

Retraction

Retracted: Analysis of Feasibility Modeling of Multimode Physical Fitness Training for Long-Distance Runners

Wireless Communications and Mobile Computing

Received 11 July 2023; Accepted 11 July 2023; Published 12 July 2023

Copyright © 2023 Wireless Communications and Mobile Computing. This is an open access article distributed under the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

This article has been retracted by Hindawi following an investigation undertaken by the publisher [1].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] X. Xia, "Analysis of Feasibility Modeling of Multimode Physical Fitness Training for Long-Distance Runners," *Wireless Communications and Mobile Computing*, vol. 2021, Article ID 5817396, 8 pages, 2021.

Research Article

Analysis of Feasibility Modeling of Multimode Physical Fitness Training for Long-Distance Runners

Xu Xia 

Hunan University of Humanities, Science and Technology, Hunan 417000, China

Correspondence should be addressed to Xu Xia; 164104134@stu.cuz.edu.cn

Received 22 June 2021; Revised 24 July 2021; Accepted 4 August 2021; Published 15 August 2021

Academic Editor: Chi-Hua Chen

Copyright © 2021 Xu Xia. This is an open access article distributed under the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

Because the traditional multimode feasibility modeling analysis method of physical fitness training for long-distance runners has the problems of long modeling time and low modeling accuracy, a new multimode feasibility modeling analysis method for physical fitness training of long-distance runners is proposed. The improved LLE (local linear embedding) method is used to reduce the dimensionality of the training data for the physical fitness of long-distance runners. According to the processing results, the information theory is used to analyze the information content of the physical fitness training features of the long-distance runners, the information entropy of each feature is calculated, and the long-distance runners are extracted. Athlete's physical fitness enhancement training characteristics, combined with quantitative regression analysis method to carry out the information regression analysis of the long-distance runners' physical fitness training multimode statistical sequence, construct the feasibility evaluation model of the long-distance runners' physical fitness training multimode and complete the feasibility of the long-distance runners' physical fitness training multimode feasibility study Mode analysis. The simulation experiment results show that the proposed method has higher accuracy and shorter modeling time for multimode feasibility modeling of physical fitness training for long-distance runners.

1. Introduction

In long-distance running, aerobic oxidation is the main body energy metabolism of athletes, supplemented by anaerobic metabolism. The training period is long, and the load and intensity of training and competition are relatively large. Long-distance running has higher requirements for athletes' physical level, and compared with ball or other collective events, the requirements for skills and tactics are relatively low [1]. Therefore, whether for professional or amateur long-distance running training, athletes' fitness enhancement training and fitness evaluation have become an important part of training. Only when athletes have a good physical fitness level can they ensure good results in training and competitions. Long-distance runners not only need to have a good endurance level and certain technical and tactical skills but also need to have good physical fitness. In recent years, with the improvement and improvement of physical fitness training models, new requirements and challenges have been put forward for the physical fitness training of long-distance

runners. For long-distance runners, due to their own conditions and exercise choices, they will affect the improvement of physical training level in long-distance running training [2]. In addition, due to the training system, the training time and training load of Chinese long-distance runners are usually higher than those of athletes from other countries. However, due to the insufficient number of physical coaches and team doctors, and the deviation of their responsibilities, according to the athletes' own characteristics and requirements, the conditions for individual specific physical training of athletes are insufficient. In the training of injured athletes, it is often passive treatment after the injury occurs, and there is a lack of injury risk assessment and injury prevention training before the injury. The treatment of injuries is often limited to the location of the injury itself, without considering the overall situation as a whole, and not analyzing the mechanism of injury from a specific perspective, resulting in the long-term treatment of injuries or repeated attacks after healing. Such problems have led to a high incidence of long-distance runners' injuries, especially during the concentrated

preparation period before the big competition. A large number of long-distance runners suffered injuries and even could not participate in the competition, which seriously affected China's long-distance running preparations [3].

To sum up, first, the increasingly fierce long-distance running competitions nowadays have raised the athletes' specific physical fitness requirements to a higher level; second, the special physical training of long-distance runners in my country is still at the initial stage, and no systematic training mode and methods have been formed; third, the rapid development of current competitive sports theory and practice promotes the renewal and improvement of traditional training methods; fourth, my country's long-distance runners have a high incidence of injuries and show common special characteristics and injuries. Therefore, combining the new training model with Chinese long-distance running practice, sorting out the special characteristics of long-distance running events, analyzing the positioning of special physical fitness in long-distance running training, and constructing a special physical training model for outstanding long-distance runners with Chinese characteristics are the job responsibility. It is also an exploration and attempt on the practice of special physical fitness enhancement training for outstanding athletes [4].

In literature [5], in order to scientifically and systematically study the optimization and innovation of the physical training methods of the Shandong middle- and long-distance running team, this article uses the observation method, the literature review method, the expert interview method, and the logical analysis method to compare the Shandong middle- and long-distance running team. Comparing the traditional physical training methods with the traditional physical training methods, the following conclusions are drawn: (1) the Shandong middle- and long-distance running team has optimized the strength training methods; (2) the Shandong middle- and long-distance running team has carried out the joint maintenance training methods Innovation and optimization; (3) Shandong Province Middle- and Long-Distance Running Team optimized the restorative training methods; (4) Shandong Province Middle- and Long-Distance Running Team carried out innovative and optimized training methods for sensitivity and coordination; (5) Shandong Province Middle- and Long-Distance Running Team's endurance quality and speed quality are not optimized. Literature [6] constructs a special physical training model for excellent fencers in China and explores effective ways and methods of special physical training for excellent fencers in China, so as to improve the special physical fitness level of excellent fencers in China. The research suggests that the special physical training for excellent fencers is supported by the special characteristics of fencing and physical fitness, with index testing, initial evaluation, model construction, practice operation, and result evaluation as the main links, feedback adjustment as the core, and improvement of athletic ability as the goal, summarizing training practice problem solutions. There are certain logical clues and a relatively stable reference style. However, the above two methods both have the problems of low modeling accuracy and long modeling time.

Mobile computing is a new technology emerging with the development of mobile communication, Internet, database, distributed computing, and other technologies. Mobile computing technology will enable computers or other information intelligent terminal devices to realize data transmission and resource sharing in the wireless environment. The multimode feasibility modeling analysis method in this paper has a very close relationship with Wireless Communications and Mobile Computing. The sensors are directly dependent on Wireless Communications and Mobile Computing technology.

Based on this, this paper proposes a multimode feasibility modeling analysis method for physical fitness training for long-distance runners and verifies the effectiveness of this method through simulation experiments. Lay the foundation for my country's long-distance running performance.

Our contribution is threefold:

- (1) To the problems of long modeling time and low modeling accuracy, a new multimode feasibility modeling analysis method for physical fitness training of long-distance runners is proposed
- (2) According to the processing results, the information theory is used to analyze the information content of the physical fitness training features of the long-distance runners and complete the feasibility of the long-distance runners' physical fitness training multimode feasibility study Mode analysis
- (3) The simulation experiment results show that the proposed method has higher accuracy and shorter modeling time for multimode feasibility modeling of physical fitness training for long-distance runners

The remainder of this paper is organized as follows. Section 2 introduces the analysis of feasibility modeling of multimode physical fitness training for long-distance runners. Section 3 discusses the experiment and analysis. Section 4 presents the conclusions of the study.

2. Analysis of Feasibility Modeling of Multimode Physical Fitness Training for Long-Distance Runners

2.1. Long-Distance Runners' Physical Fitness Enhancement Training Data Dimensionality Reduction Processing. First, collect the physical fitness training data for long-distance runners. However, due to the large amount of physical fitness training data and uneven data dimensions for long-distance runners, the physical fitness training data dimension of long-distance runners is too high, which reduces the accuracy of multimodal evaluation of physical fitness training for long-distance runners. Before the subsequent processing, the training data for physical fitness enhancement of long-distance runners needs to be processed for dimensionality reduction. At present, data dimensionality reduction methods are mainly divided into two categories: linear mapping and nonlinear mapping methods. Among them, the principal component analysis algorithm and the linear

discriminant analysis method are linear mapping methods, and the nonlinear mapping methods mainly include the kernel method (kernel+linear), two-dimensional and Zhang quantization (two-dimensional+linear), and manifold learning methods. Here, an LLE (Locally Linear Embedding) method in the nonlinear mapping method is used for dimensionality reduction. The algorithm is roughly divided into three steps:

Step 1. Find the k -nearest neighbor points of each long-distance runner's physical fitness training data sample point.

Step 2. Calculate the neighboring points of each long-distance runner's physical fitness training data sample and obtain the local reconstruction weight matrix of the sample point.

Step 3. Obtain the low-dimensional embedding output value of the training data sample point of the long-distance runner according to the calculation result of Step 2 [7].

Although the LLE method can solve the problem of data dimensionality, the dimensionality reduction effect is easily affected by the number of neighbors. For this reason, this chapter constrains the reconstruction error by constructing approximate reconstruction coefficients to achieve the improvement of the LLE method. The improved LLE method dimensionality reduction process is as follows.

For a given high-dimensional data set $X = \{x_1, x_2, \dots, x_N\}$, $x_i \in R^D$, where R^D is the D -dimensional data, sampled from the d -dimensional manifold, find the low-dimensional coordinates $Y = \{y_1, y_2, \dots, y_N\}$.

$$d_{ij} = \left[\sum_{k=1}^D \|x_{ik} - x_{kj}\|^2 \right]^{1/2}. \quad (1)$$

$$\begin{cases} \min e(W) = d_{ij} \sum_{i=1}^N \left\| x_i - \sum_{j=1}^N w_{ij} x_j \right\|_2^2 \\ \text{s.t. } \sum_{j=1}^k w_{ij} = 1 \end{cases}. \quad (2)$$

Step 1. Find the k ($k < N$) neighboring points of the training data sample point x_i of the physical fitness enhancement training of the long-distance runners and realize it by using the Euclidean distance formula [8].

Step 2. Calculate the local reconstruction weight matrix (w_{ij}) through the following formula (2).

Among them, w_{ij} is the weight between x_i and x_{ij} . x_{ij} ($j = 1, 2, \dots, k$) is the k -nearest neighbors of x_i [9].

Combining with the restrictive conditions, equation (2) can be rewritten as follows:

$$\begin{aligned} \min e(W) &= \sum_{i=1}^N \left\| \sum_{j=1}^N w_{ij} (x_i - x_{ij}) \right\|^2 \\ &= \sum_{i=1}^N \left\| (x_i - x_{ij}) w_i \right\|^2 \\ &= \sum_{i=1}^N (w_i)^T Z_i w_i. \end{aligned} \quad (3)$$

Among them,

$$Z_i = (x_i - x_{ij})^T (x_i - x_{ij}), \quad (4)$$

$$w_i = [w_{i1}, w_{i2}, \dots, w_{ik}]^T. \quad (5)$$

In the formula, Z_i is the local covariance matrix of the i th sample point; w_i is the local reconstruction weight of the i th sample point [10].

Introducing Lagrange multiplier to solve formula (3), then

$$L(W) = \sum_{i=1}^N (w_i)^T Z_i w_i + \left(\sum_{j=1}^N w_{ij} - 1 \right). \quad (6)$$

Usually, a simple solution method is used, let $Z_i w_i = 1$, to find w_i .

$$s_i^j = \frac{d_w^j L(W)}{d_b^j \min e(W)}. \quad (7)$$

Step 3. Obtain the approximate reconstruction coefficient s_i^j of the reconstruction error of the long-distance runner's physical fitness training data sample point x_i through formula (7) and construct the low-dimensional embedding output value Y according to the approximate reconstruction coefficient, namely,

In the formula, d_w^j is the average distance within the class of the training data sample points of the j -type long-distance runners; d_b^j is the distance between the j -type long-distance runners' physical fitness training data sample and the center of the overall long-distance runners' physical fitness training data sample point.

Using the Lagrange multiplier method, find

$$S = (I - W)^T (I - W) s_i^j. \quad (8)$$

In the formula, I represents a N -dimensional identity matrix; W is a diagonal matrix.

Step 4. Take the eigenvectors corresponding to the $2 \sim (d + 1)$ non-zero eigenvalues of W as the low-dimensional coordinates Y to complete the dimensionality reduction processing

of the training data for physical fitness enhancement of long-distance runners [11].

2.2. Feature Extraction of Physical Fitness Training for Long-Distance Runners Based on Decision Tree. Decision tree is a tree structure and an important technology in data mining. It uses the principle of information theory to analyze the information content of the physical fitness training characteristics of long-distance runners, calculates the information entropy of each feature, and extracts the physical fitness training characteristics of long-distance runners [12]. The quantitative recursive analysis model is used to quantify the physical fitness training feature quantities of the long-distance runners at the i th point x_i and the j th point x_j . The cost function of the multimode physical fitness training for long-distance runners is constructed as

$$G\left(U \left| \mu_k, \sum_k \right.\right) = (2\pi)^{-d/2} \left| \sum_k \right|^{-1/2} \times \exp \left[-\frac{1}{2} (U - u_k)^T \sum_k^{-1} (U - u_k) \right]. \quad (9)$$

In the above formula, $G(U|\mu_k, \sum_k)$ is the constraint feature quantity of the physical fitness training for long-distance runners. Calculate the optimal estimates \hat{a} , \hat{b}_i of the correlation dimension features a and b_i of the bit sequence of the training sample sequence bit sequence for the long-distance runners' physical fitness enhancement, and the calculation formula is expressed as follows:

$$D'_{t+1} = 1 - (1 - \lambda) \sum_{n=0}^{\infty} \Omega_{m+n+1} ((n+1)b - t), \quad (10)$$

$$\begin{cases} x(k+1) = \left(\begin{bmatrix} 1 & 0.6 \\ -0.4 & 0.5 \end{bmatrix} + \begin{bmatrix} 0.02 & 0.01 \\ -0.02 & 0.12 \end{bmatrix} \right) x(k) + \begin{bmatrix} 1 \\ 1 \end{bmatrix} kx(k - \tau_k) + \begin{bmatrix} 0.1 \\ 0.1 \end{bmatrix} w(k) \\ z(k) = [1 \quad 1]x(k) + 0.1u(k) + 0.1w(k) \end{cases} \quad (13)$$

2.3. The Feasibility Evaluation Model of Multimode Physical Fitness Training for Long-Distance Runners. Based on the feature extraction of physical fitness training for long-distance runners, the feasibility evaluation model of multimode physical fitness training for long-distance runners is constructed, and the feasibility analysis of the multimode physical fitness training for long-distance runners is carried out. The evaluation feature quantity distribution model is

$$x_{ij} = [\lg r]_{ij}, y_{ij} = [\lg C_N(r)]_{ij}. \quad (14)$$

In the above formula, j is the characteristic sampling point for multimode feasibility evaluation of physical fitness

TABLE 1: Determination of single machine connection code.

Project	Code	Stand-alone type
Height	00	Height measuring instrument
Body weight	01	Weight measuring instrument
Vital capacity	02	Spirometry
Step index	03	Step index test equipment
Long run	04	Long-distance running measuring equipment
500 m run	05	Timing equipment

$$L'_{t+1} = (1 - \lambda) \sum_{n=0}^{\infty} \Omega_{k+n} (n+1)b. \quad (11)$$

In the above formula, Ω represents the associated information entropy function, and the obtained distribution feature is defined as follows:

$$x_k = f\{x_{k-1}, u_{k-1}, w_{k-1}\}. \quad (12)$$

Among them, u_k represents the model parameter; w_k represents the fuzzy statistical value of the training characteristics of physical fitness enhancement of long-distance runners.

Using the decision tree method to extract the training features of physical fitness enhancement of long-distance runners, the expression is

enhancement training for long-distance runners under a certain embedding dimension i , denoted as follows:

$$y_{ij} = ax_{ij} - b_i. \quad (15)$$

In the above formula, $a = D$, combined with the fuzzy feature analysis method, obtains the joint distribution probability of the multimode feasibility statistical sample sequence $x(t + \tau)$ in the state estimation region of the long-distance runners, which is random sampling. Using the spatial embedding theorem obtains the correlation dimension of

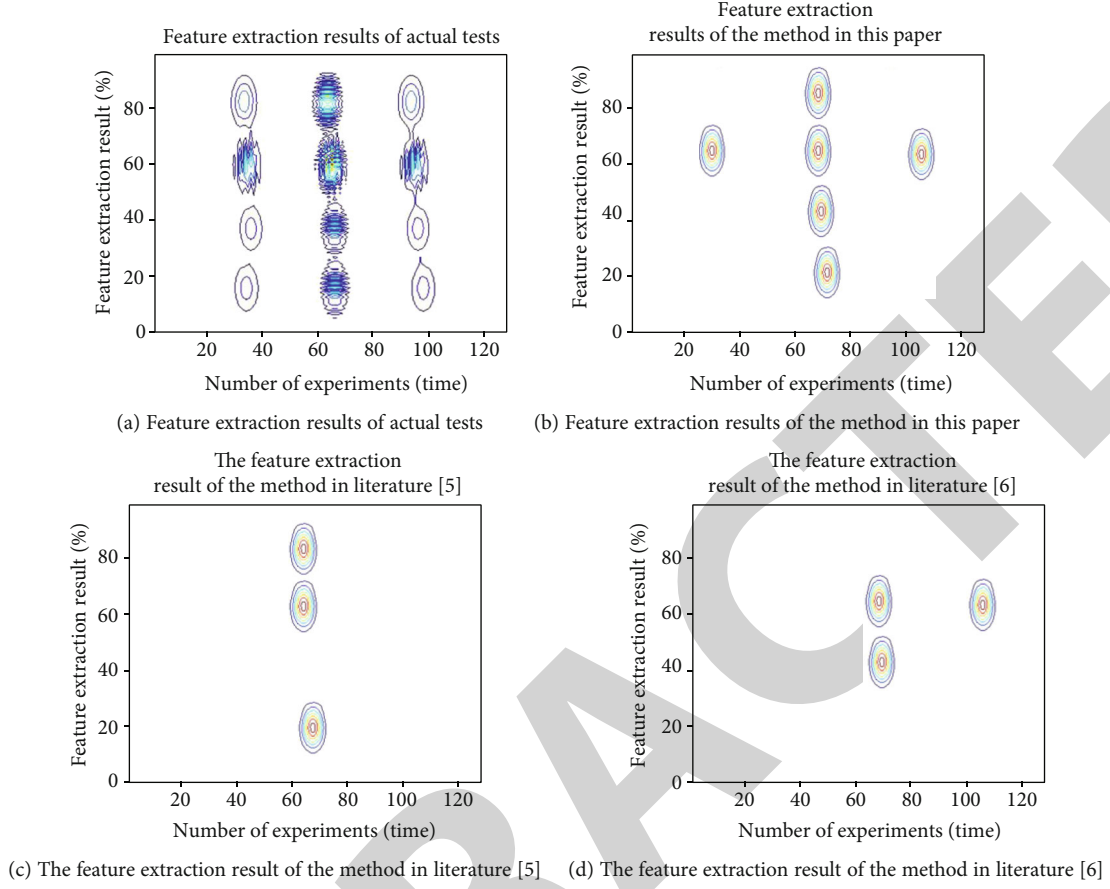


FIGURE 1: The results of feature extraction of physical strength enhancement training for long-distance runners.

the multimode feasibility evaluation of the long-distance runners' physical enhancement training

$$D = \lim_{r \rightarrow 0} \frac{\lg C_m(r)}{\lg r}, \quad (16)$$

where $C_m(r)$ is the correlation integral under the sampling delay, and when the Euclidean distance r of the phase space distribution trajectory is small enough, the fuzzy correlation characteristic component of the multimode feasibility evaluation of the long-distance runners' physical fitness enhancement training is calculated [13]. The information characteristics of multimode feasibility evaluation of physical fitness enhancement training for long-distance runners are as follows:

$$I(\tau) = -\sum_{ij} p_{ij}(\tau) \ln \frac{p_{ij}(\tau)}{p_i p_j}. \quad (17)$$

When $I(\tau) = 0$, then $x(t + \tau)$ is the statistical sample sequence of multimode feasibility evaluation of long-distance runners' physical fitness enhancement training. If it meets the convergence solution, it means that it is unpredictable, that is, $x(t), x(t + \tau)$ is independent and completely uncorrelated. Calculate the correlation mutual information $I(\tau)$ to adjust the prediction possibility. When $I(\tau)$ is the

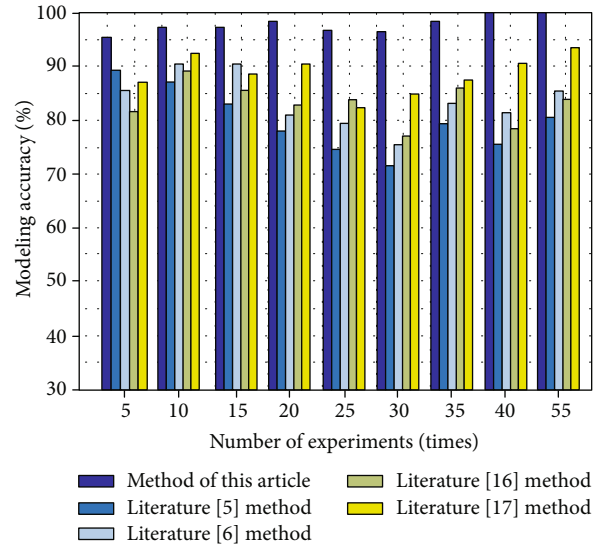


FIGURE 2: Comparison results of multimode feasibility modeling accuracy.

minimum, the corresponding sampling time points $x(t)$ and $x(t + \tau)$ are uncorrelated. It indicates that the multimode feasibility statistical sample sequence of physical fitness enhancement training for long-distance runners is

TABLE 2: Time comparison results of multimode feasibility modeling.

Number of experiments/times	Modeling time/(s)				
	Method of this article	Literature [5] method	Literature [6] method	Literature [16] method	Literature [17] method
20	7.58	10.58	14.87	10.58	14.87
40	13.74	17.33	21.41	17.33	21.41
60	16.52	23.75	27.63	23.75	27.63
80	24.63	30.96	34.85	30.96	34.85
100	30.22	35.75	40.96	35.75	40.96
120	35.85	41.96	48.69	41.96	48.69
140	40.78	57.85	57.87	57.85	57.87
160	45.63	64.27	66.25	64.27	66.25
180	51.78	71.85	72.54	71.85	72.54
200	60.52	77.54	78.96	77.54	78.96

completely predictable [14]. Using the least square fitting method for descriptive statistical analysis, combined with quantitative regression analysis method for information regression analysis of multimode statistical sequence of long-distance runners' physical fitness enhancement training [15], the multimode feasibility evaluation model of long-distance runners' physical fitness enhancement training is obtained as follows:

$$\Pi_2 = \begin{bmatrix} \bar{A}^T P \bar{A} - P + K^T R K & \bar{A}^T P \bar{B} & \bar{A}^T P F_1 \\ \bar{B}^T P \bar{A} & \bar{B}^T P \bar{B} - R & \bar{B}^T P F_1 \\ F_1^T P \bar{A} & F_1^T P \bar{B} & F_1^T P F_1 \end{bmatrix}. \quad (18)$$

Assuming that the probability random variable of the multimode feasibility time series $x(t)$ appearing in the distribution interval i satisfies the convergence condition, the multimode feasibility model of long-distance runners' physical enhancement training is completed.

3. Simulation Experiment Analysis

In order to verify the performance of the multimode feasibility modeling and analysis method of long-distance runners' physical fitness enhancement training proposed in this paper in practical application, the long-distance runners of a sports school are selected as the experimental objects, and the joint programming design of Visual C++ and MATLAB 7 is adopted. The simulation experiment is carried out in the operating system of Windows XP, server of Tomcat 5.5, 2.0 GHz CPU, 16 GB memory, and 7200 rpm hard disk. C language is a general programming language, which not only has all the characteristics of a high-level language but also can directly carry out structured programming. Among them, c51 is a structured language with high programming efficiency, strong portability, support for floating-point calculation, and strong real-time performance. Using this language to write the object program can not only shorten the algorithm cycle but also facilitate the maintenance. It is a very ideal language program.

To test the long-distance runner's physical strength enhancement, this paper connects different types of test stand-alone through the controller, and the connection code of the stand-alone is shown in Table 1.

Under the above background, the multimode feasibility modeling analysis method, literature [5] method, and literature [6] method proposed in this paper are used to extract the characteristics of long-distance runners' physical enhancement training, and the results are compared with the actual test results. The comparison results are shown in Figure 1.

It can be seen from Figure 1 that the feature extraction results of the multimode feasibility modeling analysis method for long-distance runners' physical enhancement training proposed in this paper are consistent with those of the actual test, while the feature extraction results of long-distance runners' physical enhancement training proposed in literature [5] and literature [6] are quite different from those of the actual test. The results show that the feature extraction accuracy of the multimode feasibility modeling analysis method of long-distance runners' physical enhancement training proposed in this paper is higher than that of the methods in literature [5] and literature [6], because before the feature extraction of long-distance runners' physical enhancement training, the feature extraction accuracy of long-distance runners' physical enhancement training proposed in this paper is higher than that of literature [5] and literature [6]. This paper uses the improved LLE method to reduce the dimension of long-distance runners' physical strength enhancement training data, so as to improve the feature extraction accuracy of long-distance runners' physical strength enhancement training.

In order to verify the effectiveness of this method, this paper makes a comparative analysis on the feasibility modeling accuracy of the multimode of long-distance runners' physical fitness enhancement training proposed in this paper, the method in literature [5], and the method in literature [6]. The comparison results are shown in Figure 2.

According to Figure 2, the modeling accuracy of the multimode feasibility analysis method for long-distance runners' physical enhancement training proposed in this paper is more than 95%, and the highest is 100%. However, the

modeling accuracy of the multimode feasibility analysis method for long-distance runners' physical enhancement training proposed in literature [5, 6] is lower than that of this method. The results show that the multimode feasibility modeling of long-distance runners' physical fitness enhancement training is effective.

In order to further verify the effectiveness of this method, this paper makes a comparative analysis of the multimode feasibility modeling analysis method of long-distance runners' physical fitness enhancement training proposed in this paper, the method of literature [5], and the multimode feasibility modeling time of long-distance runners' physical fitness enhancement training proposed in literature [6]. The comparison results are shown in Table 2.

According to Table 2, the time of multimode feasibility modeling of long-distance runner's physical enhancement training proposed in this paper is only 60.52 s, and the time of multimode feasibility modeling of long-distance runner's physical enhancement training proposed in literature [5] and literature [6] is 77.54 s and 78.96 s, respectively. It shows that the multimode feasibility modeling analysis method of long-distance runners' physical enhancement training proposed in this paper has shorter modeling time and higher modeling efficiency.

4. Conclusion

Long-distance running is a kind of periodic endurance project dominated by physical ability, which is characterized by long distance, low intensity, overcoming self-weight, and repeating the same action for a long time. At present, with the improvement of competitive level and the fierce competition, the requirement of athletes' speed level is higher and higher. The level of physical ability plays a leading and core role in the components of their competitive ability. Whether long-distance runners can win in the fierce competition mainly depends on the size of their physical ability. Physical fitness is based on the energy metabolism activities of the three major energy supply systems of the human body, which are expressed through the skeletal muscle system. Physical fitness includes physical quality, shape, and function. Each of the three factors has its own relatively independent role, and they are closely related, restricting, and influencing each other. The level of one of the factors will affect the overall level of physical fitness. Among them, the change of form and function is the material basis of the change of physical ability, and sports quality is the external performance of physical ability. In sports training, the development of various sports quality is the basic content of physical training.

In order to enhance the physical fitness of long-distance runners, this paper proposes a multimode feasibility modeling analysis method for long-distance runners. On this basis, according to the principle of information theory, this paper analyzes the characteristics of long-distance runners' physical enhancement training, obtains the information entropy of each feature, extracts the characteristics of long-distance runners' physical enhancement training, and adopts the quantitative regression analysis method according to the feature extraction results. This paper makes a quantitative

regression analysis on the multimode statistical sequence of long-distance runners' physical enhancement training and constructs a multimode feasibility evaluation model of long-distance runners' physical enhancement training. The simulation results show that the proposed method for multimode feasibility modeling of long-distance runners' physical fitness enhancement training has higher accuracy and faster modeling efficiency.

Data Availability

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

Conflicts of Interest

Declares that he has no conflict of interest.

References

- [1] X. Fei, "Research on physical fitness training of excellent long-distance runner Xue Fei in winter training," *Neijiang Technology*, vol. 279, no. 2, pp. 82–117, 2018.
- [2] J. Yin and X.-q. Wang, "Study on safety mode of dragon boat sports physical fitness training based on machine learning," *Safety Science*, vol. 120, pp. 1–5, 2019.
- [3] Y. Yang and W. Liu, "The influence of public physical education curriculum on college students' physical health," *Revista Brasileira de Medicina do Esporte*, vol. 27, no. spe, pp. 83–86, 2021.
- [4] Lesya Ukrainka Volyn National University, S. Savchuk, N. Zakhozha et al., "Special physical training of high educational institutions athletes in a short running race," *Physical Education Sport and Health Culture in Modern Society*, vol. 4(52), pp. 60–66, 2020.
- [5] M. Wang, "Research on optimization of physical training methods for middle and long distance running in Shandong Province [J]," *Stationery and sports goods and technology*, vol. 443, no. 10, pp. 218–219, 2020.
- [6] C. Zhen and L. Heng, "Discussion of risks in chinese construction market-contractors perspective [J]," *Journal of Construction Engineering and Management*, vol. 132, no. 3, pp. 327–329, 2006.
- [7] W. S. Jung, H. Moon, and H. Y. Park, "the effects of 12-week combined exercise participation on body composition and daily-living physical fitness in active obesity elderly men," *The Korean Journal of Growth and Development*, vol. 26, no. 3, pp. 297–304, 2018.
- [8] L. Galamandjuk, A. Siedlaczek-Szwed, G. Iedynak et al., "Evaluation of the physiological characteristics of girls with different handedness using various types of physical training [J]," *Journal of Physical Education and Sport*, vol. 6, pp. 19–30, 2019.
- [9] H. Wang, "Discussion on the application of stratified evaluation in middle school football teaching and training," *Education Research Frontier: Chinese and English Edition*, vol. 9, no. 3, pp. 80–84, 2019.
- [10] R. Stănculescu and C. Stănculescu, "Considerations regarding the possibility of implementing a model for the evaluation of the level of cadets' physical training," *Land Forces Academy Review*, vol. 26, no. 1, pp. 49–54, 2021.

- [11] B. R. Ilahi, S. Dwi Oktaria, and H. Hadiwinarto, "Evaluation of the physical training program of the badminton achievement club in Bengkulu City," *Kinestetik Jurnal Ilmiah Pendidikan Jasmani*, vol. 4, no. 2, pp. 150–157, 2020.
- [12] S. Jun and Y. Zhao, "The forward thinking of the development of physical fitness training for Sanda athletes [J]," *Fighting Wushu Science*, vol. 3, no. 3, pp. 44–46, 2018.
- [13] E. Setiawan, D. T. Iwandana, R. Festiawan, and C. Bapista, "Improving handball athletes' physical fitness components through Tabata training during the outbreak of COVID-19," *Jurnal SPORTIF Jurnal Penelitian Pembelajaran*, vol. 6, no. 2, pp. 375–389, 2020.
- [14] Y. Jeon and K. Eom, "Role of physique and physical fitness in the balance of Korean national snowboard athletes," *Journal of Exercise Science & Fitness*, vol. 19, no. 1, pp. 1–7, 2021.
- [15] R. Ramirez-Campillo, C. Alvarez, F. García-Pinillos et al., "Optimal reactive strength index: is it an accurate variable to optimize plyometric training effects on measures of physical fitness in young soccer players?," *The Journal of Strength and Conditioning Research*, vol. 32, no. 4, pp. 885–893, 2018.
- [16] J. Wang, Z. Xie, Y. Li et al., "Relationship between health status and physical fitness of college students from south China: an empirical study by data mining approach," *IEEE Access*, vol. 8, pp. 67466–67473, 2020.
- [17] H. Wang and Y. Jin, "A random forest-assisted evolutionary algorithm for data-driven constrained multiobjective combinatorial optimization of trauma systems," *IEEE Transactions on Cybernetics*, vol. 50, no. 2, pp. 536–549, 2020.