

Research on Numerical Statistics Analysis of Competitive Sports Based on the Scientific Development Concept

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Abstract. The paper uses data analysis in Scientific development concept, competitive sports, numerical analysis, Bio motricity to discuss the value orientation of China's competitive sports development in the post-Olympic period with the related theories of the scientific development concept. Putting forward the orientation of "humanities, economy, fitness and entertainment" is the three core value orientations for the development of competitive sports in my country in the future. The connotation of humanistic orientation is to pay attention to the cultural education, health and employment status of athletes; the connotation of economic orientation is to pay attention to the industrial attributes of competitive sports, to exert economic functions, and to strengthen commercial operation; the connotation of fitness and entertainment orientation is to guide national exercise and improve national health, Pleasant people's lives. At the same time, the paper uses the subjective scoring data of diving competition as an application example, and examines and discusses each method according to the combination of theoretical analysis and practical application.

Keywords: Smart electric energy meter, RFID, data acquisition.

1. Introduction

Should the development of China's competitive sports continue to follow the development model of the nationwide system, or to carry out appropriate system reforms, how to choose the value orientation of development? This is the common concern of many people in the sports and academic circles at present. To study these issues, to scientifically apply to the new era the development view guides the healthy, coordinated and sustainable development of my country's sports industry, which has important practical significance.

In sports competitions, sports performance is the result of athletes participating in the competition. It is a comprehensive evaluation of the athletes' competitive ability in the competition based on specific evaluation behaviours. Event group training theory divides many sports events into measurement category, scoring category, hit category, winning category and winning category according to different sports performance evaluation methods. And the scoring event is interpreted as a competition in which the referees score the quality of actions completed by the athletes according to specific rules and scoring methods [1]. In this type of competition, the main body that implements the evaluation of sports performance is the referee. The athlete's game performance is obtained by the referee according to the competition rules and subjective evaluation of the competitive level played by the athlete during the game. The essence of this evaluation behaviour is subjective scoring. In order to avoid the subjective scoring errors of a few referees having a decisive impact on sports performance, in this type of competition, several referees always score an athlete at the same time, and then integrate the scoring results of each referee to obtain the athlete's score. The final score. The salient feature of subjective scoring data is that each data has a subjective colour, so the most prominent problem facing subjective scoring data is the rationality of the data. The rationality of each scoring data is not the same, but there are no the ready-made evaluation standards, how to follow the scientific development concept to carry out the subjective scoring of sports is a long-term difficult problem faced by statistics.

2. Explanation of related concepts

2.1 Scientific development concept

The so-called scientific outlook on development is to use a scientific world outlook and methodology to look at and solve the problems of why, for whom and how to develop.

2.2 Value orientation

The scientific development concept points out that people-oriented is the core and essence of the scientific development concept. People-oriented is to regard people as the premise and ultimate goal of all things, and take human consciousness, human concepts and human dimensions as our analysis, thinking, and problem solving. The starting point and ending point of According to the requirements of the scientific development concept, the humanistic orientation is the preferred value orientation of competitive sports [2]. First of all, the "Humanistic Olympics" that demonstrates humanistic values is one of the three major concepts of the Beijing Olympics. It gives new cultural connotations to the contemporary Olympic movement and reflects the government's value orientation for the development of competitive sports; secondly, the humanistic orientation of "people-oriented" as the core value affirms the idea of "people are more important than gold medals", which will enable athletes to receive more attention in the process of growth and talent. It is conducive to the all-round development of athletes; thirdly, it can reduce the doubts from all walks of life on the training model of competitive sports in China, which is conducive to the healthy development of competitive sports.

3. Subjective numerical statistical analysis

The ultimate goal of subjective scoring is to determine the ranking of the competition under the guidance of the principle of fairness and justice. We can try to abandon the traditional average and final score as evaluation criteria, clarify the essential characteristics and statistical information of subjective scoring data, and find scientific evaluation criteria [3]. Establish a scientific data processing and evaluation system on this basis, so as to make the game results more objective and fairer.

3.1 Statistical model of subjective scoring data

Compared with the various types of data noticed by the statistical community, subjective scoring data has significant characteristics. From the perspective of surveying, subjective scoring data is the observation value of the same athlete by several referees, and each data is a certain referee. The player's determination of the level of competition on the field. Assuming that the athlete's performance has a true value, but the scoring results of the referees are not all consistent, it shows that each data itself has errors, and the errors are not the same [4]. According to the requirements of competitive sports, the athletes score can only be based on these subjective scoring data. to make sure. Therefore, in the processing of subjective scoring data, the status and rationality of each data are not all the same. From a statistical perspective, the result of a referee's scoring of an athlete is random.

If the subjective scoring data is regarded as a set of random variables $(X_1, X_2, X_3, \dots, X_p)$, the distribution of $X_1, X_2, X_3, \dots, X_p$ is not only unknown, but also different. $X_i (i=1, 2, \dots, p)$ represents not only p different statistical populations, but also p samples from each population, the sample size is all. The purpose of statistical processing is μ to infer the true value of athletes based on $X_i (i=1, 2, \dots, p)$, but the sampling error does not come from the difference between $X_1, X_2, X_3, \dots, X_p$, but from the variance of each $X_i (i=1, 2, \dots, p)$. This study intends to establish a statistical model of subjective scoring data, and try to process subjective scoring data with parameter estimation method, hoping to solve the data processing problem better. Set up a referee to score a certain athlete $X_1, X_2, X_3, \dots, X_p$ satisfied

$$X_i = \mu + \varepsilon_i, i = 1, 2, \dots, p \quad (1)$$

3.2 Parameter estimation of subjective scoring data

In the model, if $\sigma_i^2 (i = 1, 2, \dots, p)$ is known, the weighted least squares estimate of the parameter

$$\hat{\mu} = \sum_{i=1}^p \omega_i x_i \quad (2)$$

$$\omega_i = \frac{1}{\sigma_i^2} \left(\sum_{j=1}^p \frac{1}{\sigma_j^2} \right)^{-1} \quad (3)$$

It is easy to prove that $\hat{\mu}$ is the uniform minimum variance linear unbiased estimator of μ . The problem is that $\sigma_i^2 (i = 1, 2, \dots, p)$ is unknown, and it is difficult to make a good estimate of $\sigma_i^2 (i = 1, 2, \dots, p)$ based on subjective scoring data $(x_1, x_2, x_3, \dots, x_p)$ alone. To this end, we construct statistics

$$W_i^2 = \frac{1}{p-2} \sum_{j \neq i} (x_j - x_i)^2, i = 1, 2, \dots, p \quad (4)$$

In competitive sports competitions, the statistical processing of subjective scoring data must have a theoretical basis, reflect the scientific nature of statistics, and serve sports competitions, so the data processing is also subjective. The correction constant δ^2 in the formula is artificial. It can be seen from the formula that the size of δ affects the discrimination of p weight coefficients. From the actual situation of sports competitions in recent years, x_i is within the range of $\bar{x} \pm 2\delta$, which is more reasonable. In the range of $\bar{x} \pm 2\delta$, it is generally outside the range of $\bar{x} \pm \delta$, and belongs to outlier data [5]. The basic criterion of subjective processing should be to fully reflect fairness and impartiality, and the final iteration method is also the result of subjective processing.

4. Application of parameter estimation numerical statistical methods in diving sports

In order to improve the competitiveness and appreciation of diving events, FINA has officially implemented new rules for diving competitions since 2006. Compared with the old rules, the new rules have produced a big change in the scoring method of single-player events. The scoring method of the old rules is to remove the highest score and the lowest score from the 5-7 referees' scores for each jump of the athlete, and add up the remaining effective scores and multiply it by the difficulty coefficient of the jump. Get the athlete's final score for the action; the new rules stipulate that the 2 highest points and 2 lowest points are removed from the scores scored by 7 referees, and only the middle 3 valid points are left to evaluate the athlete's score. Is the scoring method for single-player events under the new rules scientific and reasonable? Is it objective and fair? What impact did it have on the result of the game? The 15th World Cup Diving Competition is the first international competition after the implementation of the new rules. In view of the above problems, the author analysed the scoring results of this competition and found that the rationality of the new scoring method is indeed worth pondering in several aspects.

4.1 Score deletion data analysis

The new scoring method reduces the effective points scored by referees, increases the proportion of intermediate scores, and narrows the gap between players' scores. It is difficult for contestants to lead other contestants by a big score, so they must go all out to fight every jump. As a result, the competition in the game is more intense than before, and the viewership is improved. This is inconsistent with the principle of fair competition in sports competitions. Whether it is the formulation of scoring rules, the scoring of the referee team, or the processing of scoring data, it is required to reflect the gap between athletes' competitive level as accurately and objectively as possible.

Especially in international competitions, the participating athletes are all top players in the world, and their competitive level is very close, and the gap is very small. If the scoring method is vague and rough, it is easy to have equal or even unfair scores, and the scoring results cannot reflect the objectively existing differences between individual competitive levels [6]. Therefore, when the scoring rules are difficult or have not been further refined, specific and precise, the statistical processing method of the scoring data must be sufficiently scientific and accurate under the principle of fair competition. However, the new scoring method has increased the ambiguity and contingency of the game results, resulting in multiple different athletes completing the same action in the game results. As a result, the action scores are equal. Refer to the examples in "The Impact of Data Deletion on Sample Information". Different individuals complete the same action, there must be differences objectively, even if the same action performed by the same individual twice, it is impossible to be exactly the same. In fact, the two sets of scoring data given by the referee team are not completely consistent, and the mean values of the two sets of data are not equal, indicating that the referee team has different opinions on the same action performed by different athletes. However, the new scoring method cannot distinguish this, which increases the contingency and objectivity of the scoring results, which affects the fair competition of the game to a certain extent.

The author takes the scoring results of the women's and men's sprint finals in the World Cup diving competition as an example to analyse whether the new scoring method has a significant effect on reducing the distinction of competition scores. First, calculate the scores of the athletes in each round of the game according to the scoring method of the old rules in the statistical software, and analyse the average deviation $AVEDEV \left(AVEDEV = \frac{1}{n} \sum_{i=1}^n |x_i - \bar{x}|, \bar{x} = \frac{1}{n} \sum_{i=1}^n x_i \right)$ of the scores of each round of the old rules and the new rules respectively. The average dispersion can measure the difference between the scores of athletes. If the new scoring method can reduce the discrimination of athletes, the average dispersion between athletes' scores will be reduced accordingly. If the score discrimination does not change significantly, the average dispersion There will also be no significant or tendency changes. Comparing the two different scoring methods, the difference between the two in each round of competition is listed in Table 1 and Table 2 below.

Table 1. Comparison table of the AVEDEV scores of athletes in each round under the new and old rules of the scoring method for the women's 1-meter springboard final in the diving competition

athlete	first round		second round		Third round		Fourth round	
	Old rule score	New rule score	Old rule score	New rule score	Old rule score	New rule score	Old rule score	New rule score
1	57.50	57.27	119.90	119.91	187.50	186.99	257.70	257.97
2	61.20	61.20	116.40	116.40	177.60	178.32	243.90	244.62
3	61.20	61.92	127.50	127.44	179.25	179.19	240.45	239.67
4	60.00	59.76	113.30	113.58	174.25	174.30	231.85	232.62
5	54.05	53.82	110.45	109.98	176.75	176.28	228.35	228.12
6	46.20	46.86	104.70	104.58	153.00	152.88	216.00	215.88
7	57.60	58.32	104.40	105.12	166.80	168.30	218.55	220.74
8	58.80	58.32	109.50	108.24	164.70	162.75	213.90	211.71
9	51.60	52.56	108.80	109.50	160.55	161.25	214.55	215.25
10	50.40	51.12	105.00	106.50	156.75	157.56	210.75	211.56
11	46.20	46.20	104.70	103.92	158.70	158.64	203.10	202.56
12	50.70	50.70	95.55	94.86	144.75	144.54	199.95	199.98
AVEDEV	4.76	4.63	6.24	6.22	10.31	10.48	14.33	14.34

Table 2. Comparison table of AVEDEV scores of athletes in each round under the new and old rules of the men's 1-meter springboard final in the diving competition

athlete	first round		second round		Third round		Fourth round	
	Old rule score	New rule score	Old rule score	New rule score	Old rule score	New rule score	Old rule score	New rule score
1	57.5	57.27	118.80	118.81	187.5	184.88	257.7	257.87
2	41.2	41.2	114.5	114.5	177.4	178.32	253.8	255.42
3	41.2	41.82	127.5	127.55	178.25	178.18	250.55	238.47
4	40	58.74	113.3	113.58	175.25	175.3	231.85	232.42
5	55.05	53.82	110.55	108.88	174.75	174.28	228.35	228.12
6	54.2	54.84	105.7	105.58	153	152.88	214	215.88
7	57.4	58.32	105.5	105.12	144.8	148.3	218.55	220.75
8	58.8	58.32	108.5	108.25	145.7	142.75	213.8	211.71
9	51.4	52.54	108.8	108.5	140.55	141.25	215.55	215.25
10	50.5	51.12	105	104.5	154.75	157.54	210.75	211.54
11	54.2	54.2	105.7	103.82	158.7	158.45	203.1	202.54
12	50.7	50.7	85.55	85.84	155.75	155.55	188.85	188.88
AVEDEV	5.74	5.43	4.25	4.22	10.31	10.58	15.33	15.35

It can be seen from Table 1 and Table 2 that in each round of the two events, the average deviation between the scores of athletes under the new rules is not always smaller than that of the old rules. In some rounds, the average deviation of the scores of the new rules is large, and the average deviation of the old rules is large, and the gap between the average deviation of the new rules scores in each round and the average deviation of the old rules is very small. This shows that in the current diving World Cup, the new scoring method compared with the old rules, the new scoring method did not produce a more stable and significant effect on reducing the gap between the athletes' competition performance [7].

4.2 Application analysis

Table 3. Comparison table between the scoring results of the parameter estimation method of the men's 1-meter springboard final of the World Cup Diving Competition and the scoring results of the new rule scoring method

action	DD	$\hat{\mu} \times 3 \times DD$	Single action score	J1	J2	J3	J4	J5	J6	J7	
1	5152B	3.2	81.6	81.6	8.5	8.5	8.5	8.5	9	8.5	8
	205C	3	80.149	81	8.5	8	9	9	9	9	9
	107B	3.3	84.15	84.15	8.5	8.5	8.5	8	9	8	9
	305B	3.2	72.112	72	7.5	7	8.5	8.5	7.5	7.5	5.5
	5154B	3.6	90.028	90	9	8.5	8	8.5	7.5	8.5	8
	405B	3.4	95.864	96.9	9.5	9.5	9	9.5	9.5	9.5	9
	5335D	3	72	72	8	7	8	8	8	9	8
2	205B	3.2	71.499	72	7.5	7	7.5	6.5	7.5	8	7.5
	305B	3.2	69.051	68.8	7.5	7	7	7	7	7.5	8
	5152B	3.2	83.204	83.2	9	8.5	8.5	8	8.5	9	9
	405B	3.4	92.836	91.8	9.5	9	9	9	9	9.5	9
	107B	3.3	61.321	57.75	6.5	4.5	6	5	7	5	6.5
	107C	3	74.767	75	8	8.5	8	8	8.5	8.5	8.5
	405C	3.1	70.235	69.75	7.5	7.5	7.5	8	7.5	8.5	7
3	5152B	3.2	65.834	65.6	6	6.5	6.5	7	7	8	7.5
	5335D	3	72.567	72	8	7.5	8	8	8	8.5	8.5
	205C	3	61.523	61.5	7	6	6.5	6.5	7	7.5	7

In view of the above analysis, the author tries to use parameter estimation method to improve the scoring method of the new rules of diving competition. The final score data of the men's 1-meter springboard in the World Cup diving competition is still used as the experimental object, and the

actual value of the athlete's competition performance is estimated and iterative to obtain the athlete's competition score for each jump.

Calculate according to the formula, calculate the initial estimated value $\hat{\mu}_0$ and its next iteration result $\hat{\mu}$. Due to the limitation of the length of the article, only the 9 iteration results of the top 6 athletes' score data are listed here. According to $|\hat{\mu}_k - \hat{\mu}_{k+1}| \leq 0.001$, obtain the estimated value $\hat{\mu}$ of the true value of the athlete's performance per jump. Since the new rule scoring method is to remove the highest score and the lowest score in the scoring data, the sum of the remaining effective points is multiplied by the difficulty coefficient DD, in order to make the scoring result $\hat{\mu}$ of the parameter estimation and the scoring result of the new rule scoring method Comparable, perform the following processing on $\hat{\mu}$: $\hat{\mu} \times 3 \times DD$, compare the processing result with the single action score of the new rule scoring method. The specific data are listed in Table 3.

5. Conclusion

It can be seen from the application effect that the scoring result obtained by the parameter estimation method is more accurate than the new rule scoring method. The score of the new rule scoring method can only be accurate to two decimal places at most, while the score of the parameter estimation method can be accurate to any position after the decimal point. From the perspective of scientific development, the value orientation of my country's competitive sports has shifted from highlighting political functions to a multi-faceted orientation of "humanities, economy, fitness and entertainment", which is an inevitable trend of development. The manifestation of humanistic orientation in the development of competitive sports in my country is, in the final analysis, to adhere to the people-oriented approach and realize humanistic care for athletes; economic orientation is the inevitable choice for the sustainable development of competitive sports itself, and the driving force behind the development of competitive sports.

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