Hindawi
Journal of Sensors
Volume 2023, Article ID 9791508, 1 page
https://doi.org/10.1155/2023/9791508

Retraction

Retracted: Construction and Effect Analysis of College Students' Physical Education Teaching Mode Based on Data Mining Algorithm

Journal of Sensors

Received 8 August 2023; Accepted 8 August 2023; Published 9 August 2023

This article has been retracted by Hindawi following an investigation undertaken by the publisher [1]. This investigation has uncovered evidence of one or more of the following indicators of systematic manipulation of the publication process:

(1) Discrepancies in scope
(2) Discrepancies in the description of the research reported
(3) Discrepancies between the availability of data and the research described
(4) Inappropriate citations
(5) Incoherent, meaningless and/or irrelevant content included in the article
(6) Peer-review manipulation

The presence of these indicators undermines our confidence in the integrity of the article's content and we cannot, therefore, vouch for its reliability. Please note that this notice is intended solely to alert readers that the content of this article is unreliable. We have not investigated whether authors were aware of or involved in the systematic manipulation of the publication process.

In addition, our investigation has also shown that one or more of the following human-subject reporting requirements has not been met in this article: ethical approval by an Institutional Review Board (IRB) committee or equivalent, patient/participant consent to participate, and/or agreement to publish patient/participant details (where relevant).

Wiley and Hindawi regrets that the usual quality checks did not identify these issues before publication and have since put additional measures in place to safeguard research integrity.

We wish to credit our own Research Integrity and Research Publishing teams and anonymous and named external researchers and research integrity experts for contributing to this investigation.

The corresponding author, as the representative of all authors, has been given the opportunity to register their agreement or disagreement to this retraction. We have kept a record of any response received.

References

[1] P. Wang, "Construction and Effect Analysis of College Students' Physical Education Teaching Mode Based on Data Mining Algorithm," *Journal of Sensors*, vol. 2022, Article ID 1028962, 10 pages, 2022.

Hindawi
Journal of Sensors
Volume 2022, Article ID 1028962, 10 pages
https://doi.org/10.1155/2022/1028962

Research Article

Construction and Effect Analysis of College Students' Physical Education Teaching Mode Based on Data Mining Algorithm

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Received 18 April 2022; Accepted 10 June 2022; Published 4 August 2022

Academic Editor: Wen Zeng

With the wide application of computer technology, communication technology, network technology, and multimedia technology in modern education, teaching methods tend to be diversified and scientific. Based on the DM (data mining) algorithm, this paper implements a sports achievement management system. Through this system, the efficiency of inputting and counting students' achievements can be improved, and teachers can be freed from the complicated achievement management. Aiming at the problem that SVM (Support Vector Machine) is slow in training large sample sets in DM classification, a DM classification algorithm based on improved SVM, PSO_SVM, is proposed, which applies the density of adjacent samples to the design of membership function to reduce the influence of noise points on classification. The results show that the training time of this algorithm is increased by 54.26 s and 55.69 s compared with SVM and *K*-means, respectively, and the accuracy is increased by 35.62%. The results obtained by the DM algorithm will be helpful for teachers to diagnose teaching problems and construct PET (physical education teaching) model for college students with characteristics.

1. Introduction

The continuous improvement of the quality of software and hardware in schools has promoted the continuous improvement and optimization of the teaching system. Based on the superiority of data, the communication between various subjects has gradually deepened, which has promoted the scientificity and rationality of school education. To a certain extent, the course results truly reflect the ability and quality of students in a certain specialty, such as music, mathematics, art, and physical education [1]. Previously, data information was only used for routine data recording and statistical classification, but now DM (data mining) technology is not only used for daily student information statistics, teaching task recording, and data storage but also used for data management. With the optimization and update of information processing technology and big data technology, educators place their hopes on the intelligent mining algorithm [2], and DM has gradually become an effective tool for academic performance management and learning effect analysis in universities.

Nowadays, the computer network has become very popular in universities. Using DM technology to set up a university sports achievement management system can provide administrators, teachers, and students with sufficient information and quick query means, complete teachers' scoring work, and make statistics, analysis, and processing of data [3, 4]. Wang et al. used graduates' achievements as feature data, reduced the dimension of feature data by principal component analysis, and classified them by the Bayesian near *k*-nearest neighbor algorithm, namely, career direction prediction [5]. Cai et al. put forward an improved algorithm [6] after researching and analyzing ID3 algorithm and mining and analyzing the data stored in the educational administration system, so as to find out the relationship between curriculum settings and provide some data basis for the uni-

versity's achievement statistics decision-making. Moon et al., based on the Hadoop big data platform, mined the application information of information-based campus and recommended campus information for corresponding characteristic learning [7]. Nolen et al. used rough theory to excavate and analyze the correlation between the improvement of students' performance and the leading factors of active learning [8].

There are abundant teaching resources in our school, and a large amount of data can be used for reference. However, in practical application, the utilization rate of data is low, and most of the data resources are idle in the database, so they do not play their due value. In view of this, this paper studies the application of DM technology in students' multiattribute training, with a view to effectively mine the potential rules and associations in the data related to students' training by applying proper DM technology, aiming at correctly understanding the characteristics of college students' physical education represented by Chengdu Institute of Physical Education, revealing the laws and trends of college students' physical education learning and providing reference for the research and implementation of college students' physical education learning in physical education institutes.

2. Related Work

2.1. Research on the Teaching Mode of Physical Education. Sports achievement is mainly a measure of whether there is a gap between students' physical fitness and expected goals and the means to measure this gap. It can only show the results of students' physical exercise but cannot reflect the causes of such results. Therefore, teachers have the responsibility to explain to students the significance of the test results and the reasons for the results and guide students to take appropriate exercise process to improve the test results [9].

Ding et al. used different data prediction methods, established prediction models, and made the best use of correlation analysis results and students' real achievement data to predict students' achievements in the courses currently taught by teachers [10]. Thaise et al. put forward a thousand preassumptions, intervened the students' samples, and evaluated the advantages and disadvantages of the intervention measures according to the actual teaching achievements and self-defined evaluation indicators of the intervention objects [11]. Khosravi et al. deeply understand the significance of modular teaching to the development of society and people by understanding the concept, basic characteristics and process of modular teaching [12]. According to the teaching requirements of various schools, Hu et al. divided the teaching content into several modules, combined with students' interests and employment requirements, and rationally matched the module courses [13]. The new "modular" physical education teaching structure model proposed by Li et al. is a new teaching model, which is an innovation of physical education teaching theory and plays an important role in enriching physical education teaching theory [14].

2.2. Research on DM. DM is a multidisciplinary field that integrates database technology, machine learning, information retrieval, artificial intelligence, and other latest technologies.

Luo et al. applied the improved genetic algorithm to data hiding and publishing, which can better protect the privacy of original data from leaking [15]. Li et al. applied multiobjective particle swarm optimization to multiclassification [16]. Ru et al. studied the hybrid algorithm of swarm intelligence algorithm and clustering algorithm. Aiming at the shortcomings of existing clustering algorithms and particle swarm optimization algorithms, it is meaningful to improve the particle swarm optimization algorithm to optimize the clustering model and apply it to real life data mining [17]. Stamatescu et al. put forward new methods and technologies for the development of online education at home and abroad, and made positive contributions to the development of modern education [18].

Wang et al. adopted the classification method of DT (decision tree) [19], applied DM technology to students' achievement information, and constructed the DT model of professional ability, which helped teachers to gain a more accurate and efficient insight into the existing problems in the teaching process, and achieved the effect of optimizing teaching quality by using achievement information.

3. Research Method

3.1. Construction of PET Mode for College Students. In the process of PET (physical education teaching) reform, many PE educators and PET workers have done a lot of exploration and research on PET and achieved certain results. However, most teaching models teach students from the perspectives of sports techniques and learning interests, which is one-sided, ignoring the improvement of students' physical quality, and it is difficult to promote students' allround and healthy development [20]. To construct a new modular PET structure model centered on strengthening students' physique, in order to improve students' interest in learning, enhance their physical fitness, eliminate the problems that have plagued sports workers for many years, and promote it in a large area to achieve the purpose of comprehensively improving the national physique and health.

Under the situation that the physical health of college students in China is declining day by day, how to give full play to the function of physical education, improve the effect of PET, and develop students' physical fitness in an all-round way is the top priority of contemporary college physical education research. The construction of modular teaching structure model is based on physiology and psychology, follows the law of physical quality development, and conforms to the psychological characteristics of students. The construction of the model improves the procedural and standardized degree of PET, which is convenient for PE teachers to design teaching. This method has strong operability, flexible methods, rich training means and good training effect, which can stimulate students' interest in learning and improve their physical quality. With the goal of promoting students' sports participation and social adaptability, based on the characteristics of students' physical and mental development, we design and organize the teaching content of physical education courses, divide

the modules according to the structure of students' physical quality, and practice in combination with various sports events to achieve the teaching goal.

As students' period is a period of rapid psychological and physical growth, physical education plays a vital role in the development of students' psychological and physical quality. Because physical education class is different from other indoor courses, it needs a lot of physical strength, and some students' physical abilities are weak. In addition, it is necessary to comprehensively consider the processing of all kinds of data information required by DM analysis subsystem. Compared with the traditional way of counting students' achievements by office software in teaching, big data technology pays more attention to the integration of channel data such as teaching sensors and teaching management platform. At the same time, through deep mining and analysis of the data in the database, the accurate statistical analysis results can be obtained, which can provide data support for the formulation of coaches' training plan, the monitoring of training quality and the adjustment of on-the-spot tactics.

In the process of PET, students' gender, age, and personality characteristics should also be considered. Students show different psychological characteristics at different ages. Through the influence of physical education curriculum on students' will quality, emotion, cognition, personality, and psychological characteristics, students can keep a good emotional state in physical education curriculum and control their emotions reasonably. From students with strong social adaptability to students with weak social adaptability, they should get corresponding physical exercises and enjoy the corresponding care of teachers, so that students can be fully developed.

When the system conducts DM analysis, it is necessary to analyze whether the teaching effect of teachers is related to their age, educational background, professional title, etc., which requires the system to have complete file data of participating teachers, but the above information of teachers is not needed when collecting evaluation information. It is easy to assess the grades, but how to analyze the students' grades and extract the required hidden information is also very important [21]. In all aspects, students need constant exercise in order to improve their physical quality and ability. However, teachers' neglect of PET ultimately leads to students' physical and mental health failing to develop better in sports.

In order to improve the quality of PET and make PE teachers get rid of the busy data statistics management, this paper designs a sports achievement management system based on DM technology, as shown in Figure 1.

It can be seen that users are divided into three types: physical education teachers, students, and system administrators. Firstly, it is the system presentation layer for human-computer interaction, including test project management, score management, score statistical analysis, and expansion project. Secondly, the business logic layer, as the core component of the system, contains the relevant business logic of all items in the presentation layer and completes the logic judgment and processing. Finally, the data access layer is connected with the database and documents.

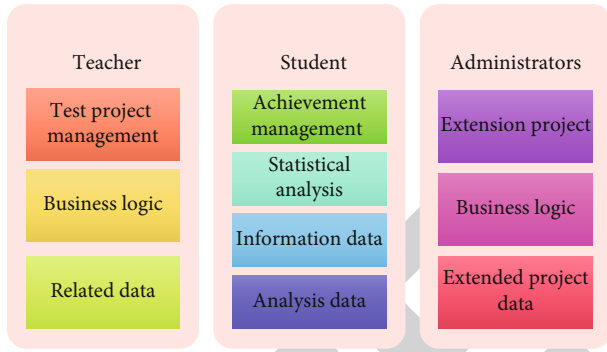

Figure 1: Overall system architecture.

With regard to the data of students' evaluation of teaching, further analysis and research on the data of students' evaluation of teaching by using the increasingly mature DM technology can help the teaching management departments and teachers to solve teaching problems in a targeted way. Excavate the potential correlation between the evaluation attributes in the data of teaching evaluation, find out the related factors that affect the quality of classroom teaching and the correlation between them, and put forward trend, operable and beneficial suggestions, and measures for improving the teaching level and strengthening the teaching management.

In the traditional PET evaluation, the evaluation of students is mainly based on students' sports achievements, and the evaluation of PE teachers is mainly based on personal subjective impressions, so the evaluation is incomplete and objective. At present, college PET evaluation mainly evaluates students and PE teachers by summative evaluation, which cannot reflect the situation of students and PE teachers at all stages of teaching. Manual evaluation is not only time-consuming and laborious, but also prone to errors, while intelligent evaluation is not only convenient and quick, but also accurate. Therefore, the means of college PET evaluation should be changed from traditional manual collection, statistics, and analysis to intelligent technology to collect, process, and analyze a large amount of evaluation data.

Based on the above methods and principles of functional module division, Figure 2 shows the overall functional module structure of the system. It can be seen from the figure that the sports performance management system includes five functional modules: sports test type management, test item management, performance management, performance analysis, and system management.

The data in the score management system will gradually increase with the use, and the storage will be realized by the database. At the same time, reading the requests and operations of the system will be the focus of the system development. The main technical difficulty of this process is entity identification. Accurate entity identification can reduce the redundancy of integrated data and prepare high-quality data for system DM. The flowchart is shown in Figure 3.

To complete the management of students' sports achievements, it is necessary to query, enter, delete, and export the achievements.

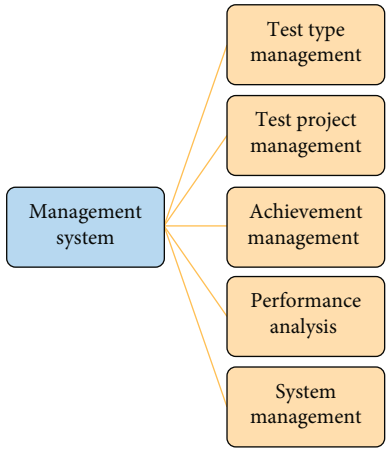

Figure 2: Overall functional structure of the system.

(1) Select the score information table in the system, and insert the required new data table in the table to record the student's student ID and the corresponding score

(2) Compare the data in the database, and judge whether the input information exists or not; if it exists, prompt the user that the input is unnecessary; if not, complete the input of the information

(3) According to the return value in the database, judge whether the entry is successful or not. If the system displays true, the entry is successful [17]

The generation of DT is divided into two stages: learning and testing. In the DT learning stage, top-down recursion is adopted. The DT algorithm is divided into two steps: the first is tree generation. At the beginning, all the data are at the root node, and then, recursively divide the data until leaf nodes are generated. The second is tree pruning, which is to remove some data that may be noise or abnormal. After receiving the data information, the application server divides the information into two paths for transmission: one path is safely sent to teachers, students, and other types of customers through the firewall; one channel is directly received by the platform administrator to facilitate the management of PET information, maintain the safety of teaching data, and control the access qualification of users.

3.2. Analysis of College Students' Physical Education Learning Effect Based on DM

3.2.1. Data Acquisition. The collected contents include teaching data (including teacher data, student data, teaching situation data, equipment status data, and classroom status data) and information on personnel, scientific research, patents, papers, awards, and loans, which are distributed in many information points in the campus and involve all aspects of campus life. Based on the association rules generated by the Apriori algorithm, this paper analyzes the elements related to students' learning effect, that is, the favorable factors and unfavorable factors that form the current learning effect, and helps teachers to scientifically optimize PET.

The importance of DM technology is gradually emerging. On the one hand, DM technology can discover the hidden laws of a large amount of data and the potential relationships among different data. On the other hand, DM can also make scientific predictions on the future development of things and then exert the greatest value of data. In the education industry, most of the research is aimed at students' achievement, and scholars explore the internal relationship between educational data and students' achievement through DM technology [18]. Promote the transformation of education mode, and gradually change the traditional teaching management mode into personalized teaching system.

The problem that DM has to deal with is to find out valuable hidden events in a huge database, analyze them, obtain meaningful information, and summarize useful structures. It has been found that in general or with a high probability, the smaller the tree, the stronger the prediction ability of the tree. To construct DT as small as possible, the key lies in choosing appropriate logical judgment or attribute. In the actual evaluation activities, the indicators should be flexible and adjustable. Then, preprocess the data to implement the selected DM algorithm. Finally, the results of DM are analyzed.

Data collection is the part with the largest number of participants in the whole system operation. Here, the roles of users are mainly divided into two categories: teachers and students, and the goal is to achieve complete and accurate collection of large-scale evaluation data. The steps of data acquisition are shown in Figure 4.

Through the application of DM technology, an effective PET evaluation system is established, the teaching evaluation is analyzed, and the shortcomings of PET are found, so as to change the teaching plan and improve the teaching quality. In PET evaluation, students grade the completion level of PE teachers' teaching tasks, evaluate the teaching effect of PE teachers, and put forward teaching opinions. In the stage of knowledge expression and evaluation, the useful information and association rule expression obtained in DM stage are mainly displayed to users or provided to related applications in the form of new knowledge.

Coefficient of variation refers to the coordination degree of experts. The smaller the coefficient of variation, the higher the coordination degree. If the coefficient of variation is greater than 0.25, it is considered that the degree of coordination is not high [19, 20]. The calculation formula is

$$V_j = \frac{S_j}{M_j},$$
$$M_j = \frac{1}{n}\sum_{i=1}^{n} X, \quad (1)$$
$$S_j = \sqrt{\frac{1}{n-1}\sum_{i=1}^{n}(X_i - M_j)},$$

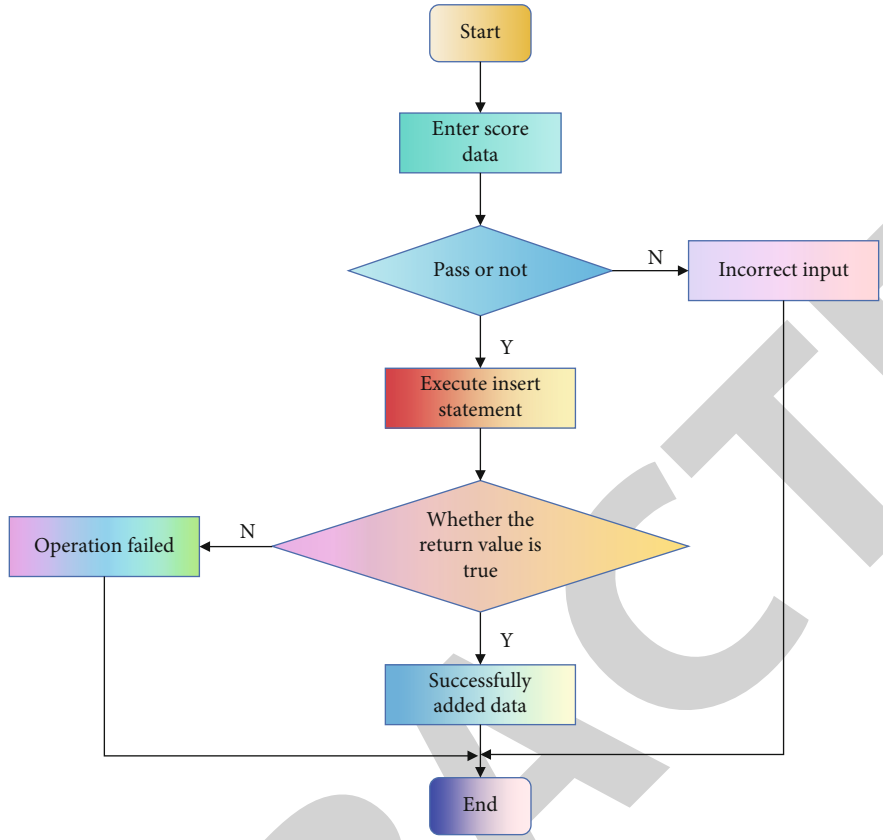

Figure 3: Flowchart of achievement management.

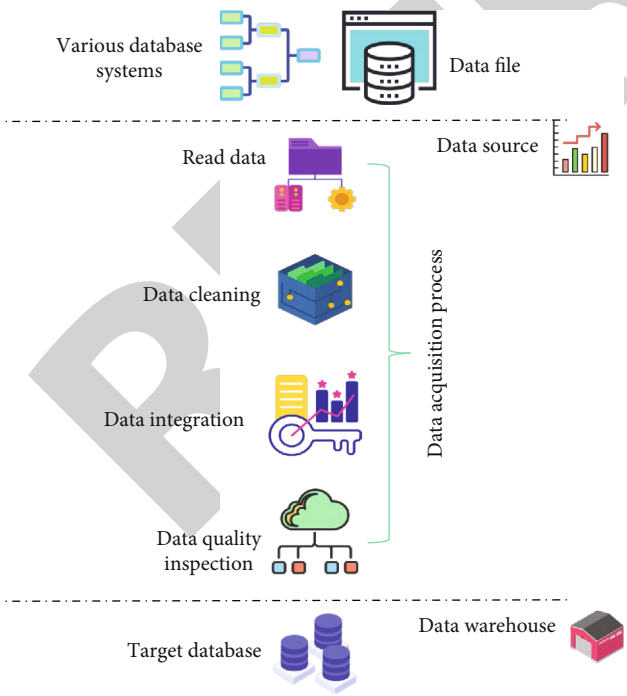

Figure 4: The process of data acquisition.

where V_j represents the coefficient of variation, S_j represents the standard deviation, and M_j represents the arithmetic mean.

The research of sports achievement management system based on DM university is aimed at improving the work efficiency and accuracy of physical education teachers in university, liberating them from tedious and boring work, and then improving their management level and teaching quality. Under the condition of setting test types, new test items can be added under each test type, and these test items can be modified or deleted. Similar to the test type score setting, each test item also has a certain score weight, so the system needs to set the score weight of each test item. The system can comprehensively analyze students' physique according to their achievements, including historical sports achievements, and provide valuable suggestions for improving their physique.

The users of the system are teachers, students, and system administrators. Among them, the operations that teachers can perform include test type management, test project management, grade management, grade statistical analysis, etc., while students can only participate in grade management. System administrators can perform all operations and have the maximum operating authority. The ultimate goal is to discover the potential problems in data flow in advance. These problems are various, including data flow and data processing.

The zero-level diagram of the system reflects the overall flow of data. Although it can see the specific business, it cannot clearly show the internal processing process. Therefore, the zero-layer data flow graph still needs to be decomposed. From the developer's point of view, this makes it possible to

change the business requirements, without modifying all the codes, only by adjusting the business logic, thus improving the development efficiency of the program and reducing the development cost.

3.2.2. DM Analysis. Among DM algorithms, the tree model is a very common algorithm, which can deal with both classification and regression problems. In most cases, it is used to deal with classification problems. DT algorithm learns from data and classifies and predicts input variables and output variables with different values in different situations. In the process of DT formation, the main components are feature selection, DT generation, and pruning. In the whole process, firstly, a feature is selected in the training set as the classification standard of the current node; then, according to the evaluation criteria, child nodes are generated from top to bottom until they are inseparable. Finally, pruning is carried out to reduce the scale of tree structure, in order to prevent DT from overfitting [21].

The ID3 algorithm uses the information gain of attributes as the criterion of node selection and considers that attributes with high information gain are good attributes. Both ID3 and C4.5 algorithms use the concept of information entropy, and the C4.5 algorithm uses information gain rate instead of information gain as the standard for determining test attributes. The branch nodes generated in this way are generated by different attributes, and each branch represents a subset of samples.

The DT algorithm can obtain DT with less instability by segmentation technology. Let S set have s sample data and s class attributes with different values: $C_i(i = 1, 2, \cdots, m)$.

Assuming that the number of samples in class C_i is s_j, the total information entropy for this sample is

$$I(s_1, s_2, \cdots, s_m) = -P_i \log_2(P_i). \tag{2}$$

The probability that the sample belongs to C_i is expressed as P_i or s_i/s.

Then, it is required that the calculated entropy value should be smaller. So for a subset f that has been given now, calculate its expected value as

$$I\left(f_{1j}, f_{2j}, \cdots, f_{mj}\right) = -\sum_{j=1}^{n} P_i \log_2\left(P_{ij}\right). \tag{3}$$

Now suppose that the coordination degree of a decision-making system such as $S = (U, C \cup D, V, f)$; then, $X \longrightarrow D$ can be expressed as $\mathrm{CON}(X \longrightarrow D)$; then, the decision-making coordination degree is

$$\mathrm{CON}(X \longrightarrow D) = \frac{|X \cup D|}{|X|}, \tag{4}$$

where $|X| = \mathrm{IND}(X)$ represents the cardinal number of $\mathrm{IND}(X) \subseteq U \times U$. And $|X \cup D|/|X|$ indicates the possibility of randomly taking out two rules with the same antecedents and successors in the decision-making system.

However, when calculating the gain of attribute information with the ID3 algorithm, logarithmic operation is used, so the computational complexity is reduced, so the original ID3 algorithm is improved accordingly.

The specific algorithm flow is as follows:

(1) Compare the coordination degree of all attribute decisions

(2) Calculate the information gain of attributes with similar decision coordination degree

(3) Select the attribute with the highest degree of coordination as the split node

(4) Recursive call is used until the conditional attribute is null, and finally DT is generated

SVM (Support Vector Machine) is a supervised machine learning algorithm; that is, it is necessary to train the training samples to obtain the optimal classification hyperplane and then classify according to the training results.

Assuming that there are k neighbor samples in the neighbor sample subset X_i of the sample, the neighbor sample density function is as follows:

$$z_i = \sum_{i \neq j}^{k} \frac{1}{d_{ij} + a}, \quad d_{ij} \leq e_1, i = 1, 2, \cdots, \mathrm{num}X. \tag{5}$$

Among them, a is a small penalty constant in order to process samples with the same value.

Let $X_i = \{X_i, i = 1, 2, \cdots, m\}$ be the data sample set, where the data sample X_i has the same dimension, all of which are d-dimensional vectors. The result of clustering is to find a reasonable partition $D = \{D_1, D_2, \cdots, D_k\}$, and make the partition satisfy the following relationship:

$$\begin{gathered} X \bigcup_{i=1}^{k} D_i, \\ D_i \neq \varnothing \quad (i = 1, 2, \cdots, k), \\ D_i \cap D_j = \varnothing \quad (i, j = 1, 2, \cdots, k, i \neq j). \end{gathered} \tag{6}$$

The PSO (particle swarm optimization) algorithm is widely used in practice because of its advantages of fast convergence, simplicity, and high precision. The PSO algorithm is applied to the simplified support vector of SVM to obtain a new algorithm—PSO_SVM. The number of support vectors obtained by training SVM is the dimension of particles, and each particle has its position and velocity. The position represents the membership degree of the sample, and the velocity changes the membership value.

The location of each particle is composed of the cluster centers of k classes. Because the data sample is a d-dimensional vector, the dimension that determines the location and velocity of the particle is $k \times d$. The calculation steps of

individual fitness value are as follows:

$$Z_r = \frac{1}{n_r} \sum_{\forall x_i \in C_r} x_i, \tag{7}$$

where n_r is the number of samples in cluster r.

The training sample set is processed and PSO_SVM is trained to get the support vector set, and the average classification error of the test set is used as the fitness value of particles. The fitness function is defined as

$$\text{Fitness} = \frac{1}{M} \sum_{i=1}^{M} (f_i - y_i)^2, \tag{8}$$

where M is the number of samples in the test set, f_i is the predicted value, and y_i is the actual value. From the above formula, the smaller the particle fitness value, the better.

The flow of the PSO_SVM algorithm is shown in Figure 5.

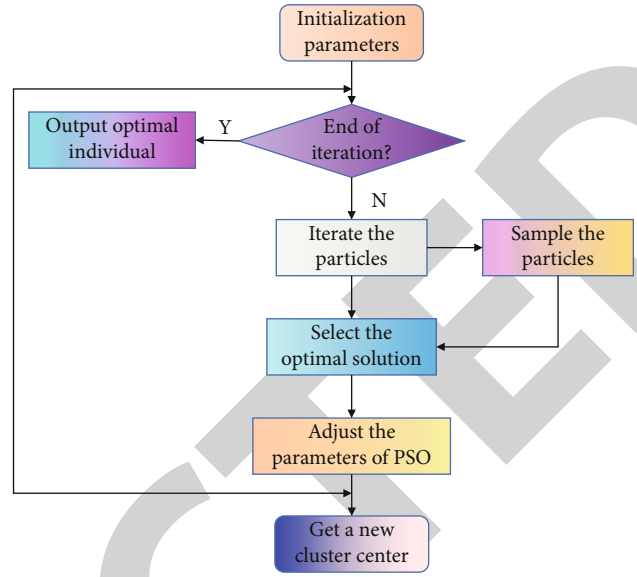

Figure 5: PSO_SVM algorithm flow.

(1) Calculate the distance between two kinds of samples and their class centers

(2) Obtain a fuzzy candidate support vector set

(3) Train PSO_SVM for the subset of support vectors selected by each particle to obtain a decision function

(4) Update the particle swarm optimization algorithm to obtain a set of new membership values

(5) Judge whether the loop stop condition is met, ending when the adaptive value is no longer changed, and output the result; otherwise, go to step 2

(6) The output result is used to train PSO_SVM, and the decision function of reduced support vector is obtained, and the decision function is used for classification

4. Result Analysis

Data analysis and mining are the core of the system. It is divided into two parts: one part is to make a preliminary analysis of the evaluation data by using the traditional statistical calculation method and give a quantitative result in the form of a specific score for each teacher's evaluation result. The other part is to apply DM technology to mine and analyze the collected evaluation data, discover useful knowledge hidden in the data, and extract it for schools and related teachers to learn from. Combined with the teaching data and information of the school, advanced network information technology is introduced and applied to school education management, teaching evaluation, paperless examination, teaching records, students' inductive learning, and teachers' teaching technology analysis.

The DT algorithm can dig out the potential relationship between physical measurement data and students' daily behavior habits. The association rule is to mine the association among factors in the physical measurement data. Based on the data information obtained after data preprocessing, the attribute of "cardiopulmonary function" in college students' physical fitness assessment table has two different values. Calculate the information profit rate of each attribute according to the formula. The calculation results are shown in Table 1.

When generating DT, the DM algorithm did not take into account the problems of data missing and noise in the actual process, so it needs pruning after generating DT. Pruning mainly simplifies the DT model by controlling the size of the tree, so as to avoid overfitting phenomenon to some extent. After the repeated branches are removed, the stability and readability of DT model are greatly improved.

The ID3 algorithm is improved and demonstrated by the degree of decision coordination, and the training sample set is tested by two different methods. Each method carries out 20 experiments on each group of data, and the average value of all experimental data is obtained by calculation, thus ensuring the universality of the experimental data. The experimental data are shown in Figures 6 and 7.

According to the above two charts, although the accuracy of the algorithm will decrease with the increase in data in the sample set, the improved algorithm is better than the original ID3 algorithm in both time and accuracy.

Endurance is divided into aerobic endurance and anaerobic endurance. In the process of physical education curriculum design, the training of endurance quality should be reasonably arranged according to the characteristics of each event. In the process of PET, different special teaching contents are different, and the intensity of stimulation to students, the development of students' physical quality, and the development of muscle groups are also different. In the process of PET, the modules corresponding to special teaching contents should be scientifically divided, and students' physical quality should be rationally developed through special exercises.

Table 1: Physical fitness data calculation results.

Calculation project	Diet	Work and rest	Habit	Importance of physical education
Subset expected information value	0.9332	0.9022	0.8871	0.9654
Information gain value	0.0041	0.0369	0.0805	0.0071
Split information value	0.8869	0.7748	0.9216	0.9975
Information gain rate	0.0054	0.0412	0.0884	0.0077

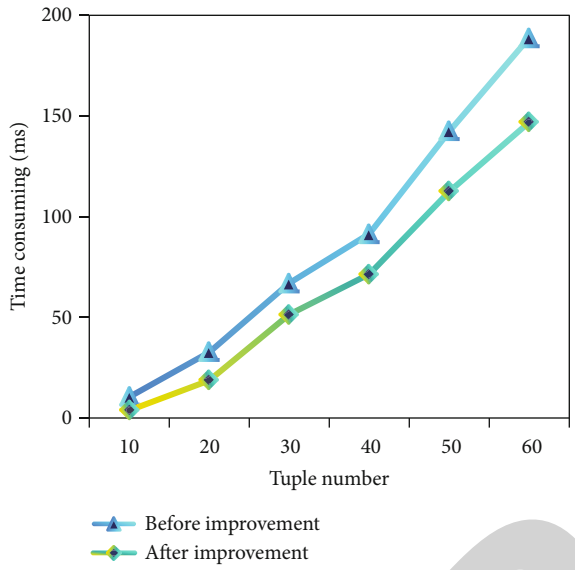

Figure 6: Comparison of algorithm time.

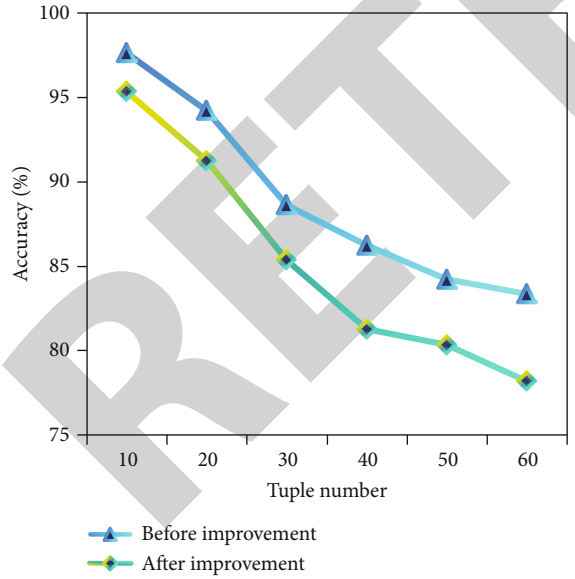

Figure 7: Accuracy comparison of algorithms.

Through testing the evaluation index of students' speed quality (100 m), it is found (Table 2): before and after the experiment, the average test scores of 1000 m in the control group and the experimental group are the same, both of which are 7.6 s. After the experiment, the score of the experimental group increased to 7.2 ± 0.6 s, which was significantly different from that of the same group before the experiment. The score of the control group decreased by 0.4 s and increased to 7.1 ± 0.7 s. There were significant differences in the test results before and after the experiment.

During the entrance test, students' mastery of 100 m running skills is not reasonable enough, and their achievements are affected to some extent. To some extent, students' 100 m running skills are positively transferred, and their skills are developed, which is conducive to the improvement of their achievements. In addition, the special basketball practice has promoted the development of students' physical quality to a certain extent, especially their reaction speed and moving speed, thus further promoting the development of students' speed quality.

With the increasing workload and difficulty of physical education teachers, teachers need to carefully analyze the characteristics of sports events, rationally plan teaching contents, scientifically design teaching actions, constantly absorb advanced teaching ideas, blaze new trails, and strive to improve their comprehensive quality; At the same time, physical education teachers are required to have high professionalism, selfless dedication and improve their professional ethics.

With evolutionary algebra Max$T = 40$, the relationship between evolutionary algebra of new algorithm PSO_SVM and K-means algorithm and optimal fitness and interclass dispersion sum is compared. Figure 8 shows the analysis of the standard data set Iris.

It can be seen that the optimal fitness value of the new algorithm PSO_SVM rises stepwise and reaches the optimal fitness when the evolution algebra is about 20. While the K-means algorithm has a high optimal fitness value in the first few generations of evolutionary algebra, but the fitness changes slowly in the later evolutionary algebra.

Compared with the traditional K-means algorithm, the improved PSO_SVM algorithm can achieve smaller interclass dispersion sum, can achieve the optimal fitness value in less evolutionary algebra, and has higher accuracy of clustering results, but the stability of the algorithm needs to be further improved.

Three two kinds of data sets in the UCI database are used in this experiment. For the convenience of comparison, the parameter selection methods of the three algorithms are consistent with (1), and the training time, classification time, and classification accuracy are verified by 10 times and 50% cross-validation for the three data sets. The classification results of our algorithm and the other two algorithms are shown in Figures 9 and 10.

It can be seen that the training time and classification time of this algorithm are obviously improved. Compared

Table 2: Experimental results of students' 100-meter running.

Group	Experimental stage	Mean time (s)	Change value (s)
Experimental group	Before experiment	7.6 ± 0.5	0.7
	After the experiment	7.2 ± 0.6	
Control group	Before experiment	7.6 ± 0.4	0.4
	After the experiment	7.1 ± 0.7	

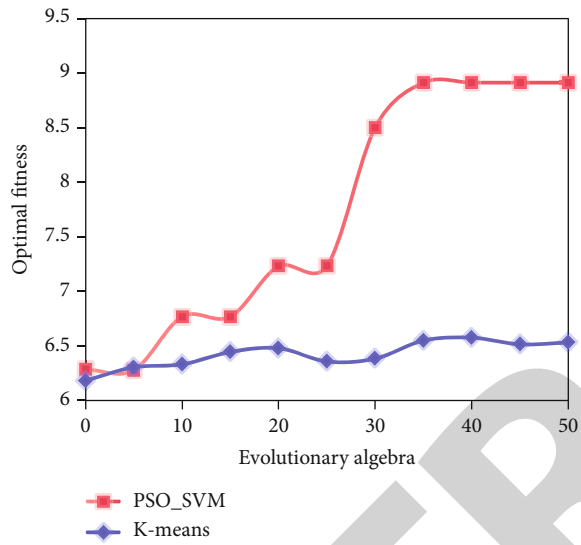

Figure 8: The relationship between evolution and individual optimal fitness.

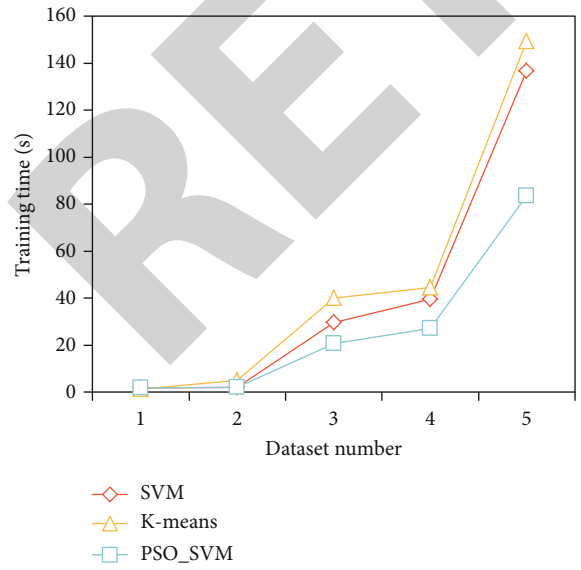

Figure 9: Training time.

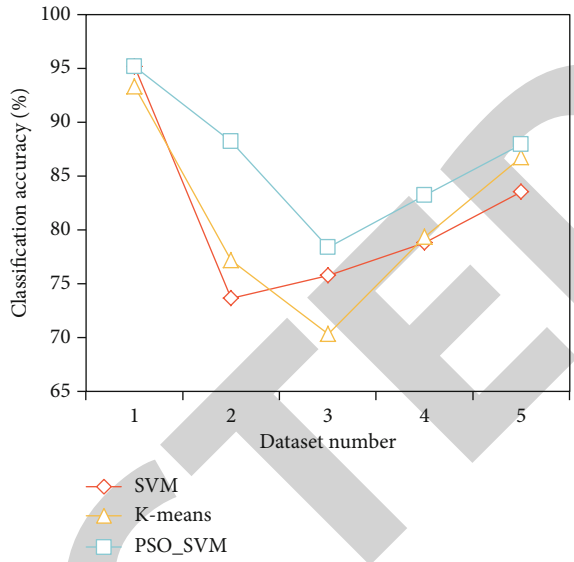

Figure 10: Classification accuracy.

with SVM and *K*-means, the training time of this algorithm is increased by 54.26 s and 55.69 s, respectively, and the accuracy rate is increased by 35.62%. It can be seen that the training speed is improved by reducing the number of training samples by preselecting candidate support vectors, and the classification speed is improved by using PSO to reduce support vectors.

Some data sets can achieve the best classification effect with fewer support vectors, and the accuracy of data set 4 has lost 0.08% relatively. This may be due to the fact that the support vector set obtained by training PSO_SVM in data sets is already sparse, and there is no need for reduction. However, on the whole, the algorithm in this paper improves the training speed and classification speed while ensuring the same classification accuracy.

Appropriate exercise load means that the exercise load of teaching content in PET process should be within the range suitable for strengthening students' physique. The determination of physical education curriculum load intensity needs to be determined according to the teaching objectives, teaching contents, teaching objects, teaching environment and other factors. The new modular PET structure mode is aimed at students' individual differences, and set up different difficulty training methods to ensure that all students get full exercise; according to students' interests and hobbies, elective courses of different sports events are set up, and targeted modular design is carried out to fully arouse students' interest in learning. By effectively recording the teaching methods of physical education teachers and combining with students' academic achievements, this paper analyzes the relationship between them.

5. Conclusion

With the help of DM technology, in-depth research on sports industry data is not only of high scientific research value, but also of great social significance, which can greatly promote the development of sports informatization. In this

paper, the DM method is used to analyze the survey data of students' intelligent physical education learning in physical education institutes, and the potential rules of students' physical education learning in physical education institutes are obtained.DM algorithm based on PSO_SVM is tested on artificial data sets and UCI data sets, and the effectiveness of the algorithm is verified. Compared with SVM and K-means, the training time of this algorithm is increased by 54.26 s and 55.69 s, respectively, and the accuracy rate is increased by 35.62%. By setting the weight value to generate the final evaluation data, using PSO_SVM algorithm to cluster and mine the data, classify students or teachers, and then, give guidance or suggestions for improvement according to the class, which can effectively save time and improve the teaching quality.

Data Availability

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

Conflicts of Interest

The author declares no competing interests.

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