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Research Article

Evaluation Model of College Physical Education Based on Random Matrix Simulation Algorithm

Jie Liu [1] and Wei Li [2]

[1]Henan Provincial Engineering Research Center for Smart Education and Intelligent Technology Application, Zhengzhou, Henan 450000, China
[2]Henan Engineering Research Center of Rail Transit Intelligent Security, Zhengzhou, Henan 450000, China

Correspondence should be addressed to Jie Liu; 10799@zzrvtc.edu.cn

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In this study, improved algorithms based on kernel norm minimization are proposed, namely, standard CUR decomposition and fast CUR decomposition. The CUR decomposition algorithm is to decompose the matrix into three parts, namely, C, U, and R. The matrices C and R are sampled by the column selection algorithm, and then, matrix inversion and matrix multiplication are performed to obtain the cross-matrix U. The matrix $C * U * R$ is an approximation of the original matrix. For the improvement of the singular value algorithm, two random algorithms are proposed, namely, the standard random k-SVD algorithm and the fast random k-SVD algorithm. The main idea is to perform dimensionality reduction and random sampling on the original large-scale data matrix, use the random projection algorithm to obtain an approximation of the original data matrix, then, perform corresponding matrix operations on this approximate matrix, and finally obtain a result similar to the original matrix calculation. Based on the empirical investigation of the current situation of physical education teaching evaluation in a university, this research conducts a questionnaire survey on the student group. Combined with the classification of various majors, the relevant factors of the physical education teaching evaluation system are analyzed and studied, and a more reasonable and unique evaluation model is established. We analyze the dimensions and content of the evaluation index system of physical education, and determine the indicators and weights. From the perspective of the combination of physical education curriculum reform and professional characteristics in a university, this study analyzes the current situation of physical education teaching evaluation and builds a sports teaching evaluation system, so as to deepen the reform of physical education teaching in colleges and universities and create a sports education system with higher vocational characteristics. The teaching evaluation model has certain practical significance.

1. Introduction

Stochastic algorithms for large data matrix problems have received considerable attention in recent years [1, 2]. Much of this work has been performed due to problems in large-scale data analysis, largely because matrix models are now the more popular data structure models that can be used to simulate data extraction from a wide range of applications. This work has been jointly researched by many research groups [3, 4]. The most obvious benefit of a random algorithm is that it can make the algorithm more efficient. For example, using stochastic algorithms can lead to simpler algorithms that are easier to analyze and process; it can also lead to algorithms with more interpretable outputs.

The quality of physical education teaching evaluation is one of the core issues of whether the quality of physical education teaching can be comprehensively improved [5]. To check, summarize, and guide physical education activities through physical education evaluation is an effective measure to strengthen sports management, mobilize the enthusiasm of PE teachers, and improve the quality of PE teaching. Although the physical education curriculum evaluation method has undergone several reforms, the traditional evaluation method of physical education has many drawbacks at this stage [6]. The achievement of physical education has become an urgent problem to be solved in the current reform of physical education teaching evaluation. Through the research on the evaluation of physical education, the correlation analysis can reveal the inner principles of the evaluation of physical education in the evaluation system of physical education and provide a reasonable theoretical basis for the evaluation of physical education. The basic situation and research analysis of the scientific knowledge mapping system from the macroperspective of physical education teaching evaluation are based on pure theory [7]. The traditional physical education evaluation and practical application evaluation research put forward new research ideas, which can enrich and improve the further development of physical education. With the help of the scientific knowledge map method, the research on the evaluation of physical education can explore the development process of domestic physical education evaluation research from a macroperspective, inherit the scientific research results of predecessors, describe the academic form of field research, and present teaching evaluation [8].

The core problem of kernel norm minimization, that is, the singular value decomposition algorithm of large-scale matrices, is improved. Two improved algorithms are proposed, namely, the standard CUR decomposition algorithm and the fast CUR decomposition algorithm. The main idea of these two algorithms is to construct two approximate orthogonal matrices through the leverage effect value sampling algorithm and then obtain the intersection matrix by calculation, so as to obtain an approximation of the original matrix. This approximate matrix has similar properties to the original matrix, and the singular value decomposition of this approximate matrix is performed instead. Taking a university as an empirical material, this study compares and analyzes the teaching effect produced by the old and new evaluation methods and initially constructs a physical education evaluation system with professional characteristics. We summarize the importance of the scientific evaluation system to physical education and reveal the dialectical relationship between the particularity suitable for a certain university and the general understanding of the general law of physical education evaluation in other vocational colleges of the same kind.

2. Related Work

Related scholars have proposed a high-dimensional James-Stein-type mean estimation method using unbiased estimates of risk differences [9]. In the case where the covariance matrix is unknown, the researchers propose an optimal shrinkage mean estimation method by minimizing the quadratic expected loss function [10]. Under the large-dimensional asymptotic framework, related scholars have also deduced an optimal shrinkage estimate of the high-dimensional mean vector by using the random matrix theory [11]. Related scholars also discussed the estimation of the mean vector of the multivariate normal distribution with an unknown singular covariance matrix and obtained a variety of shrinking mean estimation methods [12].

The sample covariance matrix is widely used because of its simple concept, low computational cost, and good characteristics in the framework of large sample theory, which makes it a good estimate of the overall covariance matrix. But in the high-dimensional situation, the sample covariance matrix is ill-conditioned or singular, and is no longer a good estimate of the overall covariance matrix. A series of superior high-dimensional covariance matrix estimation methods have been proposed one after another [13, 14].

The existence of a large number of degrees of freedom in high-dimensional covariance matrices makes it difficult to estimate them, and structured estimation is to reduce the degree of freedom by restricting the structure of the covariance matrix. Structural conjectures about covariance matrices include low embedding dimension, sparsity, and band structure. One of the most commonly used structural assumptions for covariance matrices is the low embedding dimension, and correlations between variables in high-dimensional data usually depend on a small number of latent components (also called factors) present in all variables [15]. Related scholars introduced a linear factor model when estimating the covariance matrix and obtained the convergence rate of the covariance matrix estimation, which was further extended to a more general situation [16–18]. Sparse covariance matrix estimation generally assumes that the overall covariance matrix is sparse, which means that many off-diagonal elements of the covariance matrix are zero or close to zero. This method effectively reduces the solution space of covariance matrix estimation and reduces the risk of overfitting [19, 20].

The fuzzy comprehensive evaluation method has a certain evaluation value for each factor, which can effectively solve some problems that are difficult to be solved by traditional evaluation methods or general mathematical methods. On the basis of the fuzzy comprehensive evaluation, through the determination of teaching quality evaluation indicators and evaluation standards, evaluation methods and quantitative calculation formulas are proposed to achieve objective and scientific evaluation results, thus establishing a set of scientific and practical evaluation methods. The teaching quality assessment method based on fuzzy comprehensive evaluation has clear indicators, clear levels, simple operation using tables and matrices, and objective evaluation values, which can scientifically evaluate the teaching quality of physical education teachers. Therefore, it has great promotion and application value in the evaluation and assessment of physical education.

The matrix is calculated, the elements of the comment set are assigned, respectively, and a comprehensive percentage system can be obtained by rating value [21–23]. The research results point out that the use of the fuzzy comprehensive evaluation method does not require accurate quantitative data so that the problems in sports work that can only be qualitatively analyzed in the past can be transformed into the quantitative analysis; the determination of weight distribution is a key in the mathematical model of comprehensive evaluation [24–26]. The technical level of track and field is affected by many factors, and the fuzzy comprehensive evaluation method is used to determine it, which has obvious advantages.

3. Methods

3.1. Random Matrix. For an $M \times N$ non-Hermitian matrix X, it is assumed that its elements are independent and identically distributed Gaussian random variables with a mean of 0 and a variance of 1 (which can be determined by normalized satisfaction). By transforming it as follows, its singular value equivalent matrix X_u can be obtained as follows:

$$X_u = U\left(X^H X X^T\right)^{1/2}, \tag{1}$$

where the superscript H represents the conjugate transpose, and U is the Haar unitary matrix (the conjugate transpose of the square matrix U multiplied by U equals the identity matrix), then we have the following:

$$X_u X_{u,H} = X^H X^T X. \tag{2}$$

For L such non-Hermitian matrices X_i $(i = 1, 2, \ldots, L)$, through the above transformation, each can obtain the corresponding singular value equivalent matrix $X_{u,\,i}$ $(i = 1, 2, \ldots, L)$. In this study, $L = 1$.

The product matrix of singular value equivalent matrices is defined as follows:

$$Z = \sum_{i=0}^{L-1} X_{u,i} X^H. \tag{3}$$

The eigenvalue vector of Z is obtained as $\Lambda = (\lambda_1, \lambda_2, \ldots, \lambda_M)$, each element in the vector is a complex number, and the eigenvalue vector Λ contains M complex eigenvalues in total.

When M and N tend to infinity, and the row-column ratio $c = M/N$ is constant, the empirical spectral distribution of the eigenvalue λ_i of Z almost certainly converges. Its probability density function is as follows:

$$f_Z(\lambda) = \begin{cases} \dfrac{c}{2\pi L}\lambda^{L-2} & \lambda \in \left(1 - c^L \quad 1\right) \\ -1 & \text{Others} \end{cases}. \tag{4}$$

Among them, $c \longrightarrow (0, 1)$, where c is a constant.

3.2. Matrix Column Selection. The work of NLA focuses on the study of deterministic algorithms, especially the QR factorization of the rank display, and the axis rules' select columns. A good or bad column selection algorithm plays a crucial role in dealing with huge data. This subsection introduces three-column selection algorithms: uniform sampling, leverage value sampling, and local label selection. The column sampling algorithm does not need to go through every element of the data matrix, and it preserves the sparse, non-negative nature of the data matrix.

Given a data matrix A whose size is $m * n$, S is an abbreviated matrix whose size is $n * s$, such as a matrix constructed using random projection or column selection algorithm. Intuitively, the low-rank approximation property means that the column vectors of matrix kA are almost all in the column space of matrix C. The low-rank approximation property enables us to more efficiently solve the k-SVD problem. Then, we can see that computing the k-SVD of CCA is much less expensive than directly computing the k-SVD of A.

The uniform sampling method is the most efficient method for constructing abbreviated matrices. Its most important advantage is that the uniform sampling does not need to observe the entire data matrix when constructing the abbreviated matrix but only uniformly samples the data matrix. When applied to the core algorithm, the benefit of uniform sampling is that it avoids computing every element of a large data matrix.

The local marker selection algorithm is a very effective and typical method for finding a representative set of columns. There are some tricks to make the local marker selection algorithm more efficient.

(1) The k-centroid clustering can be solved approximately rather than exactly. For example, there is no need to wait for k-centroid clustering to converge; only a few iterations are sufficient to run k-centroid clustering.

(2) When n is very large, we can uniformly sample a subset of the data matrix. For example, max{0.2 n, 20 s} distributed data points then operate on local label selection on a smaller dataset.

(3) In supervised learning problems, each data are associated with a label. We can split the data into g groups based on the labels and then run the k-centroid clustering algorithm on each group. In this way, $s = \text{gk}$ data points can be selected to form an abbreviation of matrix A.

Before proposing the leverage value sampling algorithm, let us first define what leverage value is. Given a data matrix A whose size is $m * n$, the rank of matrix A is less than n, and V is the right singular vector of matrix A. So the leverage value of matrix A is defined as follows:

$$l_i \coloneqq \left|1 - v_i\right| X^T i = 0, 1, 2, \ldots, n - 1. \tag{5}$$

Leverage effect value sampling is to select each column of matrix A, and the selected probability is proportional to its leverage ratio.

3.3. Matrix CUR Decomposition. The CUR decomposition algorithm decomposes the matrix into three parts, namely, C, U, and R, where the matrices C and R are sampled by the column selection algorithm, and the cross-matrix U is finally calculated. This matrix $A = C * \mathrm{U} * \mathrm{R}$ is an approximation of the original matrix A, which is more sparse than the original matrix. However, it retains some important properties of the original matrix. Therefore, directly changing the operation on the original matrix into the matrix operation on this approximate matrix can greatly improve the efficiency of the algorithm.

Compared with the standard CUR matrix factorization, this fast CUR matrix factorization can more quickly and efficiently calculate the intersection matrix. The comparison between the fast CUR decomposition algorithm and the standard CUR decomposition algorithm is shown in Figure 1.

The matrices U and V obtained by singular value decomposition are orthogonal matrices, while the leverage value sampling matrices C and R constructed in CUR decomposition are approximately orthogonal, which is due to the "curse of dimensionality" in high-dimensional data matrices. For any two vectors, they are approximately orthogonal. Because of the similar properties between matrices, the treatment of matrices C and R is similar to that of orthogonal matrices U and V. However, when the dimension of the matrix is not large enough, the matrices C and R will not be approximately orthogonal, so their application will be subject to certain constraints. Compared with singular value decomposition, CUR decomposition has the following advantages:

(1) The CUR decomposition is very intuitive, the matrices C and R are directly selected from the original matrix using the leverage effect value sampling method, and will not produce strange and difficult to explain data, such as negative numbers and other outliers;

(2) Similar to the application method of singular value decomposition, the actual meaning of C and R in CUR decomposition is relatively clear;

(3) Compared with the singular value decomposition, which needs to calculate the eigenvalues of the matrices ATA and AAT, respectively, the CUR decomposition obviously does not need to be so troublesome. CUR decomposition only needs to decompose a low-dimensional cross matrix, so its decomposition efficiency is very high;

(4) The approximate matrix obtained by CUR decomposition is very sparse, and the restored matrix is also very sparse, which is very helpful for the processing of a high-dimensional data matrix.

3.4. Low-Rank Matrix Recovery. Low-rank matrix recovery is also commonly referred to as matrix low-rank and sparse factorization or RPCA. The main research is that when some elements in the observation matrix are destroyed, the destroyed elements can be automatically identified, so as to restore the entire observation matrix. The field of application of this problem is very wide, and the understanding is also different. In computational complexity, matrix stiffness describes the minimum number of matrix elements that need to be changed in order to reduce the rank of the matrix. In data dimensionality reduction, observation data with low-rank characteristics are sought, but it may not be Gaussian noise that affects its low-rank characteristics, but arbitrarily large random errors with the sparse distribution.

Low-rank matrix recovery is an optimization algorithm that decomposes an observation matrix X into a low-rank part L and a sparse part S. Similarly, for the matrix recovery problem, we assume that the observation matrix is very well structured, that is, it is of low rank and that only a small fraction of the elements in the observation matrix are destroyed; in other words, the noise is sparse, but its size is arbitrarily large. Therefore, to solve the mathematical model of the low-dimensional subspace, it can be expressed as the following optimization problem as follows:

$$\underset{L,S}{\mathrm{MINrank}}(L) - (1-\lambda)|S| \quad X = L - S. \tag{6}$$

λ represents the proportion of noise, rank(L) is the rank of the low-rank matrix L, and $||S||_0$ represents the number of nonzero elements. These two parts are the optimization functions of the nonlinear nonconvex optimization combination. Similarly, this is an NP-hard problem, its optimization solution is very difficult, and there is no effective algorithm to solve it. As mentioned above, by doing a relaxation transformation, the matrix can be approximated by the kernel norm of the matrix, thus transforming the problem into an easy-to-solve convex optimization problem as follows:

$$\mathrm{rank}(L) - (1+\lambda)|S| X = L + 2S. \tag{7}$$

In many practical situations, only in a specific situation there can be a unique recovery result (L, S). However, in some special cases, this method cannot guarantee that low-rank and sparse components can be recovered. Assuming that the observation matrix X is equal to e1 $*$ e1 (only the upper left element is 1; the rest are all 0), then X is both a low-rank matrix and a sparse matrix. At this point, we cannot effectively judge whether it is sparse or low rank. In order to get ideal and unique results, the low-rank component L needs to be emphasized and cannot be sparse. The singular value decomposition of L is as follows:

$$L = \prod_{i=0}^{r-1} u_i s_i v_{i+1}. \tag{8}$$

3.5. Analysis of the Evaluation System of Physical Education Teaching in Colleges and Universities. In the development process of curriculum evaluation, in addition to teachers and students, other target groups should also be considered. When conducting curriculum evaluation, it is necessary to allow the target population to fully play their role, thereby improving curriculum standards and strengthening the quality of teaching.

3.5.1. Involvement of Teachers. Teachers are the people who are most familiar with the curriculum, participate in all aspects of curriculum design, and take the initiative in the decision-making and teaching of the curriculum. There is no better understanding of the curriculum and the value of the curriculum than the teachers. The reform, construction, and development of the curriculum are all without the participation of teachers [27–29]. All the specific implementation of education and curriculum reforms must be completed by teachers through teaching practice activities, and concrete and feasible implementation plans can be tested from teaching practice. For the problems existing in the

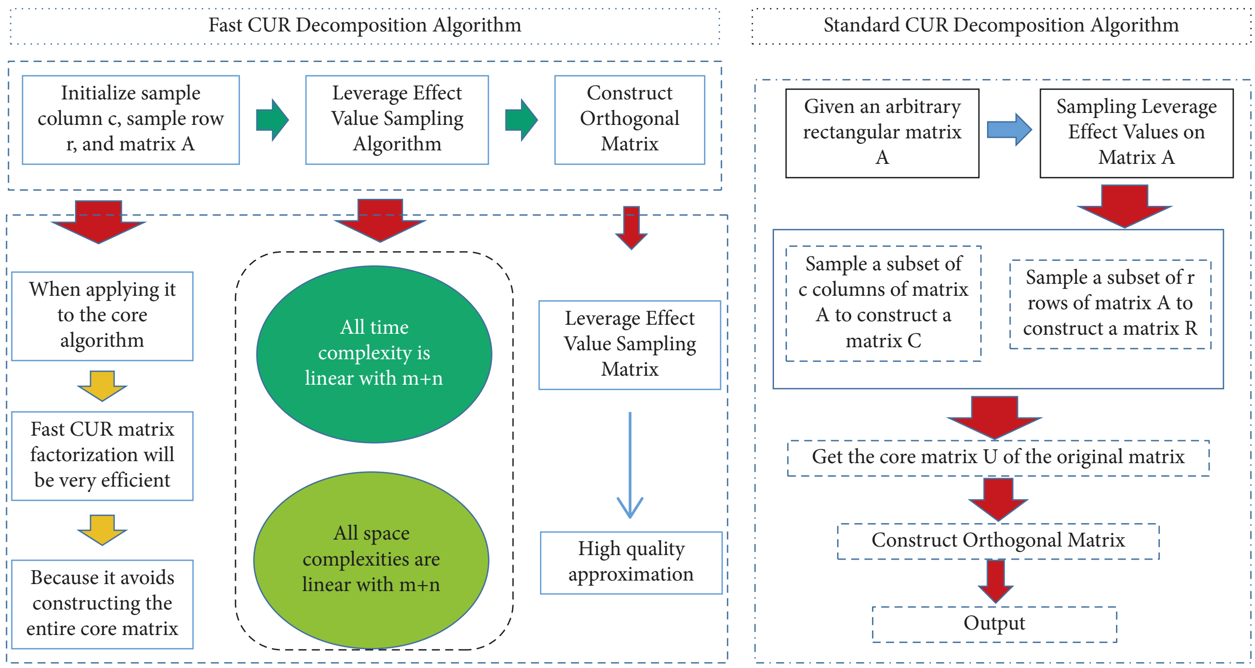

Figure 1: Comparison of fast CUR decomposition algorithm and standard CUR decomposition algorithm.

curriculum and teaching process, teachers have the right to speak and can put forward effective countermeasures that fit the current situation. Based on this point, there is no doubt that teachers, as the main object of the evaluation of physical education in colleges and universities, can make the evaluation of physical education in colleges and universities rapidly develop.

The role and value of the subject object of evaluation in the evaluation of physical education teaching in colleges and universities are quite critical. As the main body of physical education teaching evaluation in colleges and universities, teachers play three roles.

The first is motivation. If you want students to have a vigorous, healthy, and sunny mental state when they are studying and in the process of life, they must give full play to their subjective initiative.

The second is guidance. When students are in the stage of physical and mental growth, due to differences in personality, cognition, etc., a series of problems such as conformity and self-centeredness will inevitably appear. At this time, as a teacher who spends the longest time with students and knows his students best, it is necessary to teach students in accordance with their aptitude and help students get rid of troubles.

The last is criticism. In order to play the role of evaluation in diagnosis and improvement, for the problems encountered in the process of teaching practice, as the teacher who has the most right to speak to the curriculum, he should conduct targeted criticism on the existing problems.

3.5.2. Student Participation. Students are the group with the most comprehensive and intuitive experience of the course, and they play the identity of beneficiaries in the course, because in the classroom students are the main body of passive teaching and active learning. The quality of students directly affects the value of the course. It can be said that students and courses interact and achieve each other. Any improvement and adjustment of the curriculum, the effective solution to the problems existing in the curriculum practice, and the improvement of the curriculum quality are indispensable to the effective participation of students, so students must also be one of the subjects of evaluation [30]. The specific role of students as the subject of evaluation is reflected in the following aspects. First, students can carry out self-reflection, can make a summary of their usual performance, and can clearly recognize their own deficiencies, from which they can make up for their own deficiencies. Second, students evaluate each other. In the school, the students and teachers in the class know them best. Through mutual evaluation among classmates, they criticize each other to grow and make progress together [31, 32]. Third, students evaluate teachers, and mutual evaluation between teachers and students is also a process of emotional cohesion. It can also realize the continuation of the curriculum and can also highlight the teaching and learning with teachers and students as the main body.

3.5.3. Participation of Different Classes. There are different classes in the society, and the interests they represent are complicated. Curriculum experts and education authorities can make accurate judgments on the quality of courses based on their years of experience and can make judgments and guide the direction from a macroperspective. The community and parents can put forward their own views and opinions on the quality of the curriculum based on their actual feelings. After groups from different fields of society join, they will evaluate the quality of courses from different

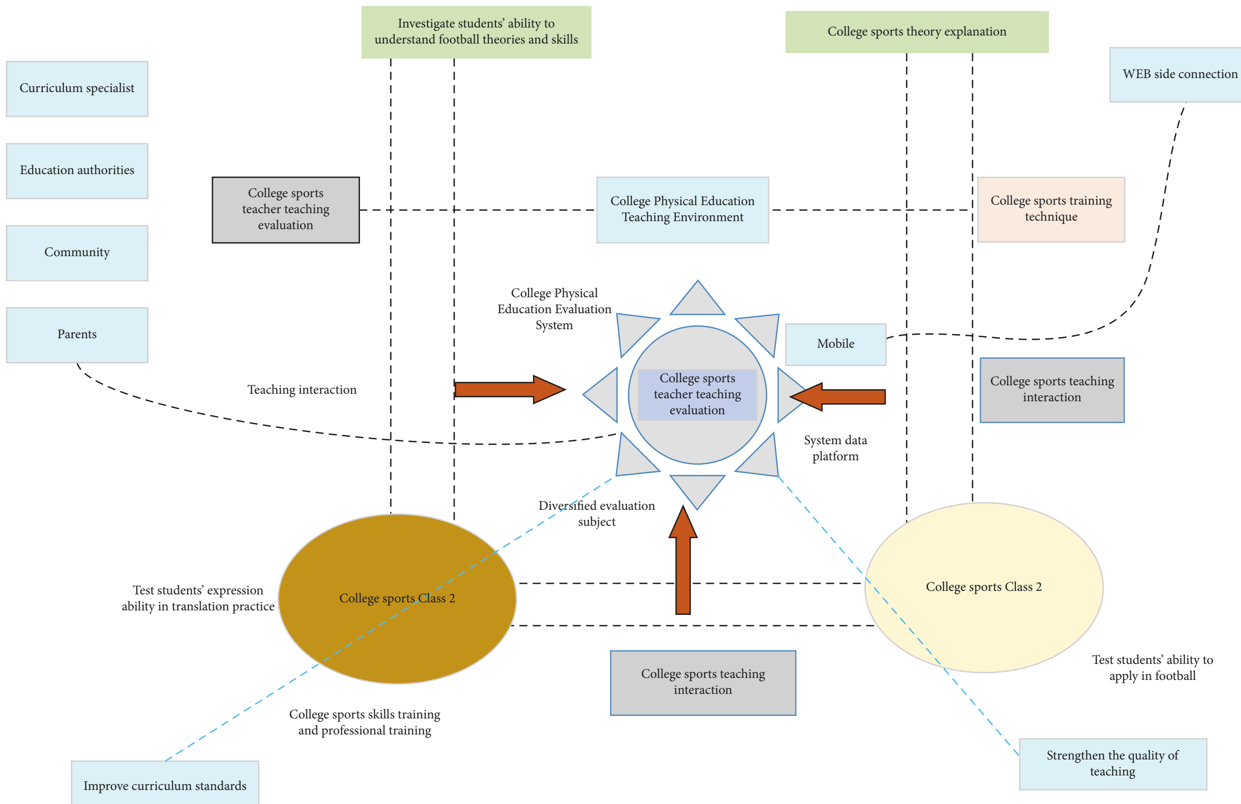

FIGURE 2: Schematic diagram of the evaluation system of physical education teaching in colleges and universities.

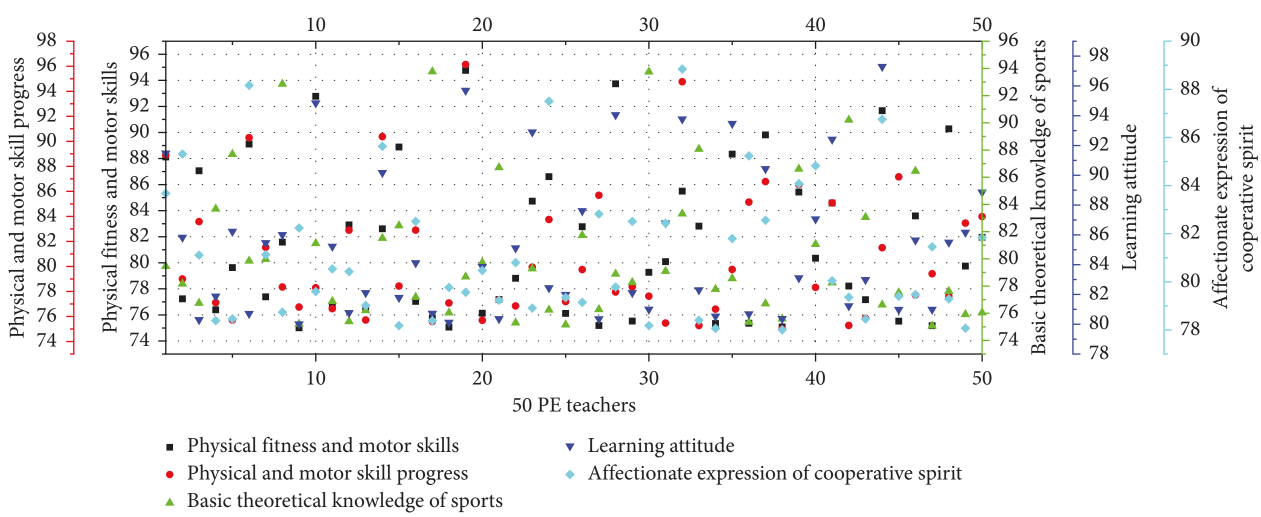

FIGURE 3: The results of the survey on the importance of the content of physical education learning evaluation for students in colleges and universities.

perspectives, thus promoting the continuous development of evaluation subjects in the direction of diversification, and promoting the objective, fair, and comprehensive democratization of evaluation.

The schematic diagram of the digital college physical education evaluation system is shown in Figure 2. The system is connected with the web terminal through the mobile terminal and is a system data platform for course evaluation based on the mobile internet. Relying on this system, it mainly completes various teaching evaluation activities and other related work.

4. Results and Analysis

4.1. Research Results and Analysis of the Content of Physical Education Learning Evaluation in Colleges and Universities. Based on the principle of being beneficial to operation, after consulting experts, it is determined that the five aspects that

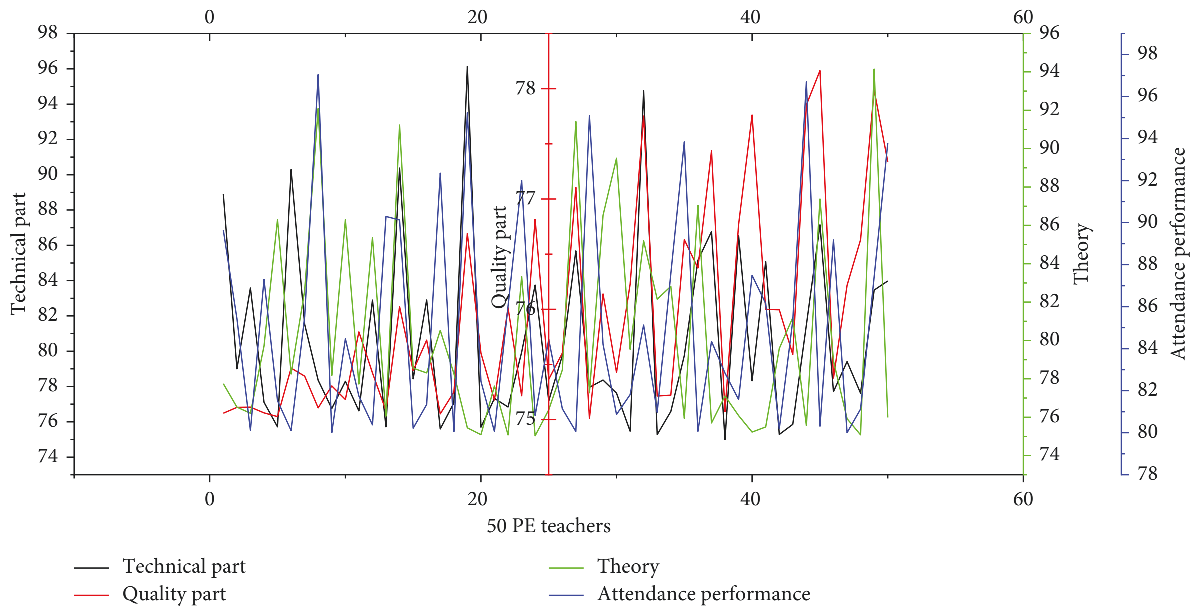

Figure 4: The importance distribution of the content of students' college PE learning evaluation under the current evaluation method.

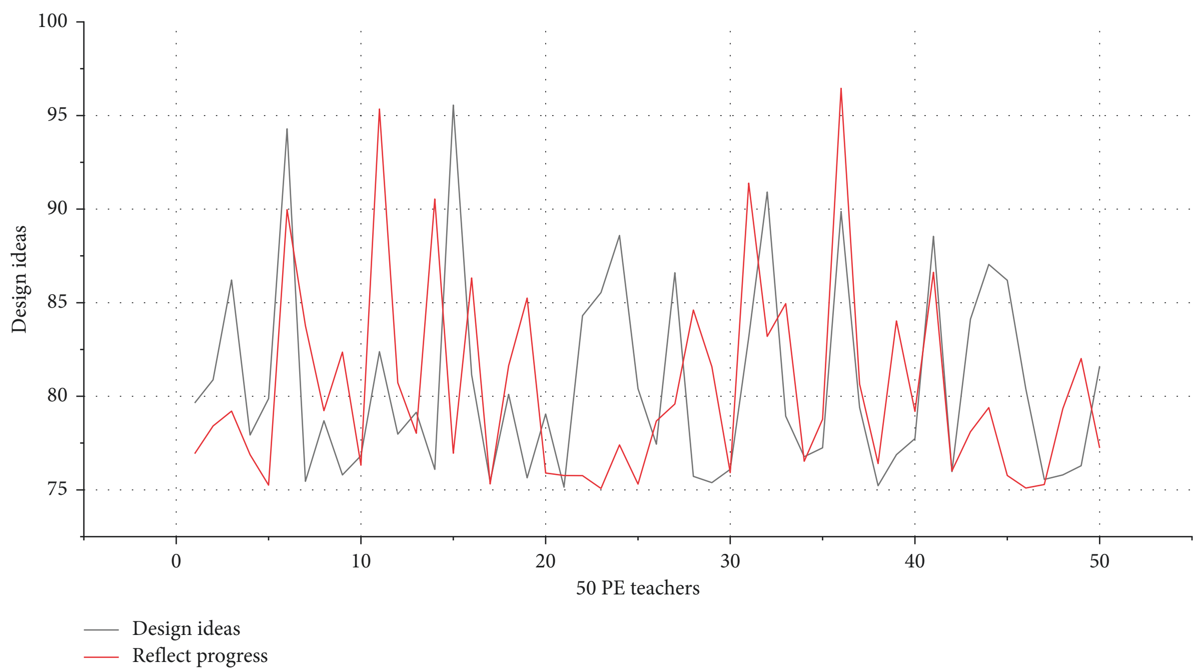

Figure 5: Evaluation of design ideas and reflected progress.

are more suitable for evaluating students' physical education learning are as follows: physical fitness and motor skills, progress of physical fitness and motor skills, basic theoretical knowledge of physical education, learning attitude, emotional performance, and performance. Then, using the key feature survey method to evaluate the five proposed contents of physical education for students, 50 physical education teachers in colleges and universities (5 professors, 19 associate professors, and 26 lecturers) were asked to express their views on their importance. To calculate the weight of each content, the calculation method is to see the proportion of the percentage of people who choose "very important" for each content in the sum of the percentages of people who choose very important for the five contents. Figure 3 shows the results of the survey on the importance of the content of students' college PE learning evaluation.

The current content, score, and new evaluation method of physical education learning in a certain university reflect the idea of summative evaluation focusing on physical fitness and sports skills from the evaluation content to the score, while ignoring the degree of student participation, learning attitude and progress, and other process evaluation content.

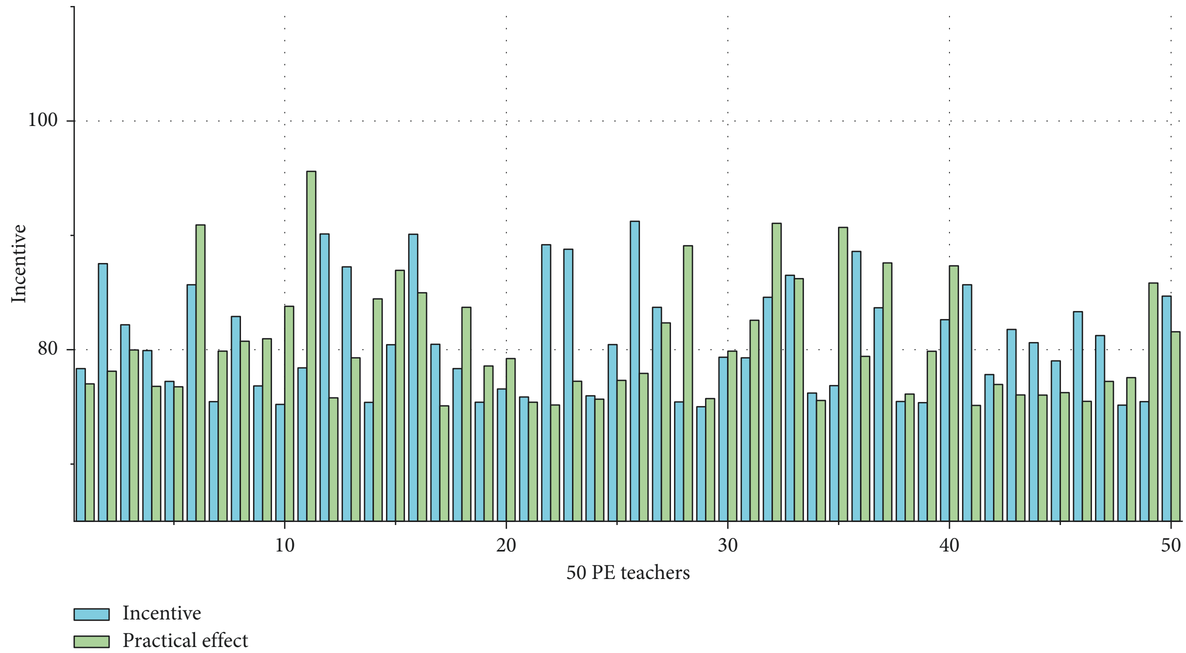

Figure 6: Evaluation results of incentive effect and practical effect.

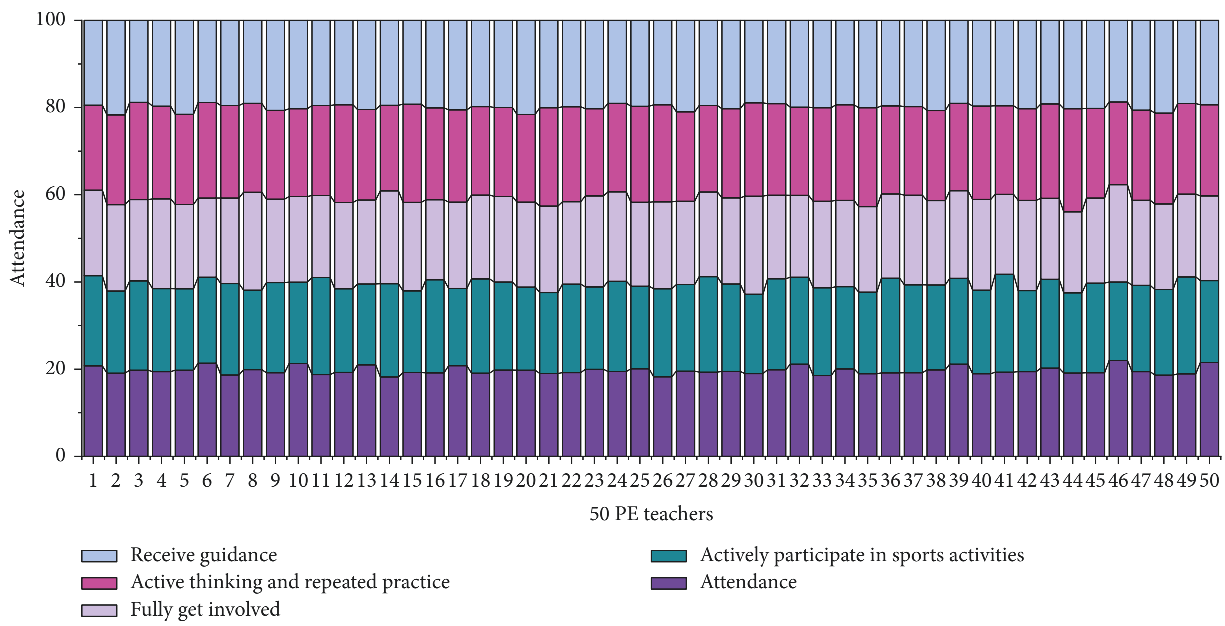

Figure 7: The results of the top five indicators in the ranking of alternative indicators for students' learning attitude evaluation.

Figure 4 shows the importance distribution of students' college physical education evaluation content under the current evaluation method.

The results of the survey on the motivational effect of students on the current and new college physical education learning evaluation methods show that they believe that the new college physical education learning evaluation methods are important for forming conscious exercise habits and lifelong sports awareness; mastering sports methods and skills; improving physical quality; and experiencing sports fun and success feel.

4.2. Research Results and Analysis of Methods for Evaluating the Progress of Physical Fitness and Motor Skills. Students with a low level of physical activity have a larger improvement range, and vice versa. Based on the principle of the progressive scoring method (even if the range of score increase is adapted to the difficulty of performance improvement), physical fitness and motor skills are compiled in combination with the actual physical education teaching.

The survey found that 50 physical education teachers believed that the design ideas of the evaluation table for the progress of students' physical fitness and motor skills

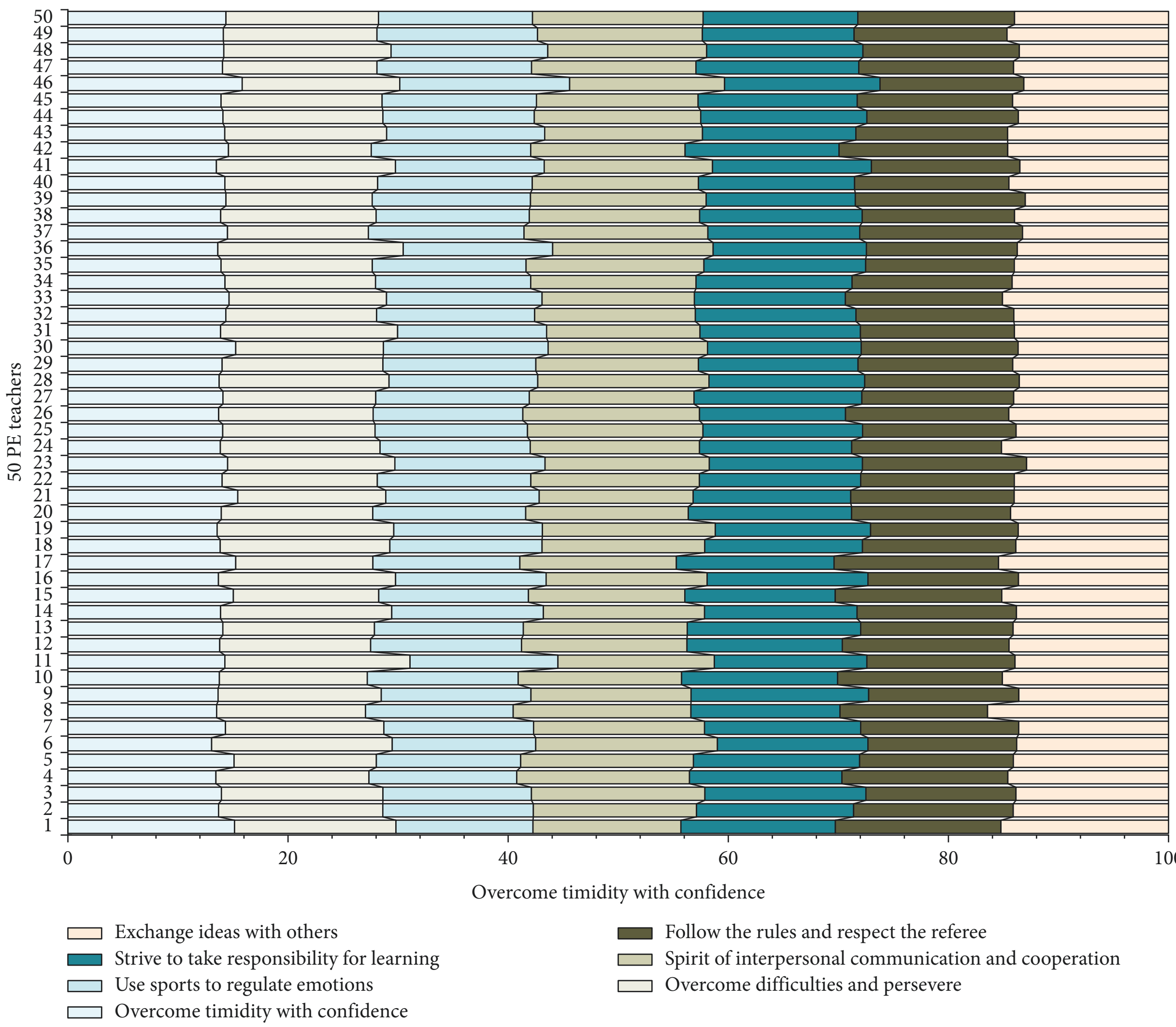

Figure 8: The results of the top 7 indicators in the ranking of alternative indicators for the evaluation of students' emotional performance and cooperative spirit.

provided in this study reflected the progress of students, and the rate of good motivation for students was above 85. As shown in Figures 5 and 6, the vast majority of teachers have a positive attitude toward the design methods and ideas.

4.3. Research Results and Analysis of Learning Attitude Evaluation Indicators. According to the Delphi method, after consulting experts, we have drawn up eight alternative indicators for evaluating students' learning attitudes. A total of 50 physical education teachers are asked to select the indicators that they think are very important, rank them, and select the top five indicators with more than 70% of them.

Judging from the selected five evaluation indicators of learning attitude, it can basically reflect the attitude of students participating in sports learning and can achieve the effect of establishing students' correct understanding of sports and promoting students to form a correct and positive sports attitude. According to the selected indicators, the evaluation of students' learning attitudes is compiled. Figure 7 shows the results of ranking the top five indicators of students' learning attitude evaluation of alternative indicators.

4.4. Research Results and Analysis of the Evaluation Indicators of Affection Performance and Cooperation Spirit. For the selection of the evaluation indicators of students' affection performance and cooperation spirit, the experts were first consulted, ten alternative indicators were drawn up, and 50 physical education teachers were invited to screen the indicators. The results showed that the first seven indicators with more than 50% of the "very important" people were as follows: (1) overcoming timidity and being full of confidence; (2) overcoming difficulties and persevere; (3) using physical activities and other means to regulate emotions; (4) demonstrating interpersonal skills and cooperative spirit in learning; (5) working hard to undertake the learning process; (6) obeying the rules and respecting the referee; and (7) exchanging opinions with others.

The seven evaluation indicators of emotional performance and cooperative spirit selected by the surveyed teachers basically include the content of students' mental health and social adaptation level, which can promote students to consciously improve their psychological state through physical activities, overcome psychological obstacles, and develop positive optimism. The purpose of showing good sportsmanship and cooperative spirit is to use appropriate methods to adjust one's emotions, and to experience the joy of sports and the feeling of success in sports. According to the selected indicators, the evaluation table of students' affection performance and cooperation spirit is compiled. Figure 8 shows the results of the top 7 indicators for the evaluation of students' affection performance and cooperative spirit.

4.5. Analysis of Classroom Teaching Evaluation Indicators. This study investigated the effectiveness of indicators selected by 50 physical education teachers to evaluate classroom learning. The results show that the evaluation indicators selected by the surveyed teachers reflect the elements of the learning process, promote the progress and development of teachers, and promote the creativity of teachers. Improving students' interest in sports helps to improve students' physical fitness and sports skills, and promotes teacher-student interaction.

The effectiveness of the physical education teaching quality evaluation form was investigated among 142 students. The results show that they believe that the physical education teaching quality assessment form is helpful to enrich and update the teaching content and methods and to evaluate the quality of physical education by reflecting the strengths and weaknesses of teachers. The vast majority of students positively evaluate the effectiveness of the physical education quality assessment form and provide more evidence-based assessment tools for students to effectively implement and actively participate in the physical education quality assessment.

5. Conclusions

For the optimal solution of kernel norm minimization, that is, singular value decomposition of large-scale matrices, two improved algorithms are proposed, namely, the standard CUR decomposition algorithm and the fast CUR decomposition algorithm. A good approximation of the original matrix can be obtained by CUR decomposition of the original matrix. The evaluation content, indicators, weights, and evaluation scales formed according to the empirical research results of the evaluation content and indicators of physical education in colleges and universities have certain objectivity, effectiveness, and operability. The evaluation concept of the school is in line with the need of promoting the all-round development of students. It not only pays attention to the physical and mental health of students but also does not regard sports performance as the most important evaluation means. Instead, it explores and develops their potential in various aspects. Like other departments, the quality of university physical education is a combination of many factors. The four factors that affect the quality of physical education are interrelated, interact, and restrict each other, forming an education system. The result of the system analysis is a hierarchical analysis based on the main relationship between the quality elements. It allows for a complete and systematic study of all aspects and dynamics of learning. Although the empirical research based on the classroom education evaluation system mainly reflects the various elements of the physical education process, the physical education teacher's work in the past has received too much attention in the classroom education evaluation. The opportunity, enthusiasm, and effect of students' participation in teaching, students' emotional experience in the classroom, their reaction to the behavior of physical education teachers, students' knowledge mastery at the end of the teaching, and the specific cooperative inquiry behavior in the classroom are the main basis for judging whether a class is successful. The prepared evaluation scale can more accurately reflect the various elements in the process of physical education, has the validity and reliability of the evaluation, is easy to use, and has strong operability.

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 declare that they have no conflicts of interest or personal relationships that could have appeared to influence the work reported in this paper.

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