

## Retraction

# Retracted: Content System of Physical Fitness Training for Track and Field Athletes and Evaluation Criteria of Some Indicators Based on Artificial Neural Network

### Discrete Dynamics in Nature and Society

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This article has been retracted by Hindawi following an investigation undertaken by the publisher [1].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

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

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

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

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

### References

- [1] W. Wang and X. Chen, "Content System of Physical Fitness Training for Track and Field Athletes and Evaluation Criteria of Some Indicators Based on Artificial Neural Network," *Discrete Dynamics in Nature and Society*, vol. 2022, Article ID 1718776, 10 pages, 2022.

## Research Article

# Content System of Physical Fitness Training for Track and Field Athletes and Evaluation Criteria of Some Indicators Based on Artificial Neural Network

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Track and field is a competitive sport with a long history, and it is one of the earliest sports that started scientific training. It is also the main source of many classic theories and methods of modern competitive training, and most of them are still in use today. The purpose of this paper is to study how to analyze and discuss the content system of physical fitness training for track and field athletes and some evaluation criteria of indicators based on artificial neural network. It also describes the BP neural network. This paper puts forward the problem of training content system and index evaluation standard, which is based on artificial neural network. Therefore, the concept and related algorithms are elaborated, and the case design and analysis are carried out. The experimental results show that the physical training method is mainly based on the transformation training method. The goal is to improve the athlete's training motivation, interest, and adaptability. The training method is relatively simple in design. According to the distribution of muscles, there are more core and trunk training methods, accounting for 23.64% of physical training.

## 1. Introduction

In recent years, with the development of competitive sports, physical exercise has been given more and more indications and meanings. The significance of physical exercise is not only to improve the body shape, function, and physical quality of athletes but also to restore and regenerate human muscles. Many elite track and field athletes have reached a high level of sports technology and competitive ability, and it is difficult to continue to improve their sports performance. With the continuous advancement of theoretical research on intelligent algorithms, deep learning technology has become an important part of the field of artificial intelligence. Its development has become a hot issue that has attracted wide attention.

It is necessary to build a special physical fitness index system, a scoring template, and a special track and field athlete performance prediction model to understand the development of track and field athletes and provide references for the scientific selection and training of track and field athletes.

Only in this way can the physical training of track and field athletes be more scientific and effective, promote the healthy development of track and field athletes, and make physical training run in the direction of optimization.

The innovations of this paper are as follows. (1) This paper combines an artificial neural network with physical training content system, introduces the theory and related methods of neural network in detail, and mainly introduces the BP neural network. (2) When facing the content of physical training, it analyzes the schedule of physical training. Through the evaluation of the experimental results, it is concluded that the physical training is mainly based on the maximum strength training.

## 2. Related Work

In recent years, neural networks and deep learning have made significant contributions in various research fields. D'Angelo et al. aimed to investigate the use of multiple artificial neural networks (ANNs) to solve resource planning

optimization (RPO) problems related to the scheduling of different combined heat and power (CHP) generators. However, his performance is not high [1]. The aim of Razavipour et al. was to design a laser heat treatment for application in the deposition of copper cold spray coatings to achieve a 30% through-thickness hardness reduction. He developed an artificial neural network model and used it to find laser heat treatment conditions that would satisfy the hardness reduction sought. However, their precision is not enough [2]. The main purpose of Lanjewar and Gurav was to process soil images and classify them accurately using Tensor flow and Keras deep learning (DL) framework with pretrained weights. In his research, a connected neural network (CNN) model was used to classify ground images. The training accuracy rate reaches 99.86%, and the validation accuracy rate reaches 97.68%. However, his process is more complicated [3]. Das and Singh reported on the use of neural networks and deep learning to automatically generate captions for images (image caption generation in Assamese journalism). Automatic image caption generation is an artificial intelligence problem that has received attention from computer vision and natural language processing researchers. A dataset of 13,000 images collected from various online local Assamese electronic newspapers was also constructed. However, his requirements are higher [4]. Matveev et al. systematized existing methods of mathematical analysis and interpretation of the behavior of the underlying algorithms. They also came up with formulas for calculating corresponding problems in mathematics. The study and visualization of deep neural networks is a new, less researched but rapidly developing field, and the considered approaches can provide a deeper understanding of the operation of neural network algorithms. However, it is not very practical [5]. Santos et al. provided an exhaustive analysis of the use of artificial neural networks and deep learning in the visual arts. They introduced the changes in artificial intelligence over the years and delved into the latest work in prediction, classification, evaluation, generation, and recognition for different visual arts through artificial neural networks. However, the scope of his research is limited [6]. Averkin and Yarushev provided a large-scale review and analysis of existing methods and approaches to extract rules from artificial neural networks, including deep learning neural networks. The results of the analysis will enable a detailed understanding of the state of research in the field. Moreover, applications created based on neural networks can study their results in detail and evaluate their reliability. However, their data are not sufficient [7]. Matveeva examined the case of diabetic nephropathy. The data are the symptoms of the disease, and a multilayer perceptron (MLP) network is used as a classifier to distinguish between sick and healthy people. The results of applying an artificial neural network to diagnose kidney disease based on selected symptoms show that the network has the ability to identify diseases that correspond to human symptoms. However, its scope of application is limited [8].

### 3. Artificial Neural Network Structure Optimization Method

#### 3.1. Overview of the Artificial Neural Network Model

**3.1.1. Artificial Neural Network Model.** In biology, there are many dendrites and axons surrounding the cell body of a neuron. Dendrites and cell bodies are in contact with the axons of other neurons. Axons connect to the dendrites or cell bodies of other neurons. When a pulse travels at the end of a neuron's axis, chemicals are released into the synaptic cleft, creating a dynamic signal. When the dynamic difference around the cell body of the next neuron accumulates with a specific dynamic, also called the threshold dynamic, a new impulse will be generated and transmitted to the axis [9], as shown in Figure 1.

An artificial neuron is the processing unit of a neural network, and its model is similar to biological neurons. It consists of three basic elements: connection weights, summation units, and activation functions, as shown in Figure 2.

**Connection weights:** after entering the neuron model, the weights corresponding to each group of signals are input. When the weight is positive, it means the neuron is activated. Otherwise, when the weight is negative, it means that the neuron is inhibited [10].

**Summation unit:** after the input signal is multiplied by the connection weight, the summation is performed, that is, a linear combination.

**Nonlinear activation function:** when the weighted sum of the input signal exceeds a threshold, the nonlinear function is activated. It controls the output of the neuron within a certain range.

Figure 2 shows the basic model of a multiinput single-output neuron. Among them,  $X = (x_1, x_2, \dots, x_m)^Z$  is the input signal,  $K = (k_1, k_2, \dots, k_m)^Z$  is the connection weight of the neuron,  $V_w = (k_1, k_2, \dots, k_m)^Z$  is the weighted sum of the input signal,  $b_w$  is the threshold,  $\theta(\cdot)$  is the activation function, and  $y_w$  is the signal output. In the following formula,

$$\begin{aligned} v_w &= \sum_{a=1}^p k_{wa} x_a, \\ y_w &= \theta(v_w - b_w). \end{aligned} \quad (1)$$

The activation function  $\theta(\cdot)$  performs a nonlinear mapping of the difference between the weight of the input signal and the threshold  $b_w$ . The mapping result is used as the output signal. It is usually restricted to a certain range (e.g., between (0, 1) and (-1, 1)). Activation functions usually take the form.

Threshold function is

$$\begin{aligned} \theta(u_w) &= \begin{cases} 1, & u_w \geq 0, \\ 0, & u_w < 0, \end{cases} \\ u_w &= v_w - b_w. \end{aligned} \quad (2)$$

Output signal is

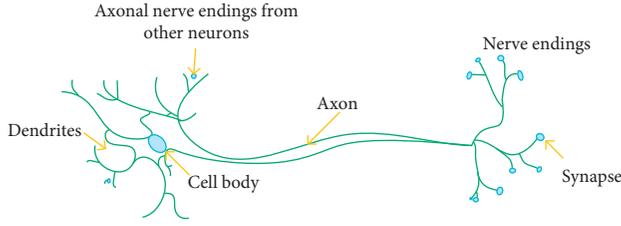


FIGURE 1: Biological neurons.

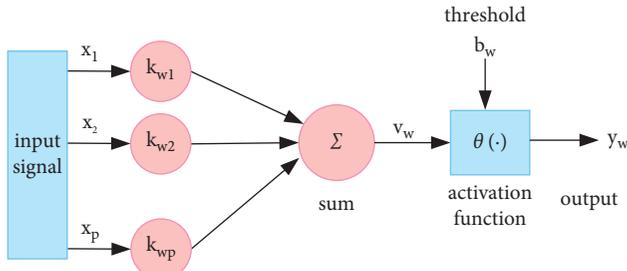


FIGURE 2: Basic neuron model.

$$y_w = \begin{cases} 1, & u_w \geq 0, \\ 0, & u_w < 0, \end{cases} \quad (3)$$

$$u_w = v_w - b_w.$$

Piecewise function is

$$\theta(u_w) = \begin{cases} 1, & u_w \geq 1, \\ \frac{1}{2}(1 + u_w), & -1 < u_w < 1, \\ 0, & u_w \leq -1, \end{cases} \quad (4)$$

Sigmoid function is

$$\theta(u_w) = \frac{1}{1 + e^{-\beta u_w}} = v_w - b_w. \quad (5)$$

The parameter  $\beta$  represents the slope ( $a > 0$ ).

The Sigmoid function is often called the S-type function, which is the most common function among the excitation functions of artificial neural networks. Its output value is controlled between (0, 1).

Hyperbolic tangent function is

$$\theta(u_w) = \frac{1 - e^{-\beta u_w}}{1 + e^{-\beta u_w}}, \quad u_w = v_w - b_w. \quad (6)$$

In practical applications, sometimes the output value is positive or negative. In this case, the redundant tangent function is usually used instead of the Sigmoid function. The output value of the redundant tangent function is checked between (-1, 1).

**3.1.2. Network Structure.** Neurons are connected to the network according to different connection forms, which can form neural networks with different structures. Feedforward

neural networks and neurofeedback networks are currently the two most common types. The information transmission methods of these two neural networks are described as follows:

**Feedforward neural network:** in a feedforward neural network, the signal transmission process is unidirectional. Each neuron can transmit its own output signal as an input signal to the next layer of neurons and then exit to the next stage [11].

**Feedback neural network:** in a feedback neural network, all nodes have the ability to process information independently. Moreover, each node can not only receive information from the outside world but also transmit information to the outside world [12].

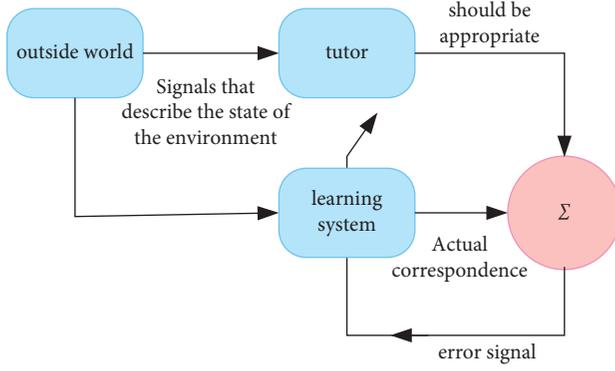
**3.1.3. Learning Methods.** An important feature of artificial neural network is that it can receive information from the external world and continuously adjust its parameters (such as weights and thresholds) to a predetermined range according to specific conditions so that the neural network can continuously improve its performance [13, 14]. This method of acquiring knowledge from the outside world and improving learning performance is very important for neural networks. The learning methods of artificial neural network are mainly divided into two types.

(1) **Supervised learning:** supervised learning, also known as teacher learning, refers to the fact that the external world provides multiple sets of input data and expected output data to the neural network. The neural network calculates the corresponding actual output data based on the input data. The difference is then compared to the expected output data. It adjusts the corresponding system parameters according to the difference and finally makes the actual output data meet the corresponding requirements, as shown in Figure 3(a).

(2) **Unsupervised learning:** unsupervised learning, also known as teacher-less learning, only has input data provided by the outside world, without corresponding expected output data. Therefore, the system parameters cannot be adjusted by calculating the difference. However, the input data provided by the outside world are adjusted spontaneously according to some statistical laws so that the system parameters represent the characteristics of the external entrance of some local data, as shown in Figure 3(b).

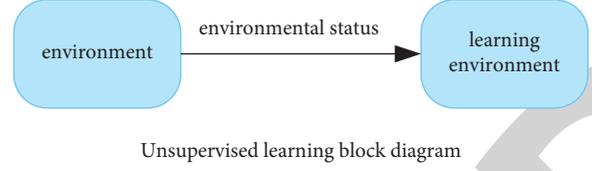
**3.1.4. Learning Algorithm.** Learning an artificial neural network is the process of adjusting the parameters of the network itself. The main method is to continuously adjust its own system parameters by calculating the error according to the input and output data given by the outside world and directly calculate the error. Its own system parameters can be determined according to the specific requirements of the outside world. Due to the different structures and functions of neural networks, the learning algorithms of neural networks are also different. Here, it mainly introduces several common learning algorithms.

(1) **Error correction learning:**  $y_k(z)$  is the actual output of neuron  $k$  at time  $z$  when  $x_k(z)$  is input and  $y_{kd}(z)$  is the expected output. Then, the error signal is as follows:



Supervised learning block diagram

(a)



Unsupervised learning block diagram

(b)

FIGURE 3: Learning style: (a) supervised learning block diagram and (b) unsupervised learning block diagram.

$$e_k(z) = y_{kd}(z) - y_k(z). \quad (7)$$

The ultimate goal of error correction learning is to minimize a specific objective function  $e_k(z)$ . Therefore, the actual output of each output unit on the network approximates the expected output in a statistical sense. The most commonly used objective functions are shown in the following formula:

$$\phi(z) = \frac{1}{2} \sum_k e_k^2(z). \quad (8)$$

Calculating the minimum value of  $\phi(z)$  for the weight  $W$  is shown in the following formula:

$$\Delta w_{kj} = \sigma e_k(t) x_j(z), \quad (9)$$

where the learning step size is  $\sigma$ .

(2) Hebb learning: Hebb learning is a learning rule invented by psychologists. When neurons at both ends of a neural network node are simultaneously active or inhibited, the binding strength of the binding weight increases. On the contrary, when the neurons at both ends of the node are in an activated state and the other end is in a suspended state, the binding force of the binding weight decreases [15]. The mathematical formula is expressed as follows:

$$\Delta w_{kj}(z) = F(y_k(z), x_j(z)). \quad (10)$$

Among them, the states of neurons at both ends of  $w_{kj}$  are  $y_k(z)$  and  $x_k(z)$ . The most common cases are shown in the following formula:

$$\Delta w_{kj} = \sigma y_k(z) x_j(z). \quad (11)$$

(3) Competitive learning: in the competitive learning process, each network output unit competes with each other, and finally, only one strongest unit is activated [16], and it is shown in Figure 4.

The most commonly used competitive learning rules can be written as follows:

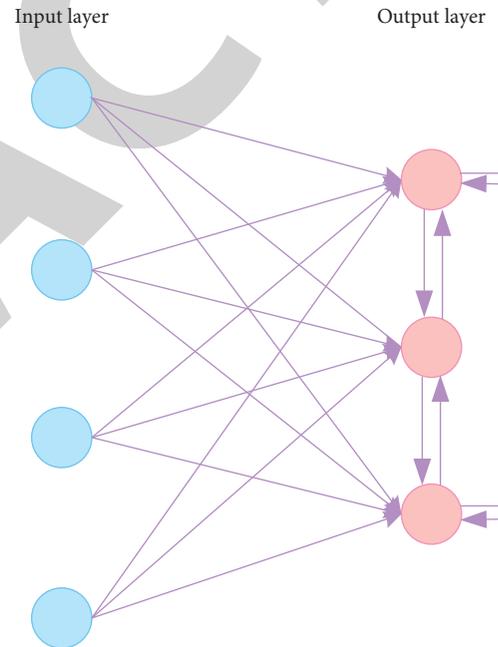


FIGURE 4: Competitive learning network with lateral inhibitory connections.

$$\Delta w_{ka} = \begin{cases} \sigma(x_a - w_{ab}), & \text{If neuron a competes to win,} \\ 0, & \text{If neuron a fails to compete.} \end{cases} \quad (12)$$

**3.2. BP Neural Network.** BP neural network is a postreverse neural network proposed by a group of scientists in 1986. The structure of BP neural network includes input layer, output layer, and one or more hidden layers. Each hidden layer contains multiple neuron nodes. The simplest BP neural network contains only one hidden layer. Figure 5 is a schematic diagram of a three-layer neural network with 1 layer of input, 1 layer of hidden layer, and 1 layer of output.

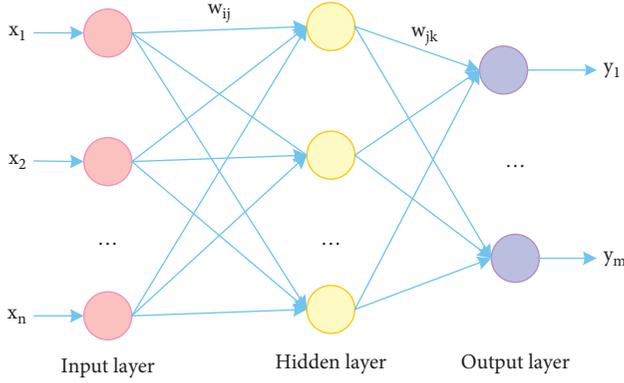


FIGURE 5: Schematic diagram of BP neural network structure.

In a BP neural network, there is no connection between neurons at the same network level, neurons between adjacent network layers are connected to each other, and neurons on all network layers are not connected to each other. The input layer receives the network input information and transmits the information to the hidden layer. After using the hidden level activation function, the information is transferred to the output layer [17, 18].

The learning purpose of the BP neural network is mainly to make any input value of the network have the desired output and to continuously adjust the connection weights and the deviation between layers as part of the network. The learning process of the BP neural network mainly consists of two parts: forward propagation of information and back-propagation of error, as shown in Figure 6.

The forward pass is when the input sample is passed through each node of the input layer and to each node of the hidden layer. The hidden layer processes the input sample information through the transfer function and passes it to the output layer. After receiving the signal, the output layer processes the output result through the transfer function [19]. In this section, the relationship between the input layer and the hidden layer can be expressed as the following formula:

$$y_a = f_1 \left( \sum_{b=1}^q w_{ab} x_b - \theta_a \right), \quad a = (1, 2, \dots, z). \quad (13)$$

Backpropagation errors compare the output to the expected value. If the error is too large, it will be brought back to the output layer, then the hidden layer, and finally the input layer. During the backpropagation process, the connection weights and readings will be gradually changed. The network error function is expressed as the following formula:

$$E = \frac{1}{2} \sum_{c=1}^p (t_c - o_c)^2. \quad (14)$$

The output layer neuron error function is expressed as the following formula:

$$\delta_c = (T_c - O_c) f_2' \left( \sum_{b=1}^q \lambda_{cb} y_a - \theta_c \right). \quad (15)$$

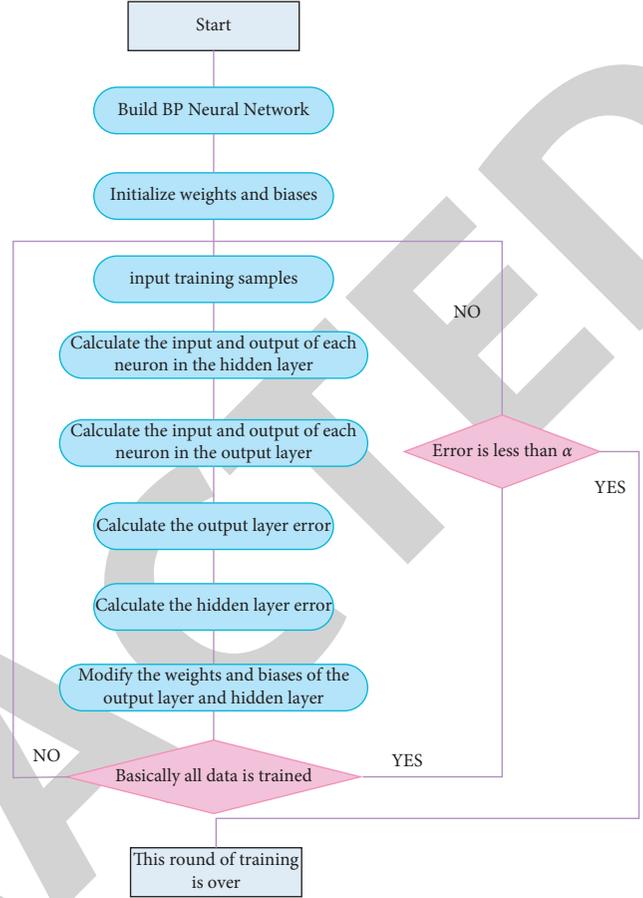


FIGURE 6: BP neural network algorithm flow.

The hidden layer neuron error function is expressed as the following formula:

$$\xi_a = f_1' \left( \sum_{b=1}^q w_{ab} y_a - \theta_a \right) \sum_{c=1}^q \delta_c T_{ca}. \quad (16)$$

Gradient descent is the basic learning algorithm of the BP neural network. Using this method to calculate the weights and thresholds of the network is expressed as the following formula.

The weight change of the output layer is expressed as follows:

$$\Delta w_{2da} = \chi (t_d - O_d) f_2 y_a. \quad (17)$$

The threshold change of the output layer is expressed as follows:

$$\Delta \theta_{2da} = \chi (t_d - O_d) f_2 y_a. \quad (18)$$

The weight change of the hidden layer is expressed as follows:

$$\Delta w_{1ab} = \chi \sum_{d=1}^{s_2} (t_d - O_d) \cdot f_2 \cdot w_{2ab} \cdot x_a. \quad (19)$$

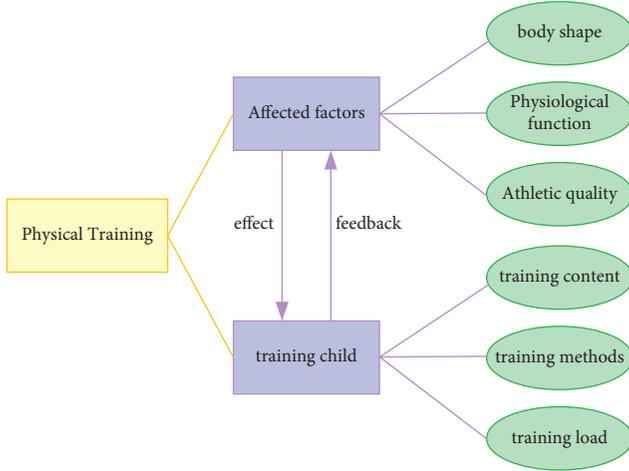


FIGURE 7: Display of physical fitness training content and affected factors.

The threshold change of the hidden layer is expressed as follows:

$$\Delta\theta_{1a} = \chi \sum_{d=1}^{s_2} (t_d - O_d) \cdot f_2 \cdot w_{2da} \cdot f_1. \quad (20)$$

The weights and thresholds in the error backpropagation algorithm of the BP network are adjusted by the sum of the output errors and the changes of the weight readings. After repeated forward and reverse operations, the weights and thresholds of the network are optimized, and finally, the output of the network meets the required error range [20].

**3.3. Neural Network Structure Design.** For neural networks, topology design is an important content. The structure design is too complex, which not only complicates the learning process but also causes overfitting, which reduces the actual usability of the neural network. In addition, after the neural network structure is fixed, the network parameters, such as adjustable weights, are limited, so the searchable space of the solution is also limited. When the necessary experience is lacking to design the neural network structure, the search space of the parameter solution is very large, and different structures will cause many permutations and combinations of parameters. Therefore, the structural design of neural network is a very important and complex problem.

When there is no necessary experience in neural network structure design, the simplest network that fits the sample input variables can be selected. Special design methods include step-by-step development; that is, first design a simpler network and then gradually increase the hidden layer neurons according to the needs and specific situations. The method of gradual pruning is as follows: first design a more complex neural network structure and then gradually delete neurons in the hidden layer until the requirements are met. The adjustment restriction method uses the objective function to restrict the neural network.

**3.4. Physical Training of Athletes.** Competitive ability is mainly composed of physical fitness, skills, tactical ability, sports intelligence, and psychological ability. Among them, triple jump training is mainly composed of physical training and skill training. Physical training is the dominant, and skill training is the key. Influencing the effect of physical training should take into account the impact of training subitems on physical training performance, that is, the relationship between training subitems and affected factors [21, 22], as shown in Figure 7.

An excellent athlete refers to an athlete whose cultural quality, ideological and moral quality, personality quality, competitive psychological quality, intelligence quality, and innovation quality can be comprehensively coordinated and harmoniously developed. At present, there are no specific criteria for judging elite athletes. In China, the athlete technical grading system is mainly implemented for athletes.

The concept of traditional physical training is to perform one-way, single joint training with low time sensitivity and cleanliness. From the definition of fitness, traditional physical exercise theory seems to divide fitness into multiple qualities such as strength, speed, endurance, flexibility, and coordination. According to the functions of these quality systems, corresponding training methods are developed. Various types of athletic training are designed to train the overall performance capacity of the body's structure, function, and metabolic state because these functions are expressed through the structure of the human system. This falls into the realm of functional training, which can be thought of as an extension of physical training.

The stability of physical fitness provides more possibilities for specific physical fitness. The relationship between the two complements each other, and the increase and decrease of either can lead to changes in the level of exercise. Based on general physical fitness, only by strengthening the distribution training ratio of special physical fitness can it vigorously develop special physical fitness and improve the level of special competition.

The indicator consists of two parts, the value and the name, and its original purpose is to reveal and explain. A metric is a specific value that reflects an element or phenomenon between different things. In special training, specific physical fitness is based on various types of general physical fitness. There is a great correlation between basic training and special grades. The state and changing trend of special physical fitness cannot be described by indicators alone.

## 4. Experiment on the Content System of Physical Fitness Training for Track and Field Athletes and the Evaluation Standard of Some Indicators

**4.1. Experiment Preparation.** A total of 10 track and field athletes were included in the FMS functional screening of this study. Among them, there is 1 athlete at the elite level, 2 athletes at the first level, 1 athlete at the second level, and 6 athletes at the third level. The test results in Table 1 show that

TABLE 1: FMS functional screening scores for track and field athletes.

Name	Training years	Sport class	Total score
A	6	Athlete	20
B	7	1	21
C	5	1	20
D	3	2	17
E	5	3	19
F	4	3	14
G	2	3	15
H	3	3	14
I	5	3	10
J	2	3	13

the full score of the FMS functional screening score is 21 points. In the test results, 2 athletes scored 14 points each, and 1 athlete scored 10 points. One athlete had a longer period of exercise (7 years), and the other two had a shorter training period (2 years). There are 5 athletes with a score of 17 or above, accounting for 50.0% of the total. The overall test scores of the track and field athletes were high, indicating that the physical function of the track and field athletes who participated in the test was quite good. One elite level athlete and two first level athletes also had the highest FMS functional screening scores.

*4.2. Content Design of Physical Fitness Training.* According to different sports, their power point is different, resulting in different parts of their physical training. According to the division of physical fitness training parts and combined with the training concept of physical fitness coaches, this study divides the 50-day physical fitness training of track and field athletes into lower body training (including buttocks training, according to the integrity of the strength of the parts), core trunk training, hip training, upper body training, etc., as shown in Figure 8(a).

Core torso training accounts for 23.64% of physical training, which is the highest proportion of all training parts. The core trunk training muscle group mainly includes the psoas (rectus abdominis, internal oblique, and external oblique), back muscles (superficial dorsi, deep dorsal muscles, erector spine, and splints), pectoral muscles, and other main force-producing muscles. The main purpose of training this part of the muscle is to improve the core stability of the triple jumper and enhance the ability of the athlete to transmit force from the bottom to the top. The triple jump project needs to complete three jumps with different movement directions and different forces under the high-speed run-up. Core torso strength training can effectively enhance the triple jumper's ability to control the body during the air, so as to effectively master the movement direction and reduce the consumption of horizontal speed. In addition, the force of the upper and lower limbs pushing the ground can be transmitted upward through the core torso and coordinated with the upper limbs, so as to achieve better sports performance.

In physical training, hip joint training and lower body training accounted for 21.82%, second only to core torso

stability training. The connection between the single-legged jump and the step jump is mainly because the hip joint actively drives the thigh to do the ground-breaking action. Hip flexibility and stability play an important role in technical performance. Lower body strength training is relatively larger than upper body strength training. First, the attributes of this project are mainly based on the lower limbs. Second, because the lower body training muscles are more distributed, the training movements are more complicated.

The purpose of physical training in all parts of a physical training session is to activate the muscles in that part. At the same time, the muscles required for special skills will be activated one by one in an orderly manner. This can not only reduce the occurrence of sports injuries but also strengthen the pertinence of physical training.

During the physical training period, the physical training quality mainly includes maximum strength training, explosive strength training, coordination ability training, and core trunk stability training. The training content of this part contains relations; that is, the training of each part is related. In this paper, the definition is mainly based on the training position and the force characteristics of the training at that time. As shown in Figure 8(b), maximum strength training mainly includes upper body strength training, lower body strength training, and hip strength training, accounting for 41.82% of the content of physical training quality. The explosive training was followed, mainly including the upper body explosive training and the lower body explosive training, accounting for 30.91% of the content of the physical fitness training. Strength stability training (mainly core area strength training) accounted for 21.82% of the physical fitness training content during the recovery period. Coordination training is relatively rare in the recovery period of physical training, accounting for only 5.45% of the physical fitness training content. In the content of physical fitness training, track and field athletes pay more attention to the maximum strength training (absolute strength) of the body. The maximum strength level is the basis for developing fast power (explosive power). On this basis, corresponding explosive training is carried out according to the special technical characteristics.

Training method refers to the ways and methods to improve the athletic ability of athletes and improve the sports level in training activities. Physical training methods and means must be designed according to the special technical characteristics (mainly including energy supply characteristics, force characteristics, and quality needs). A variety of physical training methods and means can not only improve the training interest of athletes but also comprehensively and pertinently improve the special qualities required by athletes. In different training cycles, coaches want to improve the ability of athletes differently, so the training methods used to train body parts, athletic qualities, and load intensity are different.

As shown in Table 2, the conversion training method accounted for 46%, the high-intensity interval training method and the short-duration repetition training method accounted for 19% and 33%, respectively. It shows that track and field athletes mainly use the transformation training

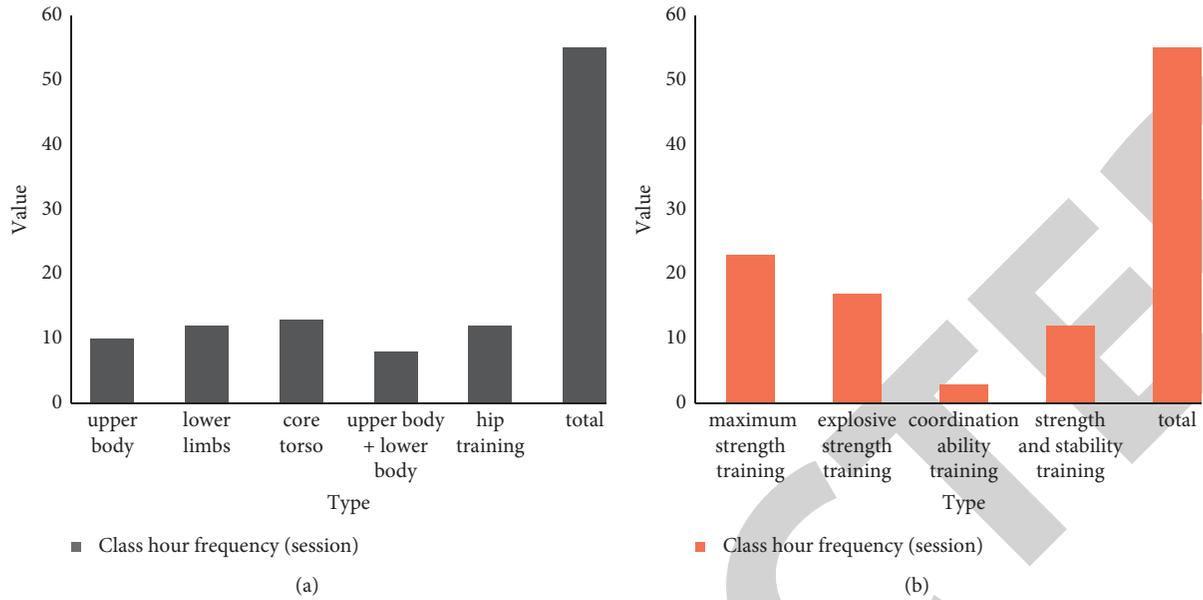


FIGURE 8: Class schedule for physical training: (a) class schedule for physical training parts and (b) class schedule for physical fitness training quality.

TABLE 2: Main training methods used in physical training.

Name	High-intensity interval training	Short repetition training	Transform training
Usage frequency	21%	33%	46%
Heart rate	180 times/min	90 times/min	90 times/min
Intermittent time	Relatively adequate	More adequate	More adequate
Intermittent form	Walk, sit	Sit, massage	Walk, sit, massage
Energy supply form	ATP-CP	ATP-CP	ATP-CP

TABLE 3: Comprehensive evaluation criteria for special physical fitness indicators.

Grade	Standard	Theory (%)
Superior	$\bar{X} + 1.28 s$ or more	10
Upper-middle	$\bar{X} + 0.52 s - \bar{X} + 1.28 s$	20
Medium	$\bar{X} - 0.52 s - \bar{X} + 0.52 s$	40
Lower-middle	$\bar{X} - 1.28 s - \bar{X} - 0.52 s$	20
Inferior	$\bar{X} - 1.28 s$ or less	10

TABLE 4: Evaluation criteria for some indicators of track and field athletes.

Grade	Evaluation criteria ( $An$ value)	Theory (%)
Excellent	$An > 72$	10
Good	$64 \leq An < 72$	20
Medium	$52 \leq An < 64$	40
Pass	$44 \leq An < 52$	20
Failed	$An < 44$	10

method. Depending on the training content, some high-intensity interval training methods and short-term repetition training methods will also be organized.

4.3. *Evaluation Criteria of Some Indicators.* This paper establishes a five-level evaluation standard, which is upper, middle-upper, medium, middle-lower, and lower. The proportion of each grade is 10%, 20%, 40%, 20%, and 10%, respectively. The comprehensive evaluation criteria are formulated, as shown in Table 3.

The evaluation criteria are formulated based on the principle of normal distribution, and the steps are as follows:

According to the single-item rating scale of the test object, the standard scores corresponding to each indicator are found

Input SPSS statistical software to calculate the mean and standard deviation

According to Table 4, the standard score interval of each evaluation level is determined

There are five grades, 10% excellent, 20% good, 40% moderate, 20% pass, and 10% fail. The comprehensive evaluation criteria for the special physical fitness of track and field athletes are shown in Table 4.

It is concluded from Table 4 that when the  $An$  value is greater than 72, the overall level of the track and field athletes' special physical fitness is relatively high, which has a greater impact on the special performance. When the  $An$  index is less than 44, it indicates that the overall level of the athlete's specific physical fitness is relatively poor, and it is necessary to strengthen the comprehensive level of the specific physical fitness to improve sports performance.

## 5. Discussion

First, through the study of the relevant knowledge points of the literary works, this paper initially masters the relevant basic knowledge and analyzes how to research the content system of physical fitness training and some index evaluation standards for track and field athletes based on artificial neural network. The concept of neural network and related algorithms are expounded, the artificial neural network model is studied, and the BP neural network is explored. And through experiments, the applicability of neural network in the training content system and some index evaluation standards is analyzed.

Artificial neural networks simulate the functions of neurons in the human brain, such as learning, memory, and problem processing, and establish a computational model of a parallel distributed processing system with a large number of connections. It can quickly acquire knowledge from the outside world and process it. It is widely used in model recognition, signal processing, knowledge engineering, empirical systems, optimal combination, robot control, etc.

Through the experimental analysis in this paper, it can be known that the transformation training method is a training method that transforms the training load, training content, and training form and conditions into a training method that improves enthusiasm, athlete's interest, and adaptability. The main purpose of using the transformation training method is to improve the adaptability of athletes to different training intensities, training contents, and sports forms. From the indicators such as heart rate and interval form, it can be seen that the ATP-CP system is the main energy supply, and the training load is small.

## 6. Conclusion

The training load content and measurement arrangement of track and field athletes selected over the years mainly include strength, speed, speed endurance, and special training techniques. It focuses on different content at different stages in different periods. The training monitoring method adopted by top track and field athletes in the training process for many years is the monitoring of physiological and biochemical indicators so that athletes can effectively improve their competitive ability. The adaptive adjustment of artificial neural network model structure is an important direction for the development of deep learning, and it has become a research hotspot in industry and academia. Due to the limitation of my personal ability, some details may still be ill-considered during the experiment. The types of training datasets can continue to grow. After testing and training data outside of some public datasets, it is found that the method used in this paper still has some room for improvement.

## Data Availability

No data were used to support this study.

## Disclosure

The authors confirm that the content of the manuscript has not been published or submitted for publication elsewhere.

## Conflicts of Interest

The authors declare that they have no conflicts of interests in this paper. .

## Authors' Contributions

All authors have seen the manuscript and approved to submit to your journal.

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