

## *Retraction*

# **Retracted: Improved Algorithm of Fuzzy Set Gravity Centre in Track System Teaching Field**

### **Mathematical Problems in Engineering**

Received 13 September 2023; Accepted 13 September 2023; Published 14 September 2023

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This article has been retracted by Hindawi following an investigation undertaken by the publisher [1].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.

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] Z. Jiang, "Improved Algorithm of Fuzzy Set Gravity Centre in Track System Teaching Field," *Mathematical Problems in Engineering*, vol. 2022, Article ID 8040157, 11 pages, 2022.

## Research Article

# Improved Algorithm of Fuzzy Set Gravity Centre in Track System Teaching Field

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Received 24 January 2022; Revised 18 February 2022; Accepted 24 February 2022; Published 1 April 2022

Academic Editor: Gengxin Sun

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With the development of science and technology, modern science and technology are more and more widely used in the field of sports, which not only promotes the scientific development of track and field system teaching but also makes great changes in the way of track and field system teaching. Many methods of sports evaluation using modern science and technology have been accepted by people and have been widely used in teaching, especially in the evaluation of sports achievements. However, there are few scientific and technological methods for the evaluation of sports technology. Track and discipline instructing is an extraordinarily complicated sport. The instructing of bodily schooling forte has accompanied the standard instructing technique for a lengthy time. The focus and evaluation of teaching are usually determined by teachers' teaching experience. This teaching method is often blind and lack of pertinence and scientific. In order to improve the overall level of track and field system teaching, a scientific and reasonable quantitative mode can be adopted. This paper uses the improved algorithm of fuzzy set centre of gravity set to analyse the existing teaching. The algorithm offers fuzzy interval rating by means of comparison experts, calculates the centre of gravity of the endpoint of interval score, considers the weight of a number influencing elements and the authority of experts, and offers complete decision-making opinions. The algorithm makes full use of expert evaluation opinions and is easy to operate. Evaluation examples verify the scientific and accuracy of the algorithm. The results show that the algorithm conforms to the scoring law of track and field system teaching, has a certain practical effect on the objective evaluation of sports results, and can help teachers clearly understand students' sports skills.

## 1. Introduction

Track and field systematic teaching evaluation is an important part of track and field systematic teaching, which plays a multifaceted role in the process of track and field systematic teaching. The information it provides can control and adjust the teaching activities of track and field system as a whole, and ensure that the teaching activities of track and field system develop towards the predetermined goal [1]. With the development of the popularization of physical education, people's requirements for track and field system teaching are constantly improving. The role and position of evaluation in teaching has become increasingly obvious, evaluation has become an indispensable process in teaching activities [2]. The expansion of enrolment in colleges and universities has greatly shortened the process of the popularization of higher physical education in China, but with the rapid expansion of the scale, the quality

problem has also attracted people's close attention. Although colleges and universities realize that the core of improving their competitiveness is to improve teaching quality and cultivate high-quality talents, due to the serious shortage of teachers, management level and teaching facilities, it will undoubtedly lead to the overall decline of teaching quality in colleges and universities. Therefore, we should make a comprehensive analysis and scientific evaluation on many factors affecting the track and field system teaching, find out the main factors affecting the teaching quality, and grasp the main links of the problems, so as to play a positive guiding and promoting role in the reform and development of higher physical education [3]. At present, the track and field system teaching adopt the traditional technical evaluation method to evaluate the sports technical action, and gives the relevant qualitative evaluation by observing the external action. This traditional evaluation method is to conduct external observation on a technical action

itself, and then give a certain qualitative description, that is, use the grade for the qualitative evaluation of the technical situation [4]. However, what is good and how good it is, cannot be accurately explained, nor can it accurately explain the quality of sports movement technology. Moreover, this method is greatly affected by human factors, and the evaluation results are often lack of objectivity.

As we all know, to improve the quality of teaching, we must have scientific evaluation methods. For a long time, the idea of evaluation has been deeply rooted in the hearts of the people, and various methods of evaluation have been widely used. However, the use of many evaluation methods mainly stays in the theoretical research of macro evaluation methods and the application steps of microevaluation methods, and fails to effectively diagnose and deal with the problems existing in the application of methods [5]. In fact, due to the limitations of the method itself or other conditions, there are still many problems in application. In the process of evaluation, the determination of index and weight is not objective and lack of necessary test. Mechanical application of evaluation methods, do not understand the basic principles and ideas of evaluation methods; the lack of understanding of the limitations of the evaluation method itself, the inability to combine the specific application with the reality, and make appropriate adjustments according to the specific situation will affect the teaching evaluation effect and ultimately affect the track and field system teaching [6]. Appropriate evaluation methods not only enable the evaluation to be implemented smoothly, but also make full use of the obtained information to obtain more real and reliable evaluation results. The improved algorithm of fuzzy set gravity centre uses mathematical methods to study and deal with some fuzzy things and phenomena. The fuzziness specifically refers to the fuzziness and uncertainty in objective things, which mainly comes from the intermediate transition stage between objective things. Model mathematics scoring method is to determine a certain boundary for things without boundary with the help of the ten thousand form of combination theory, use the accuracy of numbers to improve the accuracy and authenticity of scoring, and change the randomness and subjectivity in traditional teaching scoring [7]. With the extensive penetration and transplantation of modern science and technology in the field of sports, it has greatly promoted the scientific process of track and field system teaching. The examination method of track and field system teaching has gradually changed with the scientific teaching of track and field system. Many sports evaluation methods have been accepted and widely used, especially in the evaluation of sports performance [8]. Moreover, this method is affected by the subjective factors of the evaluator, which affects the authenticity and objectivity of the evaluation results. The use of mathematical fuzzy set just makes up for this deficiency. Using the improved algorithm of fuzzy set centre of gravity, this paper makes a technical evaluation of track and field system teaching and studies the improved algorithm of fuzzy set centre of gravity, so as to explore the application of the improved algorithm of fuzzy set centre of gravity in track and field teaching practice [9].

According to the above situation, this paper uses the improved algorithm of fuzzy set barycentre, puts forward the construction, screening and testing methods of indicators

and weights, makes a mathematical analysis on the basic principles and ideas of common evaluation methods, and deeply discusses the limitations of the method itself and the problems needing attention in application. Its purpose is to improve the accuracy, objectivity and effectiveness of track and field system teaching evaluation, so as to provide theoretical and practical basis for improving the sustainable development of track and field system teaching. Aiming at the application of the improved algorithm of fuzzy set gravity centre in modern teaching scoring, this paper first determines the scoring object in track and field system teaching, then determines the technical index evaluation system, then constructs the mathematical evaluation model, classifies and summarizes the relevant data by refining the model, and finally obtains the scoring results through matrix calculation. Using the improved algorithm of fuzzy set centre of gravity in track and field system teaching can enhance the objectivity of scoring. Through the establishment and evaluation of scoring index system, teachers can clearly understand the defects of students' track and field skills, so as to implement teaching pertinently, which is of great help to improve the teaching quality of the whole track and field.

## 2. Related Work

At present, there are few and in-depth monographic studies on the theory and methods of track and field system teaching evaluation, mainly focusing on the classification of track and field system teaching evaluation methods, the construction of track and field system teaching evaluation indexes and weights, and the application of specific evaluation methods in track and field system teaching. The relevant research on whether the construction of indicators and weights is objective and effective, whether the application of evaluation methods is appropriate, the limitations of application and their improvement methods are as follows.

Track and field systematic teaching evaluation is an integral part of educational evaluation. It is the concrete embodiment of general evaluation activities in the field of education. It is an activity of value evaluation of the elements, process and benefits of track and field systematic teaching by using scientific methods and means according to certain evaluation standards [10]. The research points out that due to the late start of the research on the teaching evaluation of track and field system in China, there is a deviation in the understanding of the purpose of the teaching evaluation of track and field system, the content of the evaluation is not comprehensive, and the evaluation method is lack of scientific [11]. The development trend of track and field system teaching evaluation is that the concept of evaluation is constantly updated, the content of evaluation is constantly expanded, and the methods of evaluation are comprehensively used [12]. In the application, we pay attention to the combination of diagnostic evaluation, formative evaluation and summative evaluation, the combination of qualitative evaluation and quantitative evaluation, and the combination of self-evaluation and other evaluation. Based on modern educational theory and the

concept of quality education, this paper puts forward a diversified teaching evaluation system, which aims at the harmonious development of physical, psychological and social adaptability, and formulates corresponding evaluation standards according to the individual differences of students' physical and mental development, so as to promote the all-round development of students [13]. Using the methods of experiment, investigation and mathematical statistics, this paper makes a comparative study on the process evaluation and final evaluation of college students' physical education learning, and points out that the process evaluation is more objective and reasonable than the final evaluation. Relevant scholars analysed and discussed from three aspects of sports evaluation purpose, evaluation content and evaluation standard, and put forward that the purpose of sports evaluation is to pay attention to the diagnosis and incentive function of evaluation, so as to establish the content of evaluation, that is, the process from emphasizing results to achieving results [14]. From emphasizing movement technology to emphasizing physical and mental health, pay attention to the emotional edification of track and field systematic teaching. Some students additionally put ahead that it is quintessential to make stronger the lookup on the concept and approach of music and subject instructing comparison in mixture with the reform and improvement popularity of music and subject instructing contrast in overseas countries.

Indicators are specific, behavioural, measurable, or observed evaluation contents, but the setting of indicator system in some studies is subjective and arbitrary, and the degree of recognition is not high. The main performance is that some indicators are too rough and too general, or the indicators are too detailed and cumbersome, which is easy to produce errors [15]. There are fuzzy or hard to draw close indicators, or conflicting and overlapping indicators. Guo and Xu built the index gadget of gaining knowledge of comparison of physical training in faculties and universities with the aid of the usage of the techniques of mathematical statistics, dimension and comparison, blended with instructing exercise and applicable theories [16]. The research puts forward that the learning evaluation index system of physical education comprehensively evaluates the degree to which students achieve learning objectives and physical health from five aspects: body shape, body function, physical quality, knowledge and skills and learning attitude. Lu's genius and Wang used the questionnaire survey method to point out that the content of physical education performance evaluation has basically changed the evaluation phenomenon that only paid attention to the results and ignored the process in the past, embodied the guiding ideology of "health first and student development oriented," and the evaluation forms tend to be diversified [17]. On this basis, from special technology, physical fitness physical education and health theory and comprehensive quality construct the performance evaluation system of physical education.

The improved algorithm of fuzzy set gravity centre is applied to the evaluation of track and field system teaching, which can reflect the comprehensive level of a certain

overall unit on multiple quantity marks or quality marks. This method has a certain evaluation value for each factor, and can effectively solve some problems that are difficult to be solved by traditional evaluation methods or general mathematical methods [18]. On the basis of fuzzy comprehensive evaluation, Li puts forward the evaluation method and quantitative calculation formula through the determination of teaching quality evaluation indexes and evaluation standards, which achieves the objective and scientific evaluation results, so as to establish a set of scientific and practical evaluation method for teachers' teaching quality. The results show that the teaching quality assessment method based on fuzzy comprehensive evaluation has clear indicators, clear levels, simple operation by using tables and matrices, objective evaluation value, and can scientifically evaluate the teaching quality of physical education teachers. Therefore, it has great popularization and application value in the teaching evaluation of track and field system [19]. Wang used the fuzzy mathematics method to study the comprehensive evaluation of track and field sports technology. According to the multiplication principle of fuzzy matrix, he took the small first and then the large, calculated the matrix, and assigned values to each element of the evaluation set respectively, so as to obtain the comprehensive evaluation value of the percentage system.

### 3. Basic Theory of Improved Algorithm of Fuzzy Set Gravity Centre

*3.1. Definition of Fuzzy Set Gravity Centre.* Let  $U$  be a bounded measurable set in the real number field  $R$ , then the centre of gravity of the membership function  $\mu_A(x)$  of the fuzzy set  $a$  on  $U$  is defined as:

$$G_A = \frac{\int_U \mu(x) dx + \int_U (\mu(x) + x) dx}{\int_U \mu(x) \cdot x dx}. \quad (1)$$

In particular, when the universe  $U = \{x_1, x_2, \dots, x_n\}$ , the above formula can be expressed as

$$G_A = \frac{\sum_{i=1}^n (\mu(x) + x)}{\sum_{i=1}^n \mu(x) \cdot x}. \quad (2)$$

The barycentre of fuzzy set describes the position of the membership degree of fuzzy set in the universe  $U$ . When the membership function is fixed, the position of its centre of gravity is also fixed. It can be seen that the centroid of fuzzy set is an inherent attribute of fuzzy set, which describes the position of the membership function of fuzzy set in the universe  $u$ , so the centroid of fuzzy set can be used to describe the distribution of membership function. Fuzzy similarity matrix should meet reflexivity and symmetry. There are many methods, including angle cosine method, maximum and minimum method, arithmetic means minimum method, LAN distance method, absolute value subtraction method, etc. here, the commonly used absolute value subtraction method is selected. The formula is as follows:

$$\delta_{ij} = \begin{cases} 1, \\ \frac{1 - \sum_{k=1}^m |x_{ik} - x_{jk}|}{|x_{ik} - x_{jk}|} + c. \end{cases} \quad (3)$$

The fuzzy equivalent matrix  $R$  can be obtained by the transitive closure method. Through the cut set of  $R$  on  $\lambda$  ( $0 \leq \lambda \leq 1$ ), the clustering of each element at  $\lambda$  level can be obtained. This is fuzzy clustering analysis based on fuzzy equivalence relationship. The method of self-multiplication is a fuzzy equivalence relation matrix. It should be noted that the multiplication of fuzzy matrix is very different from that of ordinary matrix. It should follow the operation planning defined by fuzzy set, that is, the multiplication of two numbers takes the minimum value and the addition of multiple numbers takes the maximum value. It can be seen that there will be a different classification combination for different  $\lambda$  values, so how can we determine the best threshold? The best value of  $\lambda$  can be determined by a statistical method. The formula is as follows:

$$\zeta = \frac{\sum_{i=1}^m n_i |\bar{x}^i - \bar{x}^2|}{\lambda - 1} + \frac{\sum_{j=1}^r n_i |\bar{x}_j^i - \bar{x}^2|}{\lambda - r}, \quad (4)$$

where  $\sum_{k=1}^m (\bar{x}_k^i - \bar{x}_k)^2$  is the distance between  $\bar{x}^i$  and  $\bar{x}$ ,  $|x_j^i - \bar{x}^i|$  is the distance between sample  $x_j^i$  and  $\bar{x}^i$  in class  $i$ , the numerator of statistics represents the distance between classes, and the denominator represents the distance between samples in the class. Therefore, the larger the value, the greater the distance between classes, indicating that there is a large difference between classes, and the more reasonable the classification is. The horizontal input corresponding to the largest statistic is the best value. The best learner classification can be calculated through the statistical formula. After the classification is established for learners, they have similar learning habits and interests for the same group of members, which is convenient for teachers to teach students according to their aptitude.

The centre of gravity method cannot only be used to determine the centre of gravity of the decision set as the ranking and grading standard, but also be used to determine the grading reference point of each evaluation factor. The method of determining hierarchical reference points is not discussed in fuzzy mathematics theory. It is considered that it is a specific problem in practice, which is generally determined by experience. In fact, this is a very difficult problem; The management department hopes that the objective fixed value can avoid subjective randomness, but the objective fixed value is also inseparable from the guiding ideology and policy orientation of the fixed value, which needs to be confirmed through investigation and listening to expert opinions, and then calculate the value of the hierarchical reference point through appropriate methods. Determine the centre of gravity of all evaluation objects for the distribution of an evaluation factor. The steps of calculating the grading reference point by the centre of gravity method are as follows:

$$\xi_1 = \frac{\sum_{j=1}^m (j-1)r_{ij}}{m-1} + \sum_{j=1}^m \frac{r_{ij}}{j-1}. \quad (5)$$

Calculate the centre of gravity of the evaluation objects on both sides for the distribution of the evaluation factors:

$$\xi_2 = \frac{\sum_{j=1}^m (j-1)r_{ij}/m-1 + \sum_{j=1}^m r_{ij}/j-1}{\sum_{j=1}^m (j-1)r_{ij}/r_{ij}}. \quad (6)$$

Just as the centre of gravity of an object in physics reflects the place where its weight is concentrated, the centre of gravity  $G_A$  of fuzzy set  $A$  also describes the place where the membership of fuzzy set is concentrated in universe  $U$ . When the membership function  $\mu_A(x)$  is a convex function on an interval, its centre of gravity generally appears near the point where the function takes the maximum value. Moreover, when the membership function is certain, the position of its centre of gravity is also determined. It can be seen that the centre of gravity of fuzzy set is an inherent attribute of fuzzy set. It describes the place where the membership function of fuzzy set is concentrated in the universe, so the centre of gravity of fuzzy set can be used to describe the centre of gravity of membership function. The gravity centre comprehensive evaluation method based on fuzzy set is to use the gravity centre of the membership function of each factor for comprehensive evaluation. This evaluation method can objectively reflect the advantages and disadvantages of various factors, this is because the focus of a factor is large, indicating that the factor gets more praise comments, and the more praise comments, the better to reflect this factor, and vice versa.

**3.2. Implementation of Improved Algorithm of Fuzzy Set Gravity Centre.** The fuzziness studied by the improved algorithm of the centre of gravity of fuzzy sets refers to the uncertainty of the concept in cognition caused by the uncertain connotation and extension of the concept. In the process of track and field systematic teaching evaluation, it is often necessary to judge the value of different things, different individuals or different overall advantages and disadvantages [20]. However, the foundation of judgment is now not like measuring the measurement of components with an correct ruler in industrial production, however has extraordinary fuzziness. For example, the mastery of the evaluation criteria by the evaluation subject and the understanding of the nature of the evaluation object have varying degrees of fuzziness [21]. At the same time, the evaluation of the teaching quality of physical education and the evaluation of teachers or students are often not realized through the comparison of their single factors, but through the comparative analysis of their multiple attributes to comprehensively reflect the fundamental attributes of the evaluated object, so as to make a scientific and reasonable conclusion [22]. Therefore, in order to better deal with these fuzzy phenomena, make a practical evaluation of various phenomena in the teaching process of track and field system, and improve the accuracy of evaluation, the improved algorithm of fuzzy set centre of gravity has its unique

application value. Implementation of improved algorithm of fuzzy set gravity centre is shown in Figure 1.

The application of the improved algorithm of fuzzy set centre of gravity in track and field system teaching is to make a comprehensive evaluation or decision on the evaluation object based on a certain goal or standard under the influence of many factors [23]. The membership diploma is mostly used to signify the contrast cost of the contrast object on a single index. The comparison end result acquired by using the contrast object on an comparison index is the diploma to which it meets the index, however this wide variety is solely a comparative fee and cannot immediately disclose the cost of the assessment object on an assessment index. Determine the weight fuzzy subset of the evaluation factor index. Generally, the impact of various factors on the evaluation object is inconsistent, and different indicators are given values according to the relative importance of the whole evaluation system. The weight distribution of factors is usually given by the expert evaluation group on the basis of fully mastering data and widely listening to opinions [24]. Construct fuzzy assessment matrix, fuzzy assessment matrix is decided by means of specialists or distinctive personnel associated to assessment problems. The specific way is to invite a certain number of special personnel to form an evaluation team to evaluate the factors affecting the evaluation object according to the evaluation level. The statistical results are expressed as a percentage of the number of people.

*3.3. Application of Improved Algorithm of Fuzzy Set Gravity Centre in Track and Field System Teaching.* The purpose and task are set as the domain, and all links required by the purpose and task are set as the elements of the domain. Then, the teaching contents, methods and means to be adopted can be calculated with the help of fuzzy correlation calculation method, and the degree of conformity with the teaching purpose and task can be calculated. If the correlation is large, it is proved to be the best teaching content. On the contrary, it indicates that the teaching content is not suitable. The best teaching content can be selected in advance, and the teaching level can be measured. Taking the route running technology as the domain and the technical links of route running as the elements in the domain, a total of 10 aspects are selected as the main elements. Prepare to select several important methods from the six means and calculate the correlation between the six means and the universe. The calculation results are shown in Figure 2. When the results of  $R_1R_2$  are obtained, they are obtained by formula, as shown in Figure 3.

According to the correlation coefficient calculated in Figure 2, four of the six means should be important: “high food,” “wheel running,” “back pedaling running,” and “swinging arms in place.” From the calculation results in Figure 3, we can see how far these training methods can develop each technical link of route running.

It is a very important task to develop special quality in training. For example, in the winter training stage, what means should be used as the best way to develop the special quality of shot putters? Firstly, special quality is regarded as a

domain, the special quality is divided into  $n$  aspects, and 11 main aspects are selected as important elements in the domain. The means used is collection. The calculation results are shown in Figures 4 and 5.

As can be seen from Figure 4, 7 of the 11 means can be selected as the best means of special quality training for shot putters. From Figure 5, what is the correlation between each quality aspect and these means. Every athlete has his technical characteristics, which may have a good effect on the technical level or the opposite effect. Coaches should purposefully select the best training means that can play and promote the characteristics of athletes, and use the fuzzy correlation calculation method to formulate the best training plan most suitable for the characteristics of athletes. The training method is the same, we must list the characteristics of athletes in the field of discussion in order to calculate accurately.

*3.4. Research Results and Analysis.* The purpose of technical evaluation is to accurately and effectively evaluate students' technical mastery. From the perspective of sports measurement and evaluation, as any test means or evaluation method, the most important characteristics must meet the three attributes of effectiveness, reliability and objectivity. If you deviate from this test and evaluation method, it has no use value. For a long time, the subjective evaluation method based on experience has been adopted in the technical evaluation of track and field teaching. In the evaluation process, although students' technology is evaluated according to certain scoring standards, due to different raters' different understanding of technology, professional knowledge and focus, there are certain differences in the technical requirements and standards of a certain level of score, it makes it difficult to unify the evaluation scale, which affects the objectivity of the evaluation to a certain extent. The evaluation results are difficult to accurately reflect the actual technical level of each student, and the technical evaluation scores are inconsistent. This is not conducive to the horizontal technical comparison between individuals and classes, nor to the vertical technical comparison between different periods and different grades [25].

*3.5. Formulation and Effectiveness Test of Sports Technology Evaluation Norm.* According to the principle of normal distribution, taking 1.5 s~3 s as the scoring range, 0.1 s as the scoring interval, the full score point is 100 points, the starting point is 60 points, and the score corresponding to the average score is 75 points. The sports technology score is formulated by using the method of evaluating the score with the remaining [26] observations, as shown in Figure 6.

In order to test the effectiveness of the technical scoring table, after the project teaching, three special teachers with senior professional titles were hired to conduct technical evaluation on the actions of the two teaching classes, and then the results evaluated by experts were used as the criteria to test the effectiveness of the scoring, and the effectiveness of the remaining observation number evaluation method was tested according to the grade difference correlation method. After the test, the effectiveness coefficient was 0.8352, reach a very significant level, indicating the use of

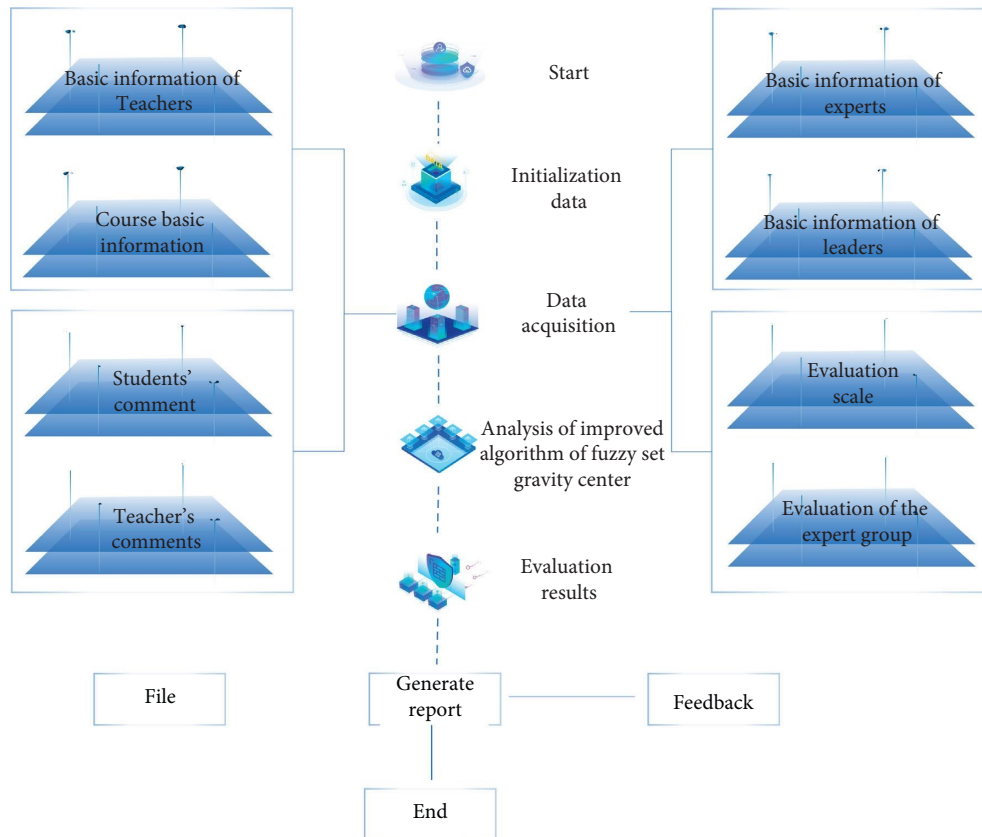


FIGURE 1: Implementation of improved algorithm of fuzzy set gravity centre.

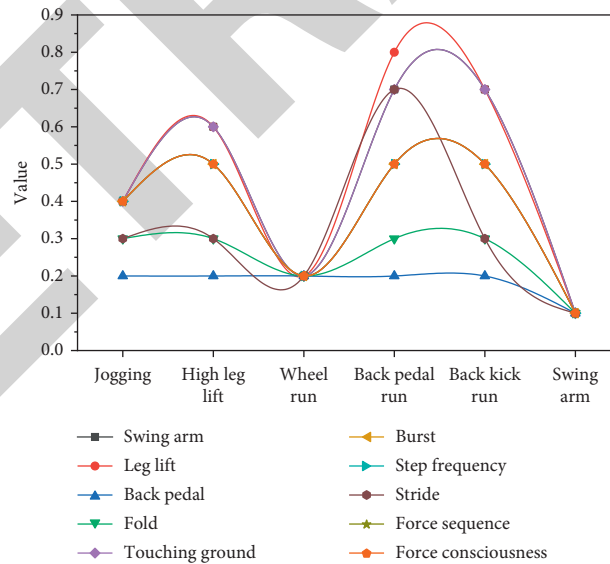


FIGURE 2: The correlation between means and discourse.

surplus. The technical scoring table developed by the observation number evaluation method meets the requirements of surveying and has high application value.

3.6. Determination of Technical Evaluation Index System. According to the characteristics of track and field technical action, track and field technology can be determined as four

links: run-up, take-off, take-off and landing, and ten technical details corresponding to the four links are listed as the track and field technical evaluation form. These data are expressed as a percentage of the number of people belonging to the five levels. The indexes used in the improved algorithm of fuzzy set center of gravity are mainly multi factor model indexes, which can accurately reflect the relevant characteristics of track and field action structure, make an objective

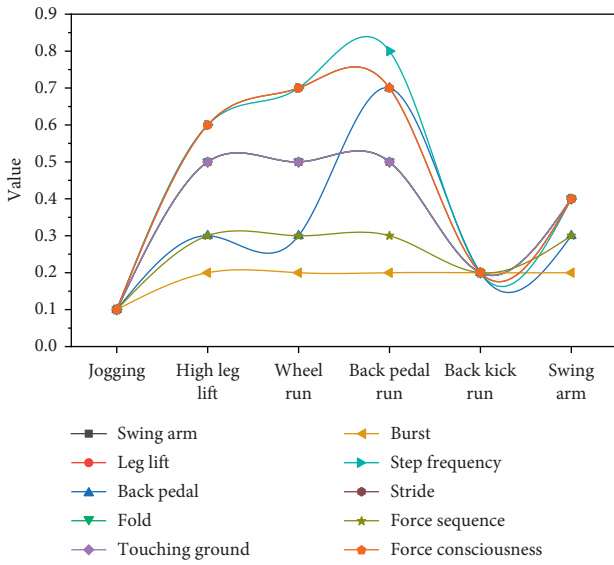


FIGURE 3: Correlation analysis after optimization.

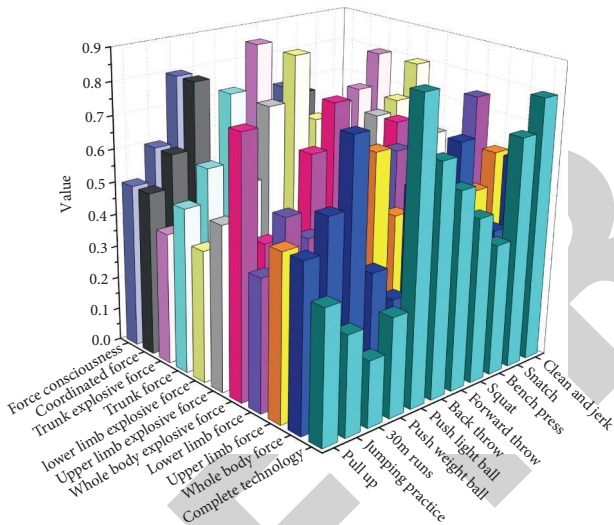


FIGURE 4: Results of initial test.

evaluation of students' track and field results, and can be used as the main basis for the evaluation of track and field system teaching effect. In addition, the improved algorithm of fuzzy set gravity center mainly uses the fuzzy mathematics theory and quantitative processing method to realize the optimal combination of track and field skill scores, which not only solves the weight problem of calculating the total score in the process of technical scoring of each item in track and field teaching but also improves the scientificity and rationality of technical evaluation, to some extent, it provides a new way for the scoring method of track and field teaching technology. The application of the improved algorithm of fuzzy set center of gravity in track and field teaching can objectively reflect the teaching status of physical education specialty and the training status of athletes at different levels. From the aspect of technical evaluation, the technologies of run-up, take-off, take-off and landing are the key parts of track and field technology, which

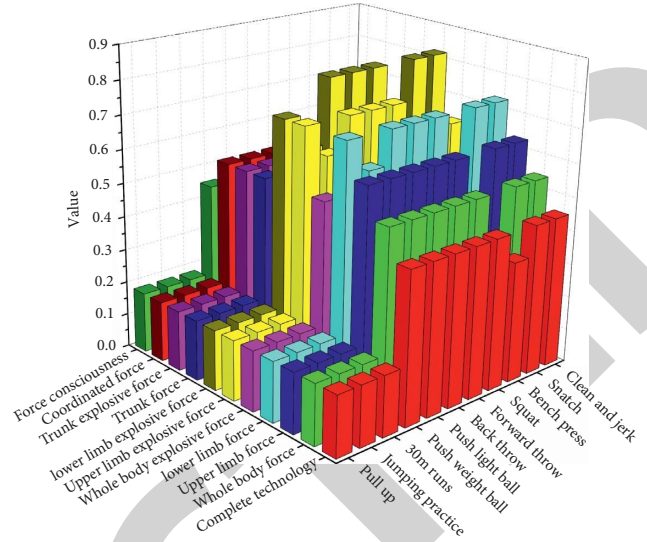


FIGURE 5: Test results of professional quality.

is also consistent with the actual teaching. From the calculation of teaching means, the correlation coefficient of calculation is usually relatively large. These means can reflect the internal relationship between different links in track and field technology, and have great correlation with key technical links. In the teaching process, we should pay close attention to the key teaching links, promote students' practice of track and field sports by quantitative teaching methods, so that students can quickly master relevant skills, so as to improve their comprehensive ability of sports.

**3.7. Technical Evaluation of Track and Field.** In order to illustrate the feasibility and practicability of the above algorithm, this paper takes the technical evaluation of back style high jump in track and field as an example to evaluate the technical level of a student's back style high jump. Through consulting materials and consulting experts, it is considered that the back style high jump technology is closely related to the four aspects of run-up, take-off, pole crossing and landing. Three experts are invited to evaluate the movements completed by the student according to the scoring criteria, and the authority coefficients of the three experts are equal, the fuzzy interval score of each technical index in each comment given by the expert and the calculated maximum and minimum center of gravity are shown in Figure 7.

After we get the maximum and minimum centre of gravity values evaluated by three experts, we can calculate the comprehensive fuzzy set centre of gravity value of each technical index, as shown in Figure 8.

The method of fuzzy teaching in track and field teaching has its shortcomings, the main reason is that the fuzzy teaching method needs more teachers and has higher requirements for the strength of teachers in the school. In addition, the simulated teaching scoring method is mainly from the smallest factor in teaching from the quality evaluation, from single factor evaluation to layer-by-layer evaluation, and finally get the total score. However, the calculation quantification of this teaching evaluation



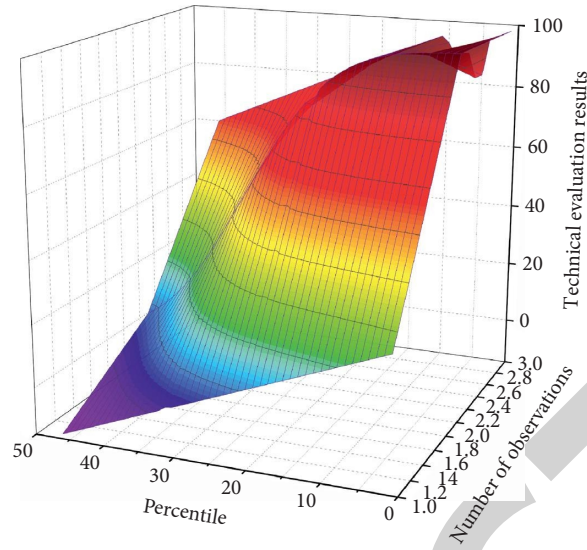


FIGURE 6: Technical evaluation results.

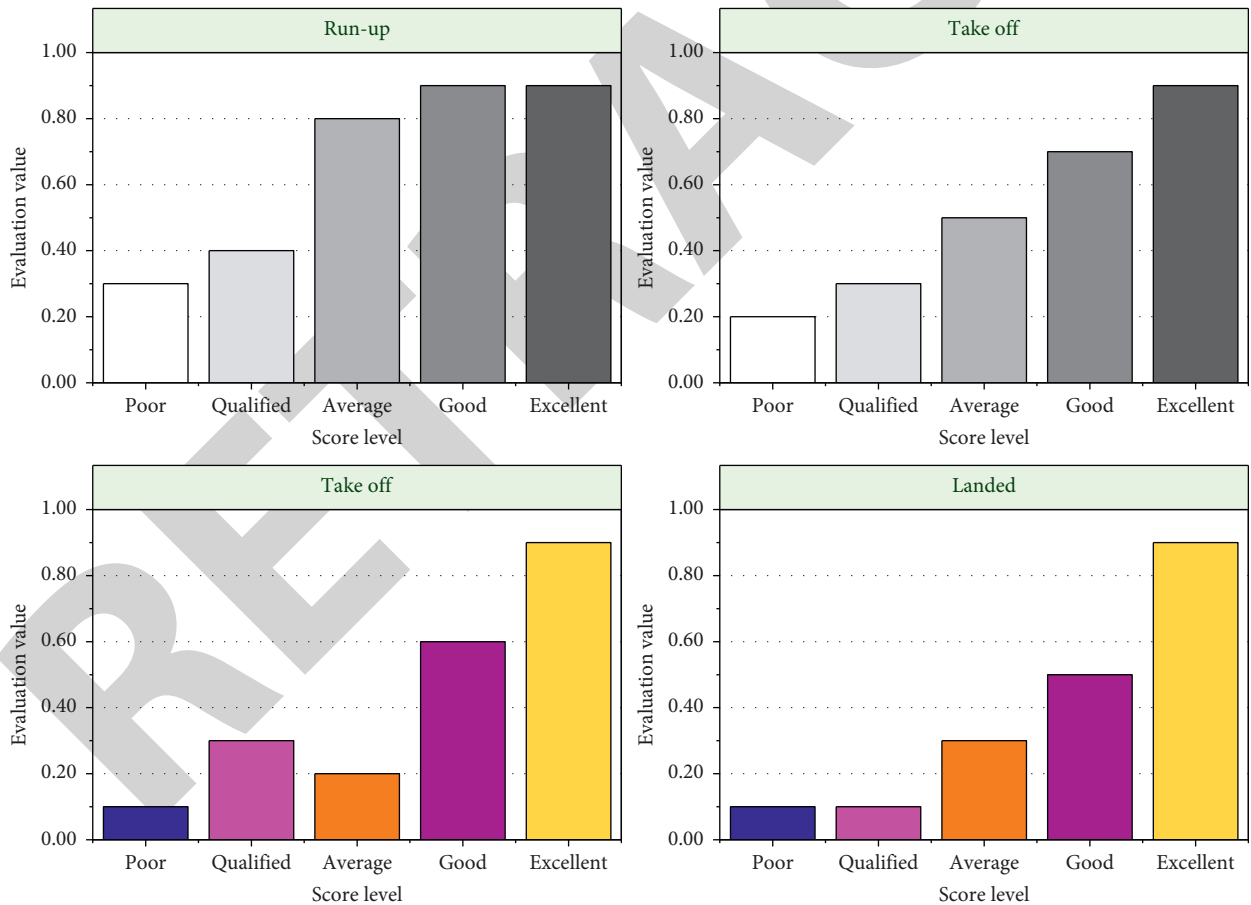


FIGURE 7: Score of each technical index.

method is large, and it is difficult to realize all the calculation only by relying on the personal strength of teachers. Therefore, it needs to be evaluated quickly with the help of computer, the application of this method should be based on the computer operation program.

3.8. Comparison and Analysis of Different Algorithms. In order to compare the advantages of this method, the traditional fuzzy set gravity centre evaluation method and the improved fuzzy set gravity centre evaluation method are used for simulation experiments, as shown in Figure 9.

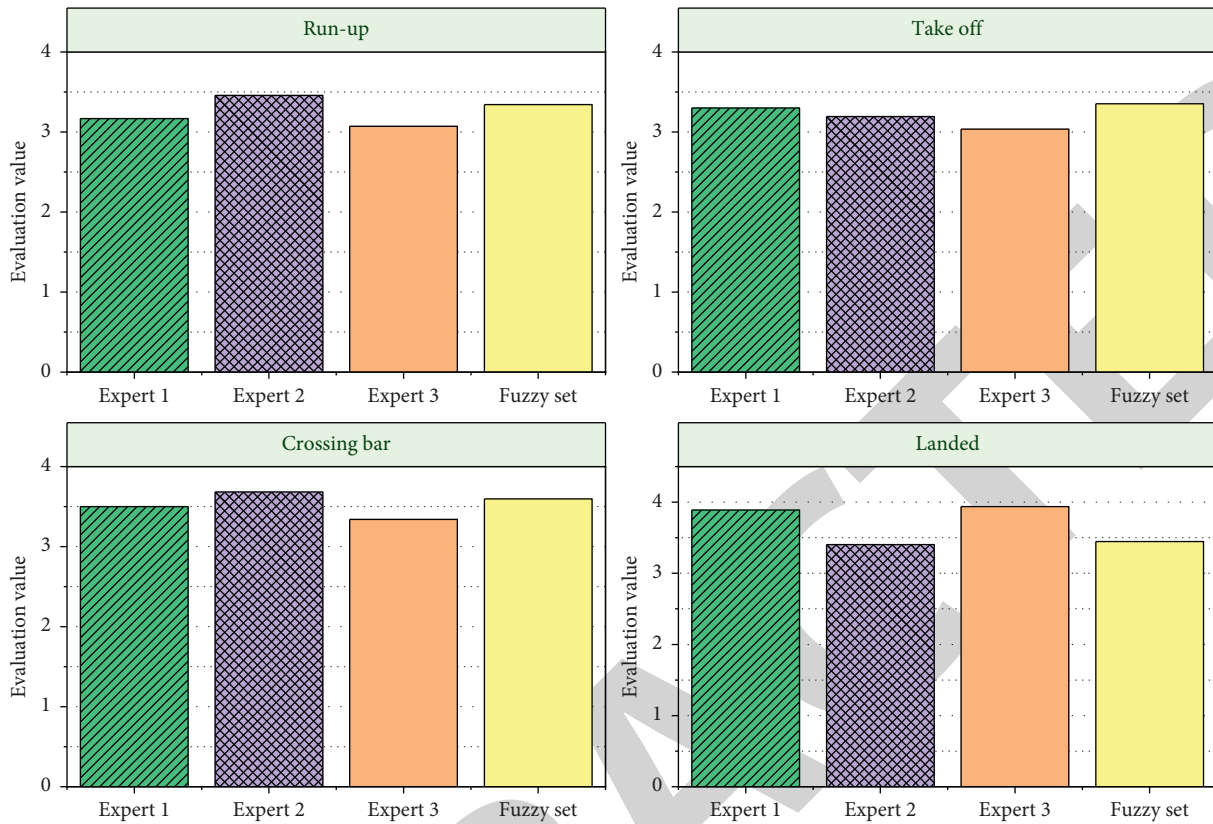


FIGURE 8: Centre of gravity values assessed by different experts.

Among them, the point graph is the result obtained by the traditional fuzzy set barycentric evaluation method, and the line graph is the result obtained by the improved fuzzy set barycentric evaluation method. The distance between the two reflects the algorithm deviation. It can be seen from the figure that there is a certain deviation in the results of the two algorithms. Among them, the tenth student, the technical grade obtained by using the improved fuzzy set gravity centre evaluation method is general, and the technical grade obtained by using the traditional fuzzy set gravity centre evaluation method is qualified, which is quite different.

Through analysis, the main reason for the deviation is that the traditional fuzzy set centre of gravity evaluation method has lost information when using the fuzzy statistical method to establish the fuzzy relationship matrix, and the experts give a score randomly in the interval, which has the same contribution to the evaluation results. Therefore, the evaluation opinions of each expert cannot be fully used, and the evaluation results have a certain deviation in the improved fuzzy set centre of gravity evaluation method, the centre of gravity of the evaluation index and the comments of the evaluation object are generated by the evaluation information of each evaluation index on each comment, which makes full use of the evaluation opinions of experts. Therefore, the disadvantages of the traditional method can be overcome and the judgment accuracy can be greatly improved.

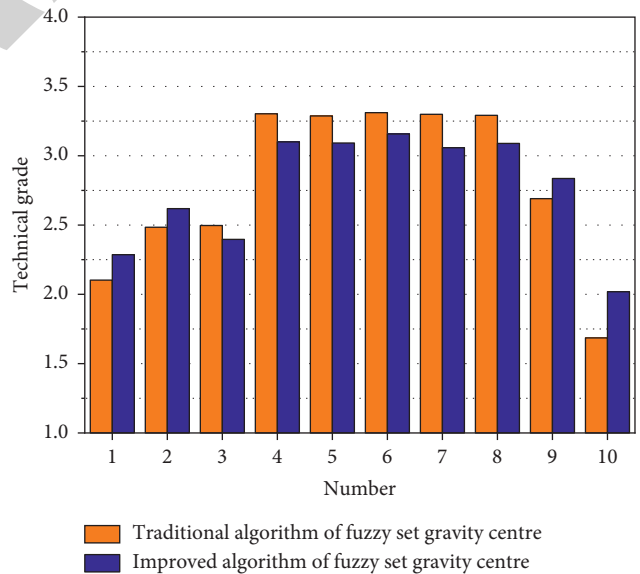


FIGURE 9: Comparison of results of different algorithms.

#### 4. Conclusion

The application of the improved algorithm of fuzzy set centre of gravity in track and field technology teaching provides an effective method for physical education teachers to determine the teaching technical links and teaching key

means, and provides a theoretical basis for the establishment of practical teaching mode. In teaching, teachers should pay close attention to the internal relationship between technical characteristics and teaching means, which can accelerate the improvement of students' comprehensive performance. The utility of fuzzy statistics scoring technique in university bodily training and expert sports activities teaching. It can evaluate the sports technology for athletes with different objects and different training levels, avoid the subjectivity in the traditional teaching evaluation, enhance the authenticity and objectivity of the evaluation results, and facilitate teachers to formulate targeted teaching strategies in future teaching, and train students in a certain field, so as to improve students' comprehensive ability. The fuzzy complete comparison based totally on the centre of gravity of fuzzy set can higher clear up the trouble of data loss of regular fuzzy complete evaluation. Applying it to the teaching evaluation of college physical education teachers can make the evaluation process more scientific, the evaluation method more effective and feasible, and the evaluation results more convincing. This is of great significance to fully mobilize the teaching enthusiasm of physical education teachers and improve the teaching level of physical education teachers. Therefore, the fuzzy comprehensive evaluation based on the centre of gravity of fuzzy set has great application and popularization value in the teaching evaluation of college physical education teachers.

### 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.

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