	0.1004	0.1010	0.1831	0.1812	0.112	0.1102	0.3433	0.3043	0.3820
Bl	0.1000	0.18l4	0.1834	0.1838	0.101B	0.1040	0.1210	0.3033	0.3113	0.3301
B2	0.1204	0.1033	0.1240	0.1812	0.1144	0.1120	0.1800	0.3323	0.3024	0.3431
B3	0.1231	0.1803	0.1103	0.1108	0.3043	0.3043	0.3401	0.3030	0.3213	0.3203
C1	0.3113	0.3314	0.3102	0.1883	0.1223	0.1003	0.1001	0.1001	0.3000	0.3821
C2	0.0482	0.0482	0.0030	0.0031	0.103	0.1021	0.1313	0.1203	0.1842	0.1810
C3	0.0323	0.0301	0.0431	0.0003	0.0800	0.1010	0.1381	0.1011	0.1001	0.3181
C4	0.1000	0.1103	0.1130	0.1128	0.1181	0.1113	0.1144	0.113	0.1133	0.1128
D1	0.0023	0.0000	0.D043	0.0288	0.083	0.011	0.1033	0.1030	0.1133	0.1121
D2	0.0330	0.001	0.0043	0.0001	0.0223	0.0000	0.0132	0.0143	0.0810	0.1034
D3	0.02	0.0041	0.0202	0.00B0	0.021I	0.0080	0.0080	0.0834	0.1112	0.1402
D4	0.1011	0.1313	0.1314	0.1031	0.0432	0.0428	0.020I	0.001	0.0813	0.1131
El	0.0018	0.013	0.0104	0.0338	0.0301	0.0384	0.0018	0.0204	.0801	0.1108
E2	0.0130	0.0101	0.0110	0.0121	0.0303	0.0302	0.0388	0.0831	0.1021	0.0100
E3	0.0143	0.0083	0.0081	0.0034	0.0410	0.0340	0.0014	0.0113	0.1133	0.0183
E4	0.0202	0.0004	0.0003	0.0818	0.0800	0.0141	0.1013	0.1382	0.1343	0.1011

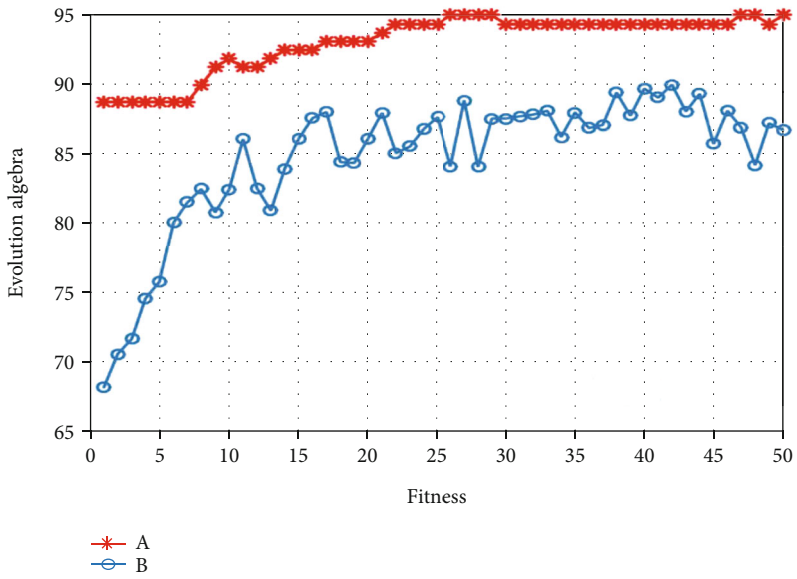
In Equation (11), ACC is the average accuracy rate of the population under k-fold cross verification, and acc_k represents the accuracy obtained under a certain K-fold.

Update individual position as

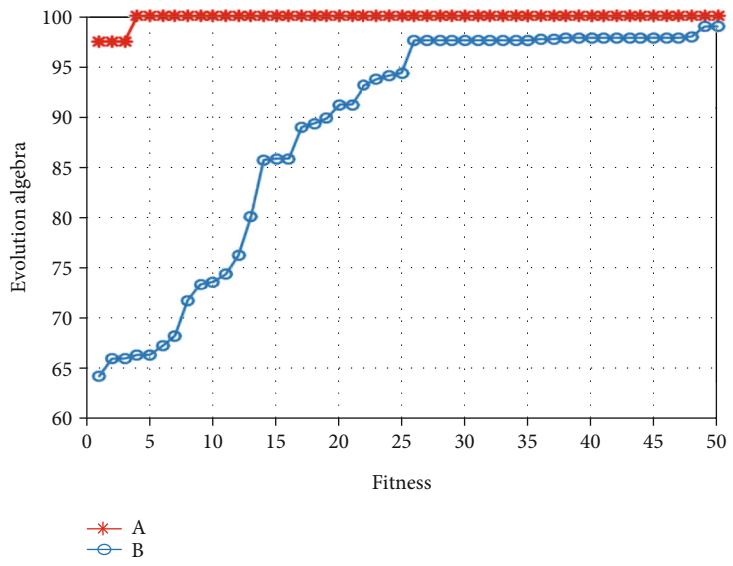
$$V_i^{t+1} = V_i^t \times |\sin(r_1)| - r_2 \times \sin(r_1) \times |x_1 \times D - x_2 \times V|. \quad (12)$$

4. Simulation and Experimental Analysis

The expert scoring method is used to obtain data on English teaching quality evaluation at Xi'an Peihua University from 2008 to 2017, according to the OLAP Hierarchical model of English teaching quality evaluation. We must use the maximum and minimum value methods to normalize the



(a) OLAP-SVM



(b) SA-SVM

Figure 5: Comparison of convergence rates.

data. Table 1 displays the normalized results.

To evaluate the quality of college English teaching, ACC, Specificity, and Sensitivity were selected as the evaluation indicators:

$$\text{ACC} = \frac{\text{TP} + \text{TN}}{\text{TP} + \text{FP} + \text{FN} + \text{TN}}, \tag{13}$$

$$\text{Specificity} = \frac{\text{TN}}{\text{FP} + \text{TN}}, \tag{14}$$

$$\text{Sensitivity} = \frac{\text{TP}}{\text{TP} + \text{FN}}. \tag{15}$$

Table 2: Evaluation results.

Methods	ACC/%	Specificity/%	Sensitivity/%
SA-SVM	95.62	95.38	97.46
OLAP-SVM	92.85	93.1	94.34
SVM	90.76	92.33	91.15

In Equations (13)–(15), TP signifies the total number of correctly classified samples, TN shows the total quantity of samples classified into other classification levels, and FP shows the total number of incorrectly classified and misreported samples.

In the experiment, the input vector of the SVM model is the score data corresponding to the second-level indicators

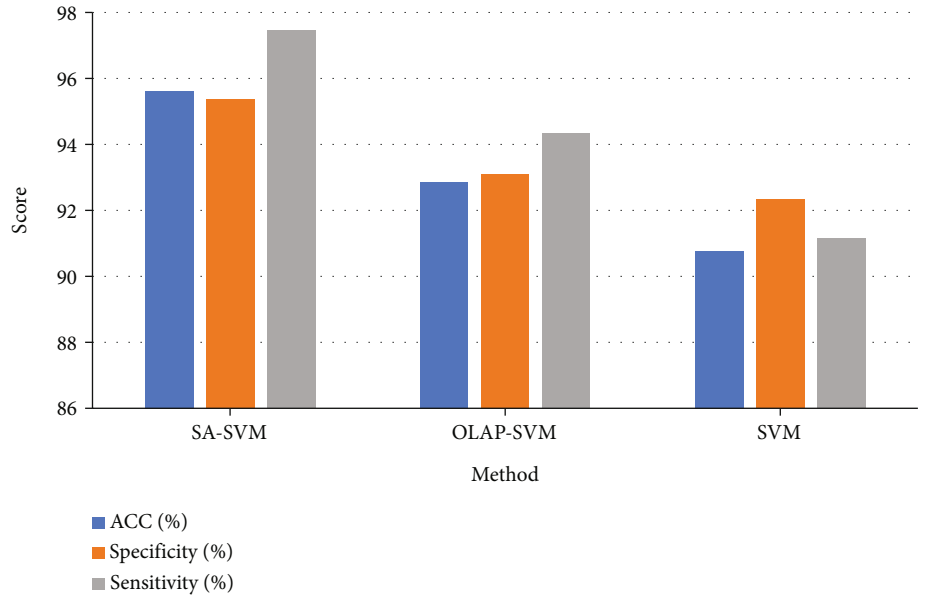


Figure 6: Comparisons of ACC, specificity, and sensitivity.

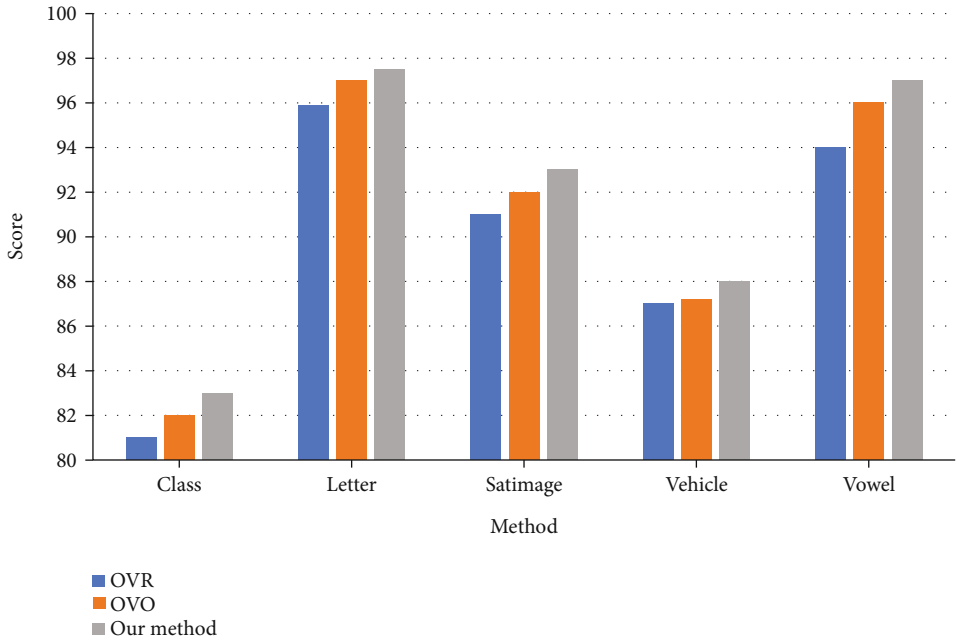


Figure 7: Classification accuracy of three multiclassification algorithms.

of English teaching evaluation, and the college English teaching quality level (excellent, good, average, and poor) is the output vector of SVM. It can be seen from Figure 5 that SA-SVM has a faster convergence rate. When the number of iterations is 5, the convergence begins.

Evaluation results of SA-SVM, OLAP-SVM, and SVM are shown in Table 2 and Figure 6.

As can be seen from Table 2 and Figure 6, the ACC of SA-SVM is 97.62%, which is better than 92.85% of PSO-SVM and 90.76% of SVM. The Specificity of SA-SVM was 95.38%, superior to 93.10% of PSO-SVM and 92.33% of SVM. The Sensitivity of SA-SVM was 97.46%, which was better than 94.34% of PSO-SVM and 91.15% of SVM. According to the comparison results of ACC, Specificity, and Sensitivity, SA-SVM has higher classification accuracy, Specificity, and Sensitivity in evaluating the quality of college English teaching.

In order to make the experimental results more illustrative, this paper uses OVR method, OVO method, and improved BT-SVM algorithm to conduct 10 experiments in 5 selected datasets, respectively, record the classification time and accuracy of each experiment, and calculate the average value of 10 experimental results. Figure 7 shows the average value of 10 experiments.

The following conclusions can be summarized from the experimental results shown in Figure 7:

(i) The improved algorithm in this paper cannot give full play to its advantages due to the small number of categories and corresponding combinations in the dataset vehicle. Therefore, it can be seen from the data in the figure that the accuracy of the three algorithms is almost the same

(ii) For both Glass and Satimage datasets, the number of categories is 6, and the accuracy gap of the three algorithms becomes larger, especially for the Satimage datasets with more attributes

(iii) For the two datasets Vowel and Letter with more than 10 categories, due to the large number of combinations, it can be seen from the figure that the improved algorithm in this paper is two percentage points higher than OVR and OVO algorithms in the best case

(iv) In general, the proposed algorithm is better than OVR and OVO methods in terms of accuracy

5. Conclusion

In the research procedure of teaching quality evaluation technology in colleges and universities, this presents the method of machine learning theory, combines with OLAP technology, and studies teaching evaluation based on support vector machines. The evaluation technology is established by data warehouse technology and OLAP technology. Through the analysis of this paper, the college teaching quality evaluation combined with OLAP technology and SVM algorithm has certain practical value. In the next step, we will establish the college teaching quality evaluation platform and put the technology into practice through information technology. Through the formation of the platform, the achievement application of technology can be realized. Through such a platform scheme, the school can get fast and accurate evaluation results as a reference, which has good application prospects and practical significance for 12 published papers. In addition, since the membership degree of sample wood is calculated in advance and applied to the sample before calculation, we will consider directly involving the membership degree in SVM algorithm calculation to further realize the fuzzy SVM algorithm. This is conducive to the realization of an automatic evaluation system. The improved SVM algorithm is expected to have more accurate prediction results and more efficient operation efficiency.

Data Availability

The data used to support the findings of this study are available from the corresponding author upon request.

Conflicts of Interest

The authors declares that they have no conflict of interest.

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