Research Article

Youth Sports Special Skills' Training and Evaluation System Based on Machine Learning

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Nowadays, most sports training adopts such a mode, that is, the coach guides and observes the movements of the trainer on the side, or uses the camera to collect the data information in the training video. After the training, the trainer needs to experience and comprehend it according to the coach's guidance and suggestions, which leads to a poor training effect to a certain extent, and the training movements are not so standardized. The most important thing is that the physical condition of the trainer will change at any time during the exercise. However, the traditional training mode cannot perceive and predict it at all, and it may even lead to the training volume being too large for the athletes to bear, which also causes irreversible effects on the body. Based on this, this paper aims to use the relevant theories and technologies of machine learning to build a system for the training and evaluation of sports-specific skills. This paper automatically determines and guides the movements of the trainer, which greatly improves the training efficiency. The movements are also more standardized, and the workload of the coaches is also reduced. In addition, the system includes explained functions. It uses holographic projection to play various videos of training and guidance, which brings convenience to trainers to observe and understand specific sports behaviors. Finally, the data results of the experimental subjects were analyzed to verify the effectiveness and feasibility of this training evaluation system, in which their special scores increased by 1.51% compared with the previous ones.

1. Introduction

One of the important principles of physical training is to combine it with special technical training, so as to play a better effect. The main purpose of skill training is to master more correct and complete technical concepts. It also enables specific skills to be improved and enhanced and enables the trainer to reach a level of proficiency. Furthermore, skill training can also improve the coordination of the body and form a unique technical style and motor skills. But, for now, the specific evaluation of sports-specific training for teenagers has not yet formed a certain system. Therefore, this paper uses machine learning methods to build an intelligent training and evaluation system. It can provide highly referenced opinions and suggestions for the training programs of adolescents at various stages and play a role as a ruler

when evaluating their special skills. Trainers can make timely adjustments based on the monitored results and detect and correct abnormal situations. It ultimately effectively improves the training level of system users.

The sports-specific skills of teenagers play a key role in their own balanced development. Some scholars have done some research on this skill. Behncke found that motor mental skills training is related to general cognitive somatosensory techniques. These techniques include mental rehearsal, mental imagery and visualization, visual motor behavioral rehearsal, cognitive behavioral therapy, biofeedback, progressive muscle relaxation, and meditation. He concluded that although mental skills training enhances the initial and ongoing capacity for self-monitoring, it is critical to the implementation of any cognitive-somatic therapy [1]. Yang used a multibaseline cross-subject experimental design

and behavioral skills training program to assess preferences in 10 children with special needs in the absence of alternative multiple stimuli. Results showed that behavioral skills training significantly improved the accuracy of the preference assessment procedures for three special education teachers and was generalized in preference assessments for other children with special needs [2]. Goswami aimed to develop a business-oriented technology skills development scaling structure and flowchart for businesses in emerging economies. The findings show that utilizing a framework based on implementation and suppliers, inputs, processes, outputs, and customers (SIPOC) identifies suppliers, inputs, processes, outputs, and customers in the value chain of extended enterprise technology skills building. It achieves a user-friendly conceptualized technical skills development framework [3]. Baran et al. investigated the impact of the Special Olympics (SO) Unified Sports (UNS) football program on anthropometrics, physical fitness, and football skills in male youth athletes with and without intellectual disability (ID). Dependent t-tests and effect size calculations showed that SO athletes and nondisabled partners had significantly higher physical fitness and football skill scores in most variables [4]. The above research results reflect the importance of skill training but are not supplemented by data explanation and validation. Even if there is, no further analysis of its feasibility has been carried out.

Machine learning is one of the research methods with an extremely wide range of applications, and many scholars have conducted different researches on this algorithm. Buczak and Guven provided short tutorial descriptions of each machine learning (ML) and data mining (DM) method. Since data are very important in ML/DM methods, they also introduced some famous network data sets used in ML/DM. They discussed the complexity of ML/DM algorithms and challenges in using ML/DM in cybersecurity and makes some recommendations on when to use a given method [5]. Mullainathan and Spiess proposed a way of thinking about machine learning that had given it a place in the econometrics toolbox. They hoped to gain a clearer understanding of how these algorithms work, where they excel, and where they can go wrong. It thus makes them conceptually easier to use [6]. Wang et al. proposed a data-driven, physically informative machine learning method for predicting differences in Reynolds stress in RANS models. They first trained a difference function using baseline flow data, which they then used to predict Reynolds stress differences in new flows. Their ultimate goal is to more accurately predict the quantity of interest by solving the RANS formula using the Reynolds stress obtained from it [7]. The purpose of the study by Voyant et al. is to outline methods for predicting solar radiation using machine learning methods. While many papers describe methods such as neural networks or support vector regression, other methods have also been shown to be starting to be used for this kind of prediction. The performance ranking of such methods is complex due to the diversity of data sets, time steps, prediction horizons, settings, and performance metrics. To improve forecasting performance, they suggested using a mixture model or ensemble forecasting method [8]. The above scholars have mainly

carried out theoretical research on machine learning and achieved certain results but have not applied it to practical fields.

According to a series of experiments carried out in this study, we can draw the following analysis: the prediction value and evaluation value of the model constructed by the RF algorithm are better. And it can achieve a relatively low error value under different environments, the lowest is nearly 0.4, and it is quite different from other algorithms. After a period of training, the machine learning-based special sports training evaluation score reached 75, and the effect was significant and much higher than other methods. This shows that special sports and evaluations based on machine learning can effectively improve the performance of sports-specific sports. In addition, the evaluation method based on SVM pays more attention to the value of physical fitness in the special training process, reaching 53.61%, but there is a certain deviation in the evaluation of average power, reaching 4.2%. In contrast, machine learning-based evaluation metrics see a speed endurance index behind average power. Therefore, its value reaches 46.02%, and its evaluation of explosive power during training is also more accurate, reaching 76.31%.

2. Machine Learning and Sports-Specific Skills and Assessment Systems

2.1. Machine Learning. Machine learning is abbreviated as ML, and the full name is machine learning. It plays a central role in big data and artificial intelligence. It is widely believed that machine learning is one of the main ways to fully realize intelligence. Machine learning involves a number of research fields, including linear algebra, probability theory, information theory, algorithm theory, statistics, approximation, and numerical computing. It is an interdisciplinary subject. Machine learning mainly studies how to imitate and learn human behavior through computers, so as to acquire some basic skills and knowledge. In other words, machine learning optimizes the machine learning model through a series of data processing, continuous training, and validation of the built model. This can improve the accuracy of the prediction and judgment process. Today, the basic definition of machine learning by researchers is an algorithm that learns directly from data and does not rely on any predetermined formula model or empirical strategy [9]. When the number of training and learning samples increases, the performance of the algorithm and the accuracy of the model can also be improved. Figure 1 shows the pattern flow of machine learning.

At present, machine learning mainly includes three types, namely reinforcement learning, supervised learning, and unsupervised learning. First, reinforcement learning abandons the tracking of raw data and instead accumulates policies and improves them based on scene feedback and evaluation mechanisms. It deals with how to act in an environment to maximize cumulative reward. Second, the standard of the supervised learning training model is known data information and conclusions, and the goal is to make the model have the ability to predict or classify. Third,
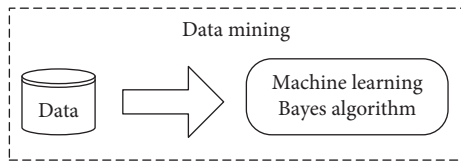
Figure 1: Pattern flow of machine learning.

unsupervised learning is the opposite of supervised learning. It does not pay attention to the nature or conclusion of the data but pays attention to the nature and laws of the data, specifically the data structure, relationship, group characteristics, and so on [10]. In general, machine learning algorithms mainly include the following six types:

(1) MLR, that is, multiple linear regression. The independent variables in each linear expression correspond to their dependent variables one-to-one, and there are generally two or more independent variables. This algorithm is used in the linear relationship between the independent variable and the dependent variable.

(2) CART, that is, decision tree; the full name is classification and regression tree. Because this kind of decision branching into a graph is very similar to the branches of a tree, it is called a decision tree. It operates based on the criterion of minimizing the squared error, and its main task is to split the nodes without interruption to construct a binary decision tree. It can finally get the average value of a leaf node and use it as the predicted value. After repeated trial and error experiments, it was found that the maximum value of the decision tree depth and the sample values of the nodes were 20 and 11, respectively, while other parameters remained unchanged.

(3) RF, that is, random forest. This algorithm originated from the idea of ensemble learning. The main process is to integrate different decision trees and then calculate the average value to obtain the predicted value of RF [11]. It is extremely sensitive to data overfitting, so it can effectively avoid overfitting and is relatively stable. According to the analysis of the specific parameters of this algorithm, it is known that when the number of decision trees is 100, the depth of each tree is 30, and the number of samples of nodes is 1, the experimental effect of this algorithm is the best. The advantages of random forests are producing highly accurate classifiers, handling a large number of input variables, balancing errors, and so on.

(4) SVR, that is, support vector regression. The main basis of the algorithm is statistical learning theory and the principle of structural risk minimization, through which the global optimal solution is obtained. Its speed is very fast, and its generalization ability is relatively strong. The main application range is the problem of relatively small sample size and high-dimensional input space [12].

SVR usually chooses RBF as its core function; RBF refers to the radial basis function, that is, radial basis function. Some other parameters are as follows: the penalty coefficient C is 200, which is also called the tolerance for error. The kernel function parameter G (gamma) is 25.

(5) BPANN, that is, BP artificial neural network; the full name is backpropagation artificial neural network. It is mainly a feedforward network and has a wide range of applications. The learning process of this algorithm is divided into two types namely signal forward propagation and error backpropagation. From a theoretical point of view, a single-layer neural network has achieved the required mapping and approximation capabilities. But, generally, people will use the structure of the three-layer neural network, namely input layer, output layer, and hidden layer. Figure 2 shows the basic working principle of the neural network. If each layer needs to be activated, the RELU function (rectified linear unit) is used, which is an activation function. It is often used in neural networks in the field of artificial intelligence. And the effect is most obvious when the value of the hidden layer is set to 200. The BP neural network model is the most common and practical machine learning framework model, and it is also one of the key foundations for advancing machine learning to deep learning [13]. Its ultimate goal is to build a more comprehensive model, first input data, then transform the data, and then go through linear fusion.

As shown in the figure above, there are several layers of neurons between the input layer and the output layer, which are called hidden units and have no direct connection with the outside world. However, the change in its state can have a certain impact on the relationship between input and output. And each layer has several nodes. The forward propagation process is that the input layer passes through the hidden layer to the output layer. Most importantly, the state changes of neurons in each layer only affect the state changes of the next layer. If the desired effect cannot be obtained in the output layer, the backpropagation process is entered, that is, the error signal is returned along the original line, and the weights of neurons in each layer are modified. It is a computational process that minimizes the error value [14]. Figure 3 shows the basic structure of the neural network.

(6) DL, that is, deep learning [15]. It is a new research direction in the field of machine learning, which was introduced into machine learning to bring it closer to its original goal-artificial intelligence. DL is improved based on the traditional artificial neural network, which is embodied by adding more hidden layers and reducing parameters, so as to achieve the ultimate goal of constructing very complex nonlinear network structures and functions. It also captures the
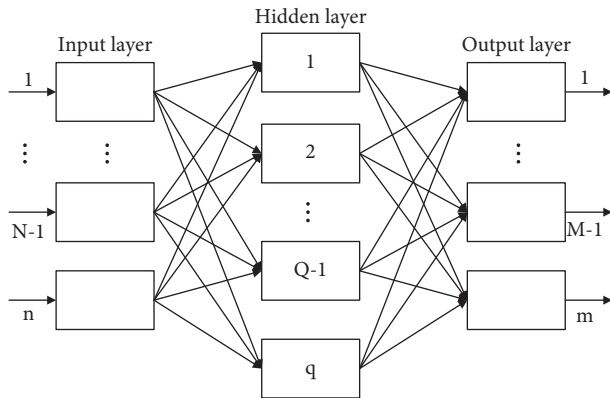
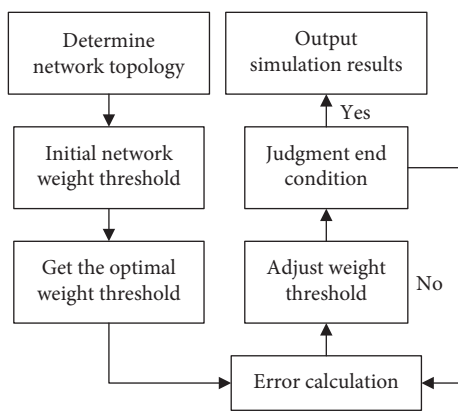Figure 2: The basic working principle of the BP neural network.

Figure 3: Basic structure of the BP neural network.

most essential characteristics of data in a relatively small and limited sample. This algorithm works best with 4 hidden layers and 70 neurons per layer.

The above six algorithms all operate according to the Python language, and the main difference is that deep learning builds the KERAS module, and other algorithms build the SKICIT module. Over time, a lot of research has been done on machine learning classification. Machine learning can have a variety of classification methods according to different angles, as shown in Table 1.

2.2. Sports-Specific Skills. General sports-specific skills mainly include basic sports skills and special sports skills, as shown in Figure 4. Among them, there are six kinds of special sports skills, each of which includes a number of specific items. Taking track and field events as an example, it mainly includes three kinds: running, jumping and throwing. Running includes sprint, long-distance, hurdles, and relay. Jumping includes high jump and long jump. Throwing includes shot put, medicine ball, and softball, to name a few. There are two types of gymnastics, namely technical gymnastics (such as low horizontal bar, support jumping, skill movements, etc.) and rhythmic gymnastics (such as the popular rhythmic gymnastics and aerobics). Water sports include breaststroke, freestyle, backstroke, and butterfly. Ice and snow sports include skating, skiing, and ice

hockey. Traditional sports include martial arts and folk, and martial arts include baguazhang, wrestling, tai chi, archery, and so on. Folk projects include lion dance, dragon boat racing, swing, and so on. There are two main categories of emerging sports, namely survival and adventure sports and fashion sports [16]. Survival adventure projects mainly include wild survival, hiking, mountaineering, and rock climbing. Fashion sports mainly include rope skipping, taekwondo, darts, and so on.

Among them, the most basic track and field special technical examination items mainly include 200 meters, 400 meters, 1,500 meters, high jump, and long jump. Table 2 shows the grading standards and norms for the special sports examination, with a full score of 30 points.

2.3. Evaluation System for Sports Special Skills' Training. In general, the hardware facilities of physical skill assessment and training systems have certain characteristics and advantages, such as versatility and ease of use. In order to better show the basic functions of this system, the following Table 3 shows the extension products of its hardware facilities. It mainly includes a grip strength tester, a hand strength tester, a balance force plate, a tester for air pressure changes, a joint angle tester, and an isometric force tester [17].

The system is designed to automatically determine and guide the movements of sports trainers, thereby improving training efficiency and standardizing their behaviors. In addition, the system will regularly collect the exercise state information and vital signs of the trainer, so as to achieve a real-time assessment and comprehensive monitoring of their physical condition. It effectively avoids excessive exercise or accidental occurrences. The system can also record a complete set of movements of the trainer into a video, which also improves its own work efficiency and recognition accuracy [18]. The sports special skills training evaluation system constructed in this paper is shown in Figure 5.

Among them, the main role of the central processing unit is coordination. It can receive the instruction of the man-machine operation module and output the instruction to the specified module according to its own preset algorithm. In addition, it also carries functions such as user registration and login, background rights management, and password change services. In addition, the system includes two displays. One of the display screens can play various data information monitored and input and convert these data information into two- or three-dimensional code renderings. The other display screen is used to display the data information of the identification and judgment results of the first, fourth, and fifth modules. More importantly, this system also includes a holographic projection system. It is a mid-air imaging system that suspends the three-dimensional picture in the real scene of the cabinet, which consists of three parts, namely the air screen automatic generation system, the 3D projector, and the data material library [19]. The central processing unit will send a series of control instructions to the system, and then the system will retrieve the corresponding data information from the material

TABLE 1: Classification of machine learning.

Classification method	Specific types			
Learning strategy	Simulating human brain		Direct use of mathematical methods	
Learning method	Inductive learning	Deductive learning	Analogical learning	Analytical learning
Learning style	Supervised learning	Unsupervised learning	Reinforcement learning	
Data form	Structured learning		Unstructured learning	
Learning objectives	Concept	Rule	Function	Category	Bayesian network
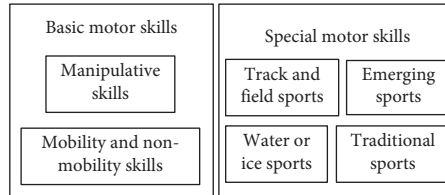
FIGURE 4: Structure of sports-specific skills.

TABLE 2: Scoring rules for each sports event.

Items	Scores	Results	
		Male	Female
200 m		25.2 s	28.7 s
400 m		55.6 s	65.6 s
1500 m	30 points	269 s	330 s
High jump		1.83 m	1.56 m
Long jump		6.5 m	5.2 m

library to construct various motion models. It will then expand to describe these major modules.

(1) Recognition of moving targets. It is mainly used to complete a series of basic tasks, such as collecting video information, detecting and identifying moving objects, and outputting video data to the data processing module.

(2) Collection of motion state. This module simply collects the exercise state information of the trainer and then outputs the information to the fourth module and the database for storage through Beidou;

(3) Data processing. The depth sensor in this module plays an important role in that it can obtain the trainer's skeletal information. It is used to detect the distance between environmental objects and the sensor.

(4) Action standard determination. Its main function is to compare the trainer's movements with the standard movements in the database and then present the similarity value. If the difference between the two is not large, the action is considered to be relatively standard; otherwise, it is not standard, and the minimum value of the general judgment standard is 90%.

(5) Action guidance suggestions. It can provide some guidance on the judgment results in the previous module and store them in the database. The SMS editing module can send the guidance to the trainer's mobile terminal;

(6) Man-machine operation. The user's registration and login are mainly carried out in this module, and the system administrator also inputs some control instructions in this module;

(7) Predictive analysis. According to some information collected by the above modules, it can evaluate the sports conditions and vital signs characteristics of the athletes and then obtain the corresponding evaluation results and display the evaluation results on the display screen. In addition, this module can be divided into functions such as graph drawing, comparative analysis, and regression calculation. Graphical drawing is drawing various data graphs according to the monitored data information. Comparative analysis refers to analyzing and predicting the drawn data graph and standard curve graph and outputting the analysis results. Regression calculation is to perform certain regression calculations on the data curve according to different functions [20].

TABLE 3: Hardware facilities of the evaluation and training system.

Hardware facilities	Features and advantages	Parameter
Grip tester	Provide biofeedback in real time	
Muscle strength tester	Set goals and save test results	2 shackles
Balance force measuring plate	Easy to install and connect	
Pressure change dynamometer	Small size, lightweight, and portability	2 ring fixing accessories
Joint angle tester	With automatic pairing function	
Isometric dynamometer	Make independent measurements	1 adjustable rigid belt

(8) Data sharing. It mainly realizes the sharing of data information in the database through wireless transmission. It enables users who use different computers and different software in different places to read other people's data and perform various operations, calculations, and analyses.

2.4. Construction of Evaluation System Based on Machine Learning.

This study uses several of the above machine learning algorithms (SVR, RF, MLR, etc.) to build a training evaluation system. In order to more accurately evaluate the feasibility of the system, first, select a suitable one among various machine learning algorithms to ensure the stability of the experimental results and then verify different algorithms to select the best experimental results [21, 22]. Specifically, the data set is divided into 10 equal parts, nine of which are selected for model training, and in the process, the attributes of the next data set are tried to be predicted. The predictive ability and effect of the model are averaged over the entire process.

In order to quantitatively evaluate the performance of the constructed system, we use the coefficient of determination and the root-mean-square error to measure the effect of the system. A regression model is considered to be more accurate if the value of the coefficient of determination is higher and the error value is lower. The coefficient of determination is $\mathcal{R}^2$, which represents the degree and level of variation of the actual value explained by the predicted value. The calculation formula is as follows:

$$\mathcal{R}^2 = 1 - \frac{\sum_{i=1}^{m}\left(x_i - \hat{x}_i\right)^2}{\sum_{i=1}^{m}\left(x_i - \bar{x}_i\right)^2}, \tag{1}$$

where x_i is the test value for sample i, $\overline{x}$ is the average value for x_i, $\hat{x}_i$ is the predicted value for sample i, and m is the number of samples.

The root-mean-square error is mainly used to test the accuracy level of the test value and the experimental value. The calculation formula is as follows:

$$RMSE = \sqrt{\frac{1}{m-1}\sum_{i=1}^{m}\left(x_i - x_i'\right)^2}, \tag{2}$$

where x_i' is the experimental value for sample i after high-throughput calculation.

In order to capture and train objects in sports, we first need to acquire the target object. Assuming that in this
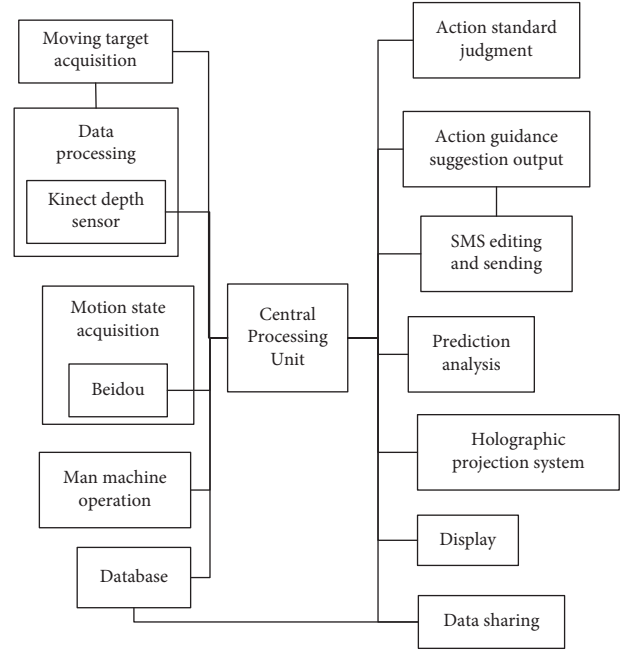

FIGURE 5: Sports special skills training and evaluation system.

process, the target movement is linearly related; then the path of its movement can be expressed as follows:

$$m(x) = H\left(\omega^T \cdot x + a \cdot x\right),$$

$$P(X = a) = \frac{a}{x + e^{-a}}, \tag{3}$$

$$F^m(a, b) = \sum_{i=1}^{m} -P^{(m)},$$

where $H(x)$ represents the motion function of the moving target, P represents the linear correlation degree of the target, a represents the linear correlation coefficient, and F represents the objective function established according to the motion function. At the same time, we also remove the interference of the linear correlation coefficient. After knowing the basic motion shape of the moving target, we can simply model and reshape it.

$$G(x) = F^{(i)}\log P\left(m^i\right),$$

$$P = \int_a^b \left(\sin mx^2 + \cos x^m\right)dx, \tag{4}$$

where $G(x)$ represents the function model established according to the objective function, which is actually a preliminary motion shape model. On the basis of this model, we need to train and match moving targets to further refine the details of the model.

$$K = A_j^{(t-1)} - \frac{\partial P(a,m)}{\partial x},$$
$$A = m^{t-1} - \frac{\partial P(m,t)}{\partial m}, \tag{5}$$

where K represents the exercise training process, a represents the matching coefficient, and A represents the training result in this process. However, the above training is mainly based on single-target motion matching and training. In the actual moving target collection process, we often encounter the existence of multiple targets. Therefore, we need to adjust the model and add a multiobjective matching coefficient to it.

$$D = \rho^{(m)}\left(A * x^T + a\right),$$
$$T_i = \min_{i=1,2,\dots,m} T_i * A, \tag{6}$$

where D represents the multitarget motion matching model, a represents the multitarget matching coefficient, and T represents the minimum value of the target in this process. After successfully matching and training the target, we also need to evaluate the relevant actions of the target so that it meets specific requirements. The relationship between the required function J and the target x is as follows:

$$J_i = P^{(i)}\left(\frac{x^T}{\|x\|} \cdot T^i\right) + m^{(i)}\left(\frac{y^T}{\|y\|}\right),$$
$$E(x,y) = \frac{\|x_m - y_m\|}{\sqrt{\sum_{i=1}^{n} (x_k - y_k)^2}}. \tag{7}$$

From formula (7), we can see that the evaluation function E is directly related to the motion form of the target. Moreover, the function has two built-in parameters, which is very suitable for dealing with multiple targets. To further explore the accuracy of the evaluation model, we introduce a correctness function, which is expressed as follows:

$$W \cdot x^T y^T + E(x,y) = 0,$$
$$\gamma = \rho^{(i)}\left(W \cdot x^T y^T + b\right), \tag{8}$$

where W represents the bias coefficient (an important index for evaluating the detector, the larger the value, the better the detection performance of the system) in this evaluation process and γ represents the correctness of the evaluation process. In order to further characterize the accuracy of the model, we take the minimum value of each evaluation process to represent the actual result of the model evaluation, and its functional representation is as follows:

$$\gamma_i = \min_{i=1,2,\dots,m} \gamma. \tag{9}$$

3. Training and Evaluation System Models

After summarizing the data sets obtained from the above calculation process, we use three machine learning algorithms of SVM, RF, and MLR to build the model of the evaluation system. In this paper, the output values are compared in different environments, and the results are shown in Figure 6.

According to Figure 6, we can find that the predicted value and the evaluation value of the model constructed by the RF algorithm are better. It can achieve a relatively low error value under different environments, the lowest is nearly 0.4, and it is quite different from other algorithms. In order to verify the practicability and effectiveness of this algorithm model, we selected five more experimental subjects. In order to protect personal privacy, this article will use their initials to indicate. It asked them to use this system model for half a year, and the training program was shot put. This paper also tests it four times to ensure the fairness of the results, and the obtained results are shown in Figure 7.

According to Figure 7, we can find that using the evaluation system model to train the experimental subjects, their special performance has been greatly improved compared with the performance of half a year ago, and the maximum increase value has reached 1.51%. In the actual development process, the performance of sports-specific sports can directly explain the pros and cons of the training and evaluation mode. The training and evaluation results under different methods are shown in Figure 8.

Figure 8 shows that the machine learning-based sports-specific assessment performance was not ideal in the early days, with the highest score being only 65. However, after a period of training, the machine learning-based special sports training evaluation score reached 75, and the effect was remarkable. Among them, the data characteristics of performance show that the average performance of special sports training and evaluations based on machine learning has reached 78, which is much higher than other methods. This shows that special sports and evaluation based on machine learning can effectively improve the performance of sports-specific sports.

In the evaluation process of special training, different indicators often represent different meanings. Therefore, the next article will start with the evaluation indicators to explore the sports skills behind different indicators. Among them, the special training evaluation indicators based on machine learning are shown in Figure 9.

Figure 9 shows that in actual sports, physical fitness is the foundation of all sports and training. Among them, the evaluation method based on SVM pays more attention to the value of physical fitness in the special training process, reaching 53.61%, but there is a certain deviation in the evaluation of average power, reaching 4.2%. In contrast, the evaluation index based on machine learning sees the speed endurance index behind the average power, so its value reaches 46.02%, and its evaluation of explosive power during training is also more accurate, reaching 76.31%.
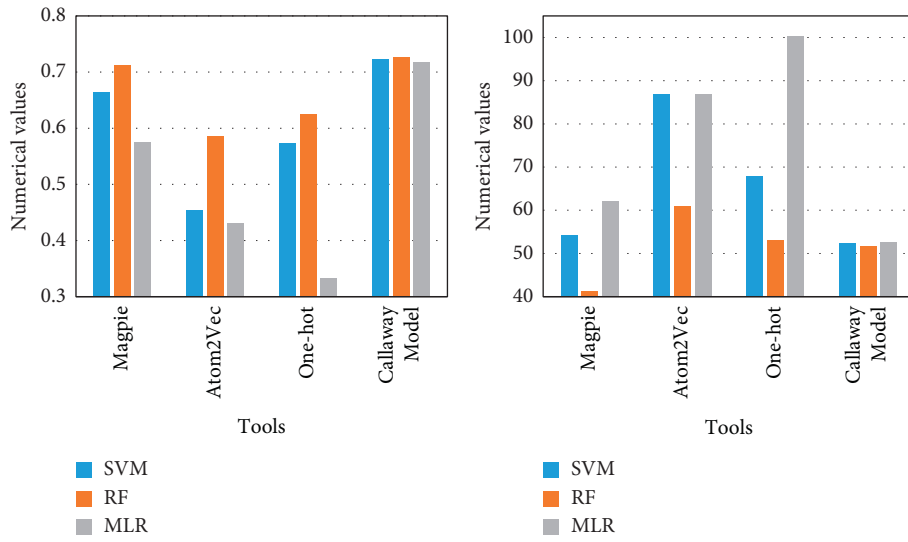
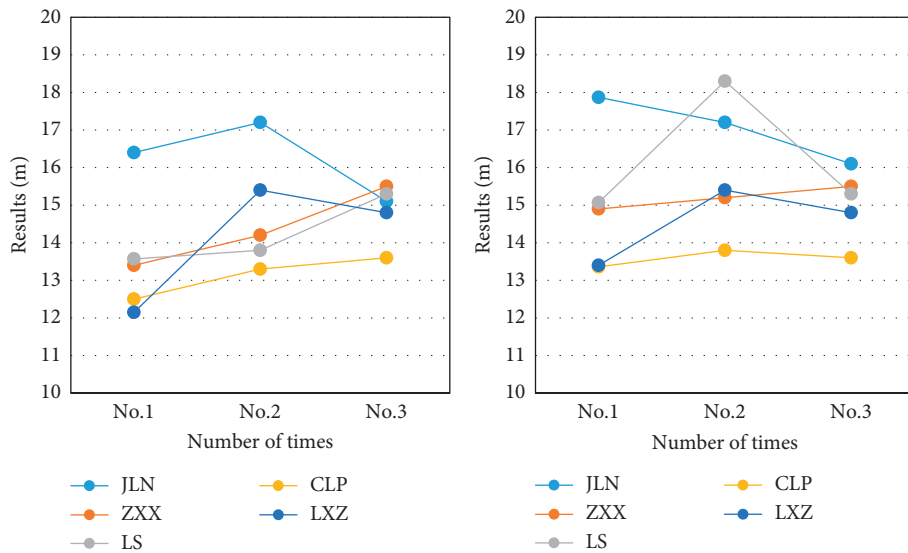Figure 6: Machine learning prediction model values in various environments.

Figure 7: Comprehensive evaluation results of special achievements and technologies.
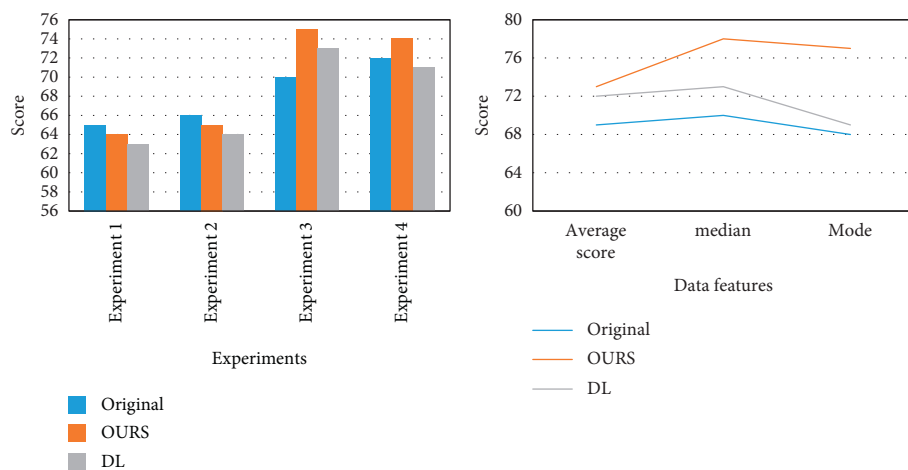

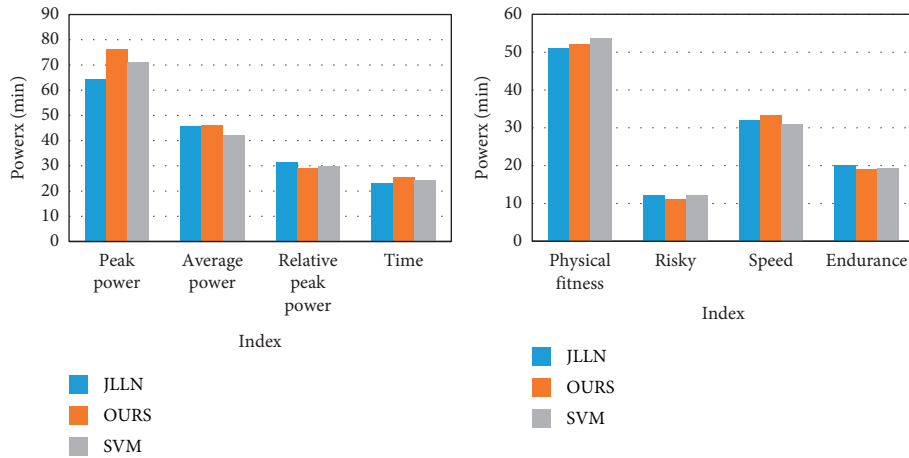Figure 8: Training evaluation results under different methods.

Figure 9: Special training evaluation indicators based on machine learning.

4. Conclusion

The immature evaluation mechanism of youth sports training directly affects the balanced development of their bodies. Therefore, constructing a more efficient evaluation system can objectively and impartially evaluate the level of youth sports-specific skills. The following conclusions can be drawn by combining the rapidly developing machine learning algorithms and the research and analysis of the system model constructed in this paper. The evaluation system for sports-specific training effects constructed by us can effectively evaluate the training effects of trainers. It better monitors the ability development of athletes, and it also provides a quantifiable standard for coaches to make training decisions. This system can match the corresponding training concept and plan for the individual technical level of the trainer and detect the development of physical fitness. However, the experimental population in this study is small, and the scale of the experiment can be continued in the future. It allows the system to take into account the physical information characteristics of groups at various stages to better optimize the system model. In addition, it can carry out weight analysis on various sports indicators of special skills in the future and provide new research ideas and directions for skill evaluation and decision-making.

Data Availability

Data sharing is not applicable to this article as no data sets were generated or analyzed during the current study.

Conflicts of Interest

The authors declare that there are no conflicts of interest with any financial organizations regarding the material reported in this article.

Acknowledgments

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