ORIGINAL

SIMULATION OF VOLLEYBALL TEACHING AND TRAINING EFFECT ASSESSMENT MODEL BASED ON SUPPORT VECTOR MACHINE MODEL

Lei Xu[1]

[1] Nanjing University of Chinese Medicine, Nan Jing, Jiang Su, 210023, China.
E-mail: njucmxulei@163.com

ABSTRACT

The traditional assessment method of volleyball teaching and training effect can't adapt to the informationization and modernization of modern education. On this basis, a new assessment method is put forward, that is, using the SVM model. This method makes full use of the high efficiency of small sample learning of SVM, achieves excellent learning effect, reduces the divergence error and subjective factors in traditional assessment methods, and is more in line with the macro-oriented assessment conclusion. The research results can be combined with information entropy, fuzzy mathematics and other research methods to further enhance the accuracy of data fitting. This method has certain reference significance for improving teachers' teaching level and promoting the improvement of instructional quality. Starting from deepening the effect of volleyball teaching and training, and combining with the characteristics of volleyball events, this paper evaluates the significance, function and methods of volleyball teaching and training. It is pointed out that the assessment of volleyball teaching and training effect is very important for the management of college volleyball teaching and the control of volleyball instructional process. Finally, it is analyzed that the prediction accuracy of DBT-SVM algorithm is higher than that of SVM and multi-class classification algorithm (BT-SVM) algorithm. The accuracy of SVM is 93~95, that of BT-SVM is 95~97, and that of DBT-SVM is 97~98, with the highest accuracy of 98.33. The test time of this method is also the shortest, with an average of 6~7ms; The training effect of volleyball is different in different fields. The DBT-SVM algorithm proposed in this paper is feasible to evaluate the training effect of volleyball teaching.

KEYWORDS: vector machine model; volleyball teaching; assessment model.

1. INTRODUCTION

With the advancement of sci & tech, volleyball teaching and training have become increasingly rich in learning resources. This training method is not only limited to simple basic sports teaching for students, but has developed a volleyball teaching method based on various types and different types of activities (Lima et al., 2020). These are endowed with more educational significance and a more personalized teaching mode, which enhances students' enthusiasm for learning diversified sports such as volleyball in physical education courses, and enriches students' extracurricular activities. At present, this kind of personalized physical training is a research hotspot for optimizing teaching mode, and it is more exploratory, experiential, intuitive, and interesting, which is more worthy of in-depth research, and provides a superior teaching method for the comprehensive development of students. In order to study the application effect of the current personalized volleyball teaching training model, an assessment of the instructional effect is proposed (Pereira et al., 2011). The assessment of teaching work is to determine whether the teaching has reached certain quality requirements. Teaching assessment is to use all feasible assessment techniques to give value judgments on the instructional process and all effects predicted by opponents according to the teaching purposes and principles, so as to provide information to improve teaching and make some kind of qualification certificate for the evaluated object (Leong et al., 2012). At present, judging from the development of volleyball lessons, due to various conditions, it is difficult for some colleges and universities to teach volleyball lessons, but more colleges and universities not only offer volleyball lessons when conditions permit or actively create conditions Focus on teaching volleyball. Volleyball teaching involves many factors such as psychology, physical quality, ability, etc. Therefore, in volleyball teaching, we should combine the characteristics of volleyball sports to establish a practical assessment system to carry out this work, and strive to improve the quality of volleyball teaching and training. Purpose: In college sports majors, performance assessment is usually based on the combination of theory and technology, and the effect of volleyball teaching and training is also a very important content. Most colleges and universities use a relatively fixed assessment method, that is, the three parts of the theoretical knowledge assessment score, technical score and ordinary score are combined in a certain proportion to form the final score, usually the ratio of the three is 3:6:1. As far as the nature of assessment is concerned, two-thirds of colleges and universities use the combination of process assessment and summative assessment, while other colleges only use the method of summative assessment (Xu & Liu, 2015). The emergence of this situation has also led to a serious lack of value and function of the assessment system, and even obscured the actual instructional results. If colleges and universities use this kind of assessment method based on performance for a long time, it will cultivate a sense of speculation for students who are eager for quick success,

which is contrary to the nature and goal of volleyball teaching. Therefore, instructional effect assessment (Zhao, 2016) is one of the core issues of volleyball education assessment, and it is the focus and difficulty of current volleyball teaching and training effect research, which has attracted a number of scholars to conduct related research. SVM is a new type of machine learning method (Xiao, 2018), so this paper proposes a volleyball teaching training effect assessment model based on the SVM model, using the SVM method to replace the complex function representation in the traditional statistical method , reduce the influence of subjective factors on the assessment of teaching level, explore the potential factor correlation in the assessment process, provide algorithm support for the establishment of a more scientific and objective teaching level assessment system, and enhance the objectivity of assessment methods and the accuracy of assessment results. It has certain reference significance to improve the level of volleyball teaching and training and promote the quality of teaching and training (Batez et al., 2021). Generally speaking, the assessment of volleyball teaching and training effect is beneficial to promote the improvement and overall improvement of volleyball training effect, and it is a work that cannot be ignored in school instructional quality management. Physiological state indicators are applied to the assessment of athletes' training effects to improve the scientificity of the athletes' training process (Fernandez-Echeverria et al., 2019). The athlete's physical function state determines the performance of the athlete's function. It is highly scientific to evaluate the training effect of the athlete according to the athlete's physical function state (Zhang & Xu, 2015). The athlete's training task is adjusted according to the athlete's physical state, and the whole training process is scientifically formulated (García-González et al., 2020). The effect of volleyball teaching and training can make teachers engage in volleyball teaching scientifically, promote the development of teaching work in a standardized and scientific direction, and ensure the quality and effect of teaching work. It is also a good means of building spiritual civilization. A mathematical model for evaluating the effect of volleyball teaching and training was constructed by using the SVM method, and the selected samples were effectively processed, and a model SVM was established to evaluate the effect of volleyball teaching and training. In this way, the principal component analysis and the least squares SVM are organically combined to improve the accuracy of the model (Ceazón et al., 2021). Its innovations are: 1. In this paper, principal component analysis and SVM method in statistical learning theory are used to construct a model for evaluating the training effect of volleyball teaching. 2. This text research will combine a variety of relevant research methods, so as to obtain comprehensive and in-depth research results on this topic, and promote the quality of volleyball teaching and training effects. The main work of this paper is as follows: The first chapter is the introduction part. This part mainly expounds the research background and research significance of volleyball teaching and training effect assessment, and puts forward the research purpose, method and innovation of this paper. The

second chapter mainly summarizes the relevant literature, summarizes the advantages and disadvantages, and puts forward the research ideas of this paper. The third chapter is the method part, which focuses on the optimization design method combined with SVM model. The fourth chapter is the experimental analysis part. This part is experimentally verified on the dataset to analyze the performance of the model. Chapter five, conclusion and outlook. This part mainly reviews the main content and results of this research, summarizes the research conclusions and points out the direction of further research.

2. Related Work

As a new type of machine learning method, SVMs uses a kernel function to map the learning samples from a low-dimensional space to a high-dimensional Hilbert space through the kernel function, thereby transforming nonlinear problems into linear problems. It has the advantages of global optimality, nonlinear classification, sparsity of solutions, and strong generalization ability. Benefiting from the algorithm advantages and excellent performance of the SVM method, the related research of this method has been applied in handwriting recognition, face recognition, system recognition, fault diagnosis, medical diagnosis, model prediction, chemical analysis, environmental monitoring, risk assessment and credit assessment, etc. The field has been widely used and verified. Using principal component analysis and the least squares SVM method in statistical learning theory, a mathematical model of teaching and training effect assessment was constructed (Rizzi et al., 1997). Due to the certain correlation between the indicators, the input information will overlap, which will reduce the accuracy of the model. Therefore, efficient processing of selected samples is required (Uřičář et al., 2012). Ji A B, et al.(Ji et al., 2010) proposed a multi-layered assessment model based on cluster analysis and principal component analysis to improve the teaching assessment method; Shi G D, et al.(Shi et al., 2010) introduced the relevant theory of fuzzy mathematics and established a general higher education Mathematical model for evaluating the level of undergraduate teaching work in schools; Pan Y, et al.(Pan et al., 2019) used fuzzy mathematics and interval value sampling to establish a mathematical model and implement computer operations, in order to make the assessment plan more scientific and easier to operate; Feng L, et al.(Feng et al., 2014) analyzed the characteristics that the assessment subject of college teachers' classroom instructional quality tends to be relatively single, specifically, only students are allowed to participate in the assessment, and the teachers themselves, leaders and peers who are participants in teaching activities have no chance to participate at all; He X, et al.(He et al., 2010) mentioned that It is very common to pay attention to the results and ignore the process in the teaching assessment of colleges and universities in China. It only pays attention to the students' assessment of the instructional results of the teachers and does not pay attention to the teaching

behavior in the instructional process; Jiang T, et al.(Jiang et al., 2012) used the shortest distance method to evaluate the SVM. The improved algorithm was applied to the instructional quality assessment model; S. Wei, et al.(Wei et al., 2013) applied SVM to the teaching design of text classification; Bo L I (Bo, 2011) used SVM in instructional quality according to the particularity of teaching activities. In the assessment of indicators, not only can the teacher's instructional process be weighed according to the actual situation, but also the teacher's teaching activities can be improved according to the instructional process. In Silaban D M (Silaban et al., 2013), some problems in the assessment of classroom instructional quality can be solved by using SVM. , the experimental results show that SVM has a good assessment effect and has good generalization (Xiao & Desai, 2020). This paper will make use of the research advantages of support vector machine in the direction of pattern recognition to establish a volleyball training effect assessment model. The influence of training level assessment, mining the potential factor correlation in the assessment process, and providing algorithm support for the establishment of a more scientific and objective teaching level assessment system.

3. Methodology

3.1 SVM Theory

SVM algorithm is a new machine learning algorithm. When handling the compromise between empirical risk and confidence risk, the principle of structural risk minimization usually has two countermeasures. The first is to fix the scope of confidence risk and minimize the empirical risk, such as artificial neural network algorithm; Minimize trust risk, such as SVM classification algorithm discussed in this paper. In practical problems, most of the problems we need to solve are linearly inseparable, which is also the advantage of the SVM algorithm compared with other algorithms. In dealing with nonlinear problems, the constraints are softened by introducing slack variables, so that $y_i[(w \cdot x) + b] - 1 + \xi_i \geq 0$, Part of the sample error division is allowed at the beginning, as shown in Figure 1:
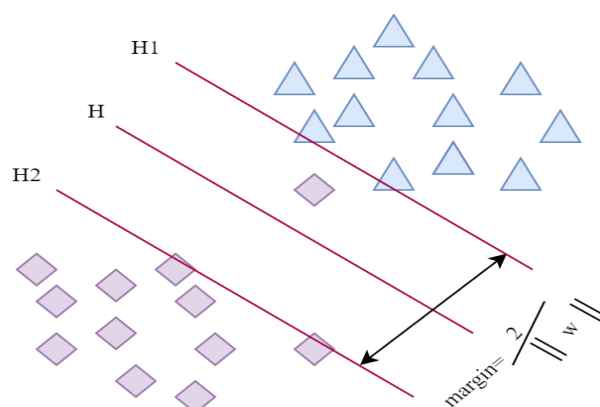
Figure 1: Optimal classification surface with slack variables introduced

The training sample set, $S = \{(x_1, y_1), (x_2, y_2), \dots, (x_i, y_i)\} \in (X \times Y)^l$, $i = 1, 2, \dots, l, x_i \in R^n, y_i \in \{1, -1\}$, the goal of the algorithm is to use the information provided by the training samples to construct a classifier, that is, a function. xi (i=1, 2, ..., l) are called support vectors. The slack variable $\xi = (\xi_1, \xi_2, \dots, \xi_l)^T$ represents the degree to which the training set is incorrectly divided, then the larger the slack variable, the greater the degree of incorrect division, and the objective function (Equation 3.1) becomes:

$$\min_{w,b} \frac{1}{2} \| w \|^2 + C \sum_{i=1}^{l} \xi_i \qquad (1)$$

$$s.t. \; y_i[(w \cdot x) + b] - 1 + \xi_i \geq 0, i = 1, 2, \dots, l \qquad (2)$$

Where C is the penalty parameter, which is used to represent the weight of the slack variable and the classification interval. Another way to deal with nonlinear problems in SVM algorithm is to borrow the idea of kernel function. In a certain high-dimensional space, it is only necessary to find a certain kernel function that satisfies the equation $K(X, X') = \phi(X). \phi(X')$, and then the optimal hyperplane of the feature space can be obtained by solving it. In the case of nonlinearity, the final optimization problem is:

$$\text{Maximize} F(\alpha) = \sum_{i=1}^{l} \alpha_i - \frac{1}{2} \sum_{i,j=1}^{l} \alpha_i \alpha_j y_i y_j [\phi(x_i) \cdot \phi(x_j)] \qquad (3)$$

Among them, $\phi(x)$ represents the training samples are mapped to the samples in the high-dimensional space. Let $K(x_i, x_j) = \phi(x_i) \cdot \phi(x_j)$, the above formula can be transformed into:

$$\text{Maximize} \, F(\alpha) = \sum_{i=1}^{l} \alpha_i - \frac{1}{2} \sum_{i,j=1}^{l} \alpha_i \alpha_j y_i y_j K(x_i, x_j) \qquad (4)$$

Among them, $K(x_i, x_j)$ is called the kernel function. When solving nonlinear separable problems, it adopts the concept of kernel function, so as to avoid solving nonlinear and cumbersome mapping operations, so that the optimized hyperplane is only carried out in low dimensional space. In addition, the calculation results obtained by selecting different kernel functions are different, but there is no hard rule on which kernel function to use. As of the current experimental results, most of the classification problems are obtained by using the radial basis kernel function. The results are relatively satisfactory, and RBF will also be selected in the subsequent pages of this article.

3.2 BT-SVM

The initial application of the SVM algorithm is to solve the two-class

classification problem, but most of the classification problems encountered in reality are multi-class classification situations. The solution strategies for multi-class classification problems are mainly divided into two types. The classifier function classifies the samples at one time; the other is to divide the multi-class classification problem into two-class classification problems to solve, and to solve the multi-class classification problem by constructing multiple two-class classification functions.

The first strategy seems to be direct and fast, but the multi-class classifier function is complex, and the solution process is not simple. On the contrary, the second strategy is widely used on the market. Currently commonly used are the "one-to-many" BT-SVM (Figure 2), the "one-to-one" BT-SVM (Figure 3), the "directed acyclic graph" BT-SVM (Figure 4), and "Binary tree" BT-SVM. The construction idea of the "one-to-many" SVM algorithm (OVR for short) is the first to use the SVM multi-class classification technology. Its construction process is as follows: construct m classifiers using the one-to-many method of m-class samples. When training the samples, the i-th classifier treats the i-th class as a positive class and the remaining m-1 classes as a negative class, and then constructs a decision surface. Then when testing the sample, it is necessary to send the sample n to be tested to all the constructed sub-classifiers, and calculate m decision function values, and finally determine that n is part of the class with the largest function value.
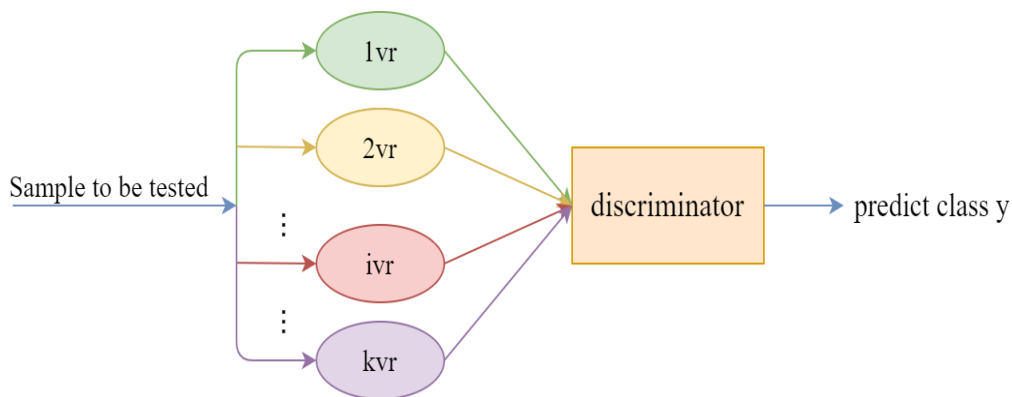
Figure 2: Schematic diagram of OVR classification algorithm

The construction process of the "one-to-one" SVM algorithm (OVO for short) is very simple: in the training process of the sample, a classifier is constructed between each two categories, then a total of $m(m-1)/2$ classifiers need to be constructed for m types of samples, and the test When the sample x is part of the i-th category, there are m-1 classifiers associated with x. The "voting method" is used to determine which category the sample is part of the most times, then which category the sample is part of, if there is a judgment When the number of times is equal, one of them is arbitrarily selected.
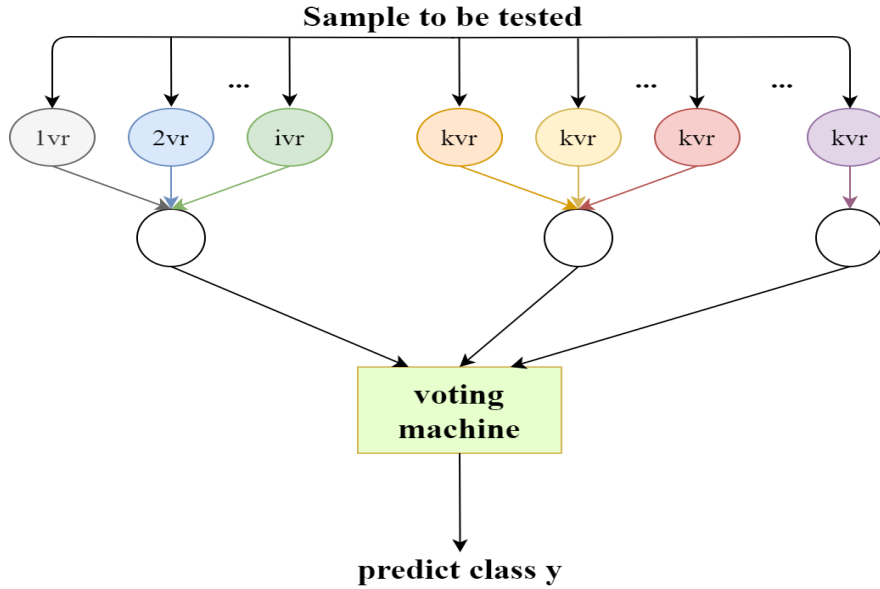
Figure 3: Schematic diagram of OVO algorithm

In view of the shortcomings of the above multi-class classification methods, some scholars have proposed improved algorithms on this basis. For example, the directed acyclic graph SVM multi-class classification method is based on the idea of two-class classification. By borrowing the idea of the OVO algorithm, the m-class training. The sample constructs a binary classifier, and then these classifiers are formed into the shape of a directed acyclic graph, and the number of leaf nodes is m and the number of intermediate nodes. Take the 4-classification problem in Figure 4 as an example, for any unknown After the input of the sample, the output value of the root node classifier is used to determine the next output path of the sample, and so on, until the leaf node is reached, and the category of the leaf node reached is the category of the sample.
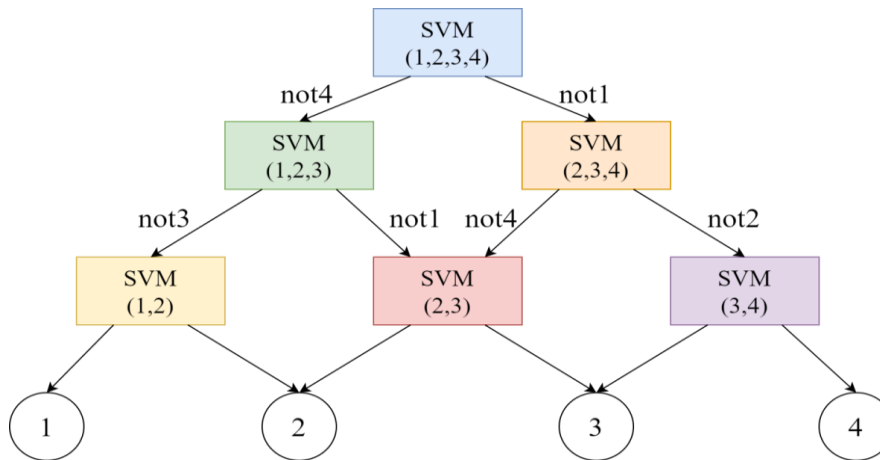

Figure 4: Schematic diagram of DAG algorithm

The "binary tree" BT-SVM (BT-SVM for short) is inspired by the idea of

the binary tree and combines it with the SVM to form a binary tree BT-SVM. The classification idea of the algorithm is: first, all samples are divided into two categories, and they are divided into the left subtree and the right subtree of the root node respectively, and then the root nodes of the left subtree and the right subtree are reused The two-class classifier is trained and continues to be divided into two subclasses, and so on, until it reaches the leaf node. The final result is that each subclass contains only one class of samples. After in-depth study of the BT-SVM, some scholars made a scientific and detailed comparison of the commonly used algorithms described above, and summarized the results as shown in Table 1:

Table 1: Comparison of BT-SVM

METHOD	NUMBER OF CLASSIFIERS	TRAINING EFFICIENCY	CLASSIFICATION EFFICIENCY	ACCURACY
OVR	K	generally	lower	generally
OVO	K(K-1)/2	better	generally	good
DAG	K(K-1)/2	better	generally	generally
BT-SVM	K-1	lower	better	good

As can be seen from Table 1, various methods have their own advantages and disadvantages, and it is not easy to determine which method is good or which method is not good, but the appropriate method needs to be selected according to the specific situation.

3.3 The Introduction of Assessment Indicators

For the introduction of the assessment index of volleyball teaching and training, there are a lot of factors that affect the teaching of volleyball, so a certain method is needed to select the most critical factor as the assessment index.

3.3.1 Principles of Constructing Assessment Indicators

① Guiding principle. Assessment is an important part of volleyball teaching and training, and an important part of teaching activities. Therefore, the assessment of volleyball classroom teaching for volleyball teachers is mainly to understand the progress of volleyball teachers in instructional content, and to point out their shortcomings, and then adopt corresponding teaching methods and management methods, so as to find a more suitable teaching method. teaching methods. Therefore, the assessment of the quality of classroom teaching must be formulated according to the syllabus in the textbook and the teaching objectives of the course, so as to ensure the continuous progress of students in the volleyball classroom and promote the all-round development of students. ② The principle of objectivity and impartiality. When evaluating the effect of volleyball teaching and training, the

established assessment system must conform to the university's school-running characteristics, and the listed assessment contents and indicators must make the educational quality reach the scientific measurement goal. At the same time, we should also consider different skills, different methods, and different basic levels of volleyball teachers, and strive to be objective and fair, and to truly and comprehensively reflect the level of volleyball teaching. ③The principle of simplicity and efficiency. In volleyball education and training, volleyball teachers themselves have a lot of work pressure. If the assessment procedure is too cumbersome and complicated, it will have a negative impact on both the testee and the testee. Therefore, the assessment method should be simple and easy to implement, easy to implement in teaching, and strive to achieve the scientific and operability of various indicators. Therefore, when selecting assessment indicators, be direct and specific.

3.3.2 Establishment of Assessment Index System

Based on the above principles of the assessment index system, combined with the actual situation of comprehensive volleyball teaching and training, an ideal index assessment system is formulated, so that the assessment of the effect of volleyball teaching and training can be carried out smoothly, so that the accuracy and effectiveness of teaching assessment can be improved. The representation of the assessment index system can generally be divided into two types: tower structure and linear structure. In the assessment of volleyball teaching and training effect, the index system of the tower structure is usually used, that is, first of all, the assessment target is made according to certain requirements. It is decomposed into multiple primary indicators, and then each primary indicator is divided into multiple secondary indicators according to the specific situation. And so on, according to the requirements of specific problems, it is decomposed into several levels. Based on the existing volleyball teaching and training quality assessment system and system construction principles in colleges and universities, this paper formulates the assessment index system of classroom instructional quality as shown in the following table: As shown in Table 2, the assessment index system is composed of 5 first-level indicators and 14 second-level indicators. The score of each second-level indicator is all 100 points. This is a very common assessment table in my country. The characteristic is that the general characteristics of the courses studied are extracted from different types of courses as assessment indicators. This set of indicators system has the following characteristics: ①The format is simple and clear, which is easy for assessors to understand and judge. ②Try to comprehensively consider the factors and assessment procedures that affect the quality of volleyball teaching and training. On this basis, this study also integrates the overall characteristics of volleyball into other aspects of the curriculum. ③The assessment of volleyball teaching and training is completed by multiple subjects, including students and volleyball teachers. Combining his assessment with self-

assessment can combine teaching and learning organically. ④The same index is used to evaluate the effect of volleyball teaching and training for volleyball teachers, so that managers can grasp and guide the teaching goals as a whole. The whole assessment process is relatively simple, and the assessment results have good comparability.

Table 2: Assessment system of volleyball teaching and training effect

FIRST-LEVEL ASSESSMENT INDEX	SECONDARY ASSESSMENT INDEX
TEACHING ABILITY	1. Standard Mandarin, vivid and concise explanations, full of appeal
	2. Reasonable arrangement of course time
	3. Reasonable use of multimedia equipment
TEACHING METHOD	1. Focus on summarization
	2. Use a variety of teaching methods
TEACHING ATTITUDE	1. Passionate
	2. Patient counseling and answering
	3. Strict requirements
TEACHING CONTENT	1. Pay attention to the training of volleyball students
	2. The content of the lesson is correct
	3. The instructional content grasps the frontier of science and is related to science projects
TEACHING EFFECT	1. Stimulate students' love for volleyball
	2. Students can understand what is being taught
	3. Improve students' volleyball skills

This paper adopts the 5-level scoring standard commonly used in teaching assessment, and divides the assessment results into 5 levels. The value range corresponding to each level is shown in Table 3 below：

Table 3: Correspondence table of the grade standard of classroom instructional quality assessment

ASSESSMENT LEVEL	RANGES
EXCELLENT	90~100 分
GOOD	80~90 分
MEDIUM	70~80 分
QUALIFIED	60~70 分
FAILED	Lower than60 分

3.4 Assessment Model of Volleyball Teaching and Training Effect

In order to deal with the defects of several methods such as AHP and BP neural network in the assessment model of volleyball teaching training, after actively discussing the complete instructional process and assessment system framework in colleges and universities, this paper establishes a multi-class

classification based on DBT-SVM. Method of instructional quality assessment system model. The flow chart of DBT-SVM volleyball teaching and training effect assessment model is shown in Figure 5：
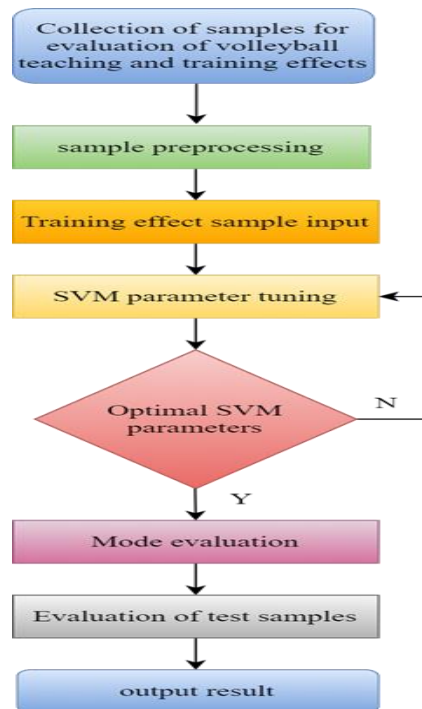
Figure 5: Flow chart of DBT-SVM volleyball teaching and training effect assessment model

4. Result Analysis and Discussion

The three datasets in this experiment consist of 20 data samples, of which 10 of each dataset are used as training sample sets, and the remaining 10 are used as test sample sets. Each sample contains 10 feature attributes, that is, a feature attribute corresponds to an assessment factor in the assessment index system, and the value range of each attribute is [0, 100]. Figure 6 below shows some of the original sample data：
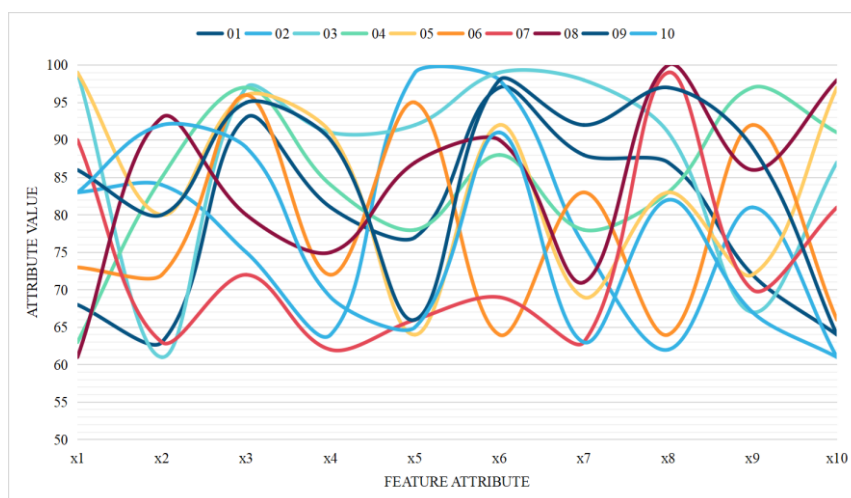
Figure 6: The original data of volleyball teaching and training effect assessment

In order to ensure the accuracy and validity of the training and testing results, the collected data should be properly processed according to the specified format of SVM. This paper adopts the normalization method to reduce the range to [0,1].

By analyzing the indicators of the assessment system and the assessment data, it can be seen that the assessment indicators and the assessment results show an obvious nonlinear relationship, and the assessment results show that the data is multi-classified, so the DBT-SVM algorithm is selected to The experimental data is classified, and the SVM algorithm and the BT-SVM algorithm are also used on the experimental data set, and the accuracy rates of the three algorithms are obtained respectively. The experimental results are shown in Figure 7：
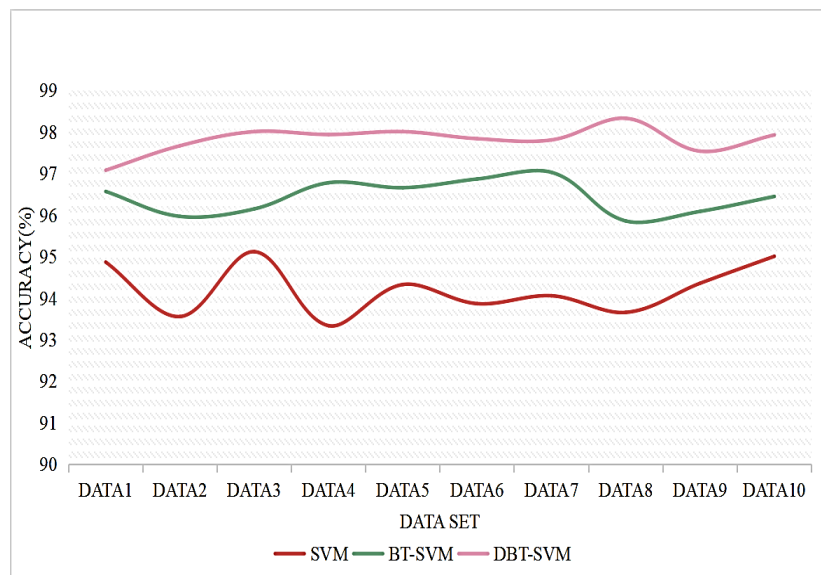
**Figure 7:** Comparison of assessment accuracy results

The experimental results show that the classroom instructional quality assessment model based on the DBT-SVM algorithm is trained and predicted for multiple data sets respectively. And in the same background environment, using the SVM algorithm and the BT-SVM algorithm to predict the data results, from Figure 7, the prediction accuracy of the DBT-SVM algorithm is higher than that of the SVM and BT-SVM algorithms, mainly because In this paper, the DBT-SVM algorithm uses the strategy of generating a complete binary tree and the definition of the distance of the classes in the clustering.

So that the easy-to-divide classes are divided first, and at the same time, it avoids the accumulation of errors caused by the partial binary tree structure, thereby improving the accuracy of the classification. In addition, 10 experiments were performed on the dataset with these three algorithms, and the time consumption in the experiments was counted. The values in Figure 8 are the average of the training time of these 10 experiments.
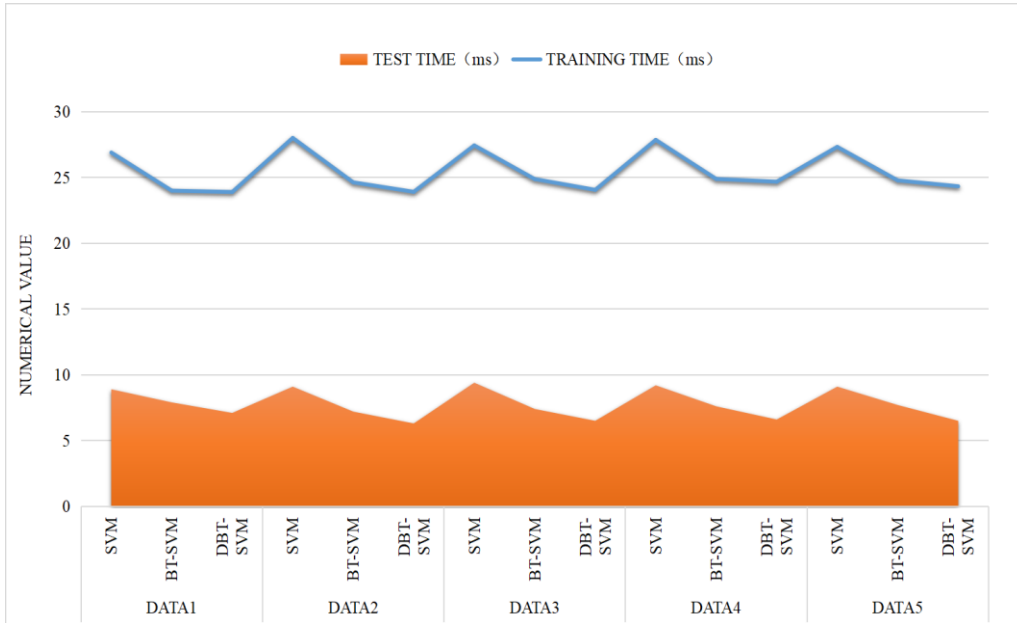
Figure 8: Comparison of time required for assessment

As can be seen from Figure 8, the SVM algorithm consumes a little longer time, but the time consumed by the BT-SVM algorithm and the DBT-SVM algorithm in the classification process is very small. This is because the number of experimental data and the category are relatively The amount of computation is not large, so that the two algorithms are not significantly different in classification time. As the types and numbers of experimental data increase, the degree of difference between the two will become larger and larger. Then, data analysis is performed on the training effect, and data is obtained through behavioral feedback. Each group of 14 data, the average value is finally obtained, and finally the data graph as shown in the figure is obtained:
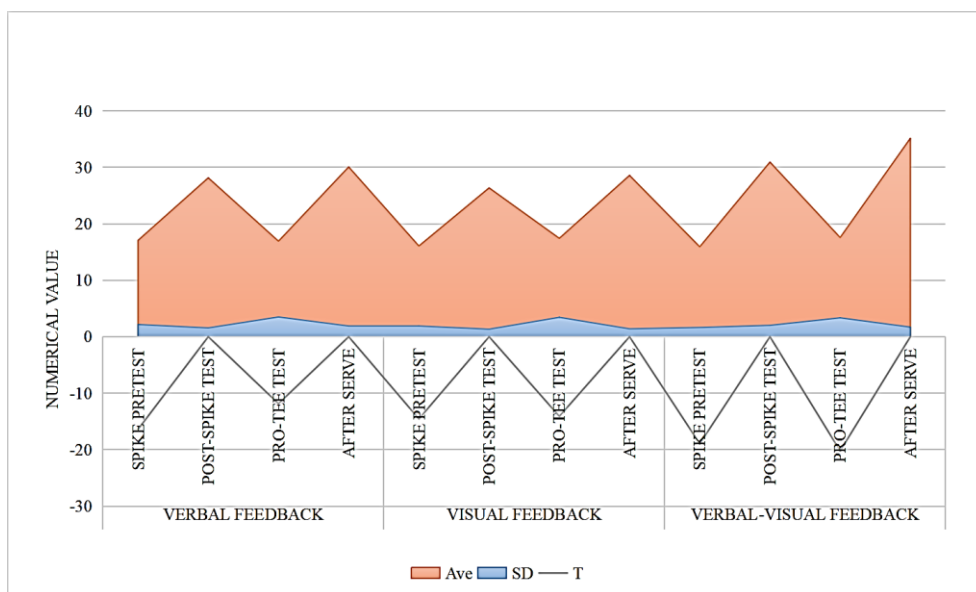
Figure 9: The effect of volleyball training

It can be seen from Figure 9 that all the verbal, visual and verbal-visual feedback groups have improved scores of volleyball teaching training effects from before the test to after the test. The results showed that there were significant differences in the cognitive domains of volleyball spike and serve before and after the test in each experimental group. In conclusion, the DBT-SVM algorithm proposed in this paper is feasible to evaluate the effect of volleyball teaching and training.

5. Conclusions

In volleyball teaching, the effect of volleyball teaching is very important. Scientific and reasonable assessment of the effect of volleyball teaching is an important factor to ensure the quality of volleyball teaching. The assessment of the instructional effect of volleyball teaching is not only an assessment of teaching ability, teaching method, teaching attitude, and instructional content, but also a comprehensive assessment of instructional effect. The specific work of this paper is summarized as follows: ①This paper summarizes the current domestic and foreign research on classroom instructional quality assessment through the domestic. And foreign research on the assessment of volleyball teaching and training effect. ②After a brief introduction to SVM-related theories and methods, the BT-SVM is introduced, and each SVM algorithm is compared. ③Based on practical needs, this paper proposes a method for evaluating the effect of volleyball teaching by using the assessment scale, and combines the basic principles of volleyball instructional effect assessment to establish a set of assessment systems, and based on this, a set of assessment scales are compiled. ④Using the improved method, a set of mathematic models adapted to the effect of modern volleyball teaching and training was established. Through the analysis of the example, the validity and correctness of the assessment model of volleyball teaching and training effect based on the SVM algorithm is proved.

REFERENCES

Batez, M., Petrušič, T., Bogataj, Š., & Trajković, N. (2021). Effects of teaching program based on teaching games for understanding model on volleyball skills and enjoyment in secondary school students. *Sustainability*, *13*(2), 606.

Bo, L. I. (2011). Application of university's teaching quality assessment based on SVM. *Computer Simulation*, *46*(8), 336-338.

Ceazón, T. E., Peter, A. S., & Cindy, H. (2021). Paclitaxel Exposure and Dosage of Drug-coated Devices for the Treatment of Femoropopliteal Peripheral Artery Disease. *Vascular & Endovascular Review*, *4*.

Feng, L., Ren, L., & Liu, Y. (2014). Problems and countermeasures of the assessment of college teachers' classroom teaching effect. *Shanghai Journal of Educational Assessment*, *46*(8), 488-492.

Fernandez-Echeverria, C., Mesquita, I., Conejero, M., & Moreno, M. P. (2019).

Perceptions of elite volleyball players on the importance of match analysis during the training process. *International Journal of Performance Analysis in Sport*, *19*(1), 49-64.

García-González, L., Abós, Á., Diloy-Peña, S., Gil-Arias, A., & Sevil-Serrano, J. (2020). Can a hybrid sport education/teaching games for understanding volleyball unit be more effective in less motivated students? An examination into a set of motivation-related variables. *Sustainability*, *12*(15), 6170.

He, X., Zhu, Z., & Yong, Z. (2010). University teaching quality assessment using fuzzy comprehensive assessment approach. *IEEE*, *13*(4), 89.

Ji, A.-b., Pang, J.-h., & Qiu, H.-j. (2010). Support vector machine for classification based on fuzzy training data. *Expert systems with applications*, *37*(4), 3495-3498.

Jiang, T., Tang, M. Z., & Yang, C. H. (2012). Self-training cost-sensitive SVM with uncertainty based on sampling. *Journal of Central South University (Sci & Tech)*, *23*(11), 246-249.

Leong, C. K., Lee, Y. H., & Mak, W. K. (2012). Mining sentiments in SMS texts for teaching evaluation. *Expert systems with applications*, *39*(3), 2584-2589.

Lima, R. F., Silva, A., Afonso, J., Castro, H., & Clemente, F. M. (2020). External and internal load and their effects on professional volleyball training. *International Journal of Sports Medicine*, *41*(07), 468-474.

Pan, Y., Zhang, L., Li, Z., & Ding, L. (2019). Improved fuzzy Bayesian network-based risk analysis with interval-valued fuzzy sets and D–S evidence theory. *IEEE Transactions on Fuzzy Systems*, *28*(9), 2063-2077.

Pereira, F. R. M., Graça, A., Blomqvist, M., & Mesquita, I. M. R. (2011). Instructional approaches in youth volleyball training settings: the influence of player's age and gender. *International Journal of Sport Psychology*, *42*(3), 227-244.

Rizzi, M., Baltes, M., Theobald, U., & Reuss, M. (1997). In vivo analysis of metabolic dynamics in Saccharomyces cerevisiae: II. Mathematical model. *Biotechnology and bioengineering*, *55*(4), 592-608.

Shi, G. D., Jiang, B. B., & Gong, F. H. (2010). On new round of undergraduate teaching assessment in colleges and universities. *Journal of Changzhou University (Social Science Edition)*, *53*(8), 333-335.

Silaban, D. M., Saepudin, D. D., & Adiwijaya, D. (2013). Prediksi Time Series Harga Saham Menggunakan Metode Learning Support Vector Machine (SVM) dengan Studi Kasus PT. Aneka Tambang (ANTAM) Tbk. *Telkom University*.

Uřičář, M., Franc, V., & Hlaváč, V. (2012). Detector of facial landmarks learned by the structured output SVM. International conference on computer vision theory and applications,

Wei, S., Guo, J., Yu, Z., Chen, P., & Xian, Y. (2013). The instructional design of Chinese text classification based on SVM. 2013 25th Chinese Control

and Decision Conference (CCDC),

Xiao, J. B. (2018). Research on the Innovation of Volleyball Training in New Period. *Value Engineering*, *26*(4), 126-129.

Xiao, N., & Desai, K. R. (2020). Antithrombotic therapy after venous stent placement. *Vascular & Endovascular Review*, *3*.

Xu, M.-D., & Liu, D. J. (2015). The application of "volleyball comprehensive trainers" in volleyball teaching and training. *Liaoning Sport Sci & Tech*, *46*(3), 233-236.

Zhang, S., & Xu, Z. (2015). Vocational training of volleyball teaching tactics awareness. *Contemporary Sports Technology*, *26*(3), 56-60.

Zhao, J. X. (2016). "Happy volleyball teaching" in college physical education. *Journal of Jiamusi Vocational Institute*, *33*(5), 113-115.