

The Application of Artificial Intelligence Technology in Physical Training

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Abstract. Athletics have become a key development area. Through a large number of trainings, our universities train sports talents for society, and encourage sports talents to go to the world stage to Strive for the glory of our country. In physical training activities, the use of artificial intelligence technology is the main development direction of society. This paper analyzes the application of artificial intelligence technology in physical training and predicts the future of artificial intelligence technology in the field of athletics to create a high-quality physical training approach.

Keywords: Physical Training; Artificial Intelligence Technology; Training.

1. Introduction

Artificial intelligence technology has attracted a great deal of attention in all sectors of society, and for sports, automated data analysis technology has become a strategic area of knowledge development in sports science. This paper briefly describes the application of AI technology in sports, and analyzes the use of AI technology in sports activities, such as basketball, tennis, skiing, taekwondo, and vertical jumping, and predicts that AI technology will have a broad development space in sports training activities, which is mainly reflected in the application of multimedia computer technology, expert system and virtual reality technology, aiming at improving the current situation of sports training, increasing the application of artificial intelligence technology and building a platform for training sports talents.

2. The Current State of Artificial Intelligence Technology Applications in the Field of Sports

2.1 Training and Competition Status

Artificial intelligence technology is used in training and competition situations, mainly through hardware terminals such as video equipment and sensors for deep learning. In athletic training and competitions, where maintaining a calm state of mind is an essential element for good performance. The machines the machine recognizes facial expressions in videos and images by using public data such as face detection image processing tools and basic emotional states, and predicts emotions based on the detected facial features. Currently, we have mature machines for complex facial recognition tasks [1]. Foreign scholars use some methods to build a data-driven reimagining model using such tracking data, which is a reliable sequence of basketball behaviors generated mainly from first-person images, learned in an unsupervised manner, and is widely used in the field of sports. Chinese scholars are putting more efforts on their targeted models based on the actual development of sports in China trying to understand training and games through artificial intelligence techniques [2].

2.2 Prediction and Evaluation of Achievements

Prediction and evaluation of performance are mainly based on the machine which can learn algorithms to build nonlinear models to improve the fit of regression models and accurately predict the explanatory variables. Our scholars have proposed a sports performance prediction model based on machine learning algorithms, which works by using the principle of structural risk minimization to improve the current state of performance prediction, improve the level of evaluation of physical fitness, and make the prediction results accurate[3].

2.3 Athletes' Health Condition

Leading AI technology into the medical industry can change the outcome of medical treatment, and the predictive and diagnostic capabilities of AI technology are being applied to physical training for the purpose of focusing on the health of athletes. To ensure that athletes are staying in healthy, AI technology has become a suitable medical tool for athletes. Using AI technology to analyze athletes' health parameters and body movements is the sample data to determine athletes' health status. Foreign scholars have proposed injury risk mitigation theories that using common individual and team sport is effective in providing advanced pre-processing techniques and estimating athlete injury risk, managing athletic loads, and minimizing athletes injury levels.

2.4 Athlete Training Situation

Artificial intelligence technology is applied to athlete training. Traditional physical training statistics are based on numbers, and automated digital reporting is the direction of physical training development, which can only be achieved by artificial intelligence technology. Artificial intelligence technology can completely change the live broadcast. According to the live events of sports training, artificial intelligence technology can choose the correct successive angles, acquire the real-time situation of athletes, and spot detection of emergencies in the training process promptly[4].

3. The Use of Artificial Intelligence Technology in Physical Training

3.1 Basketball Training

In traditional basketball training, training data processing and analysis are important elements. Most of the training records and data collection and storage need to be processed manually, which consumes a lot of manual time and can not guarantee the accuracy of the data. Within this context, the introduction of artificial intelligence technology can change the current situation. For example, in the process of physical fitness tests such as the fold run, artificial intelligence technology can be used to compare and analyze the actual physical data in training with the data during the competition, and then we can understand the actual value and potential of the athletes[5]. In recent years, basketball robot-assisted training research has been springing up. The design principle of basketball robot-assisted training is calculating the shooting distance, arc and speed, inputting these into the robot program, and using it to evaluate the athletic ability and movement patterns of athletes. The basketball robot is mainly composed of perception system, decision system and motion control system and so on. The subsystems are interconnected and interact with each other to obtain the training results of the athletes, and the system guides the basketball robot to complete each action, and monitors the health indexes such as the center rate of the athletes in the exercise process. It can help to know the training intensity and recovery of the athletes, and to provide the basis to make training plans for the athletes.

3.2 Tennis Training

In tennis training, players usually have serious musculoskeletal system injuries, but AI technology can be used to monitor the quality of human movements. In the process of technical movement analysis of tennis specific sports, AI technology is the future direction of tennis training, and it is important to determine each sub-purpose of tennis by separating the techniques and movements according to the sport purpose. The main research direction is to establish the excellent technical model, based on the technical movement parameters of excellent athletes. Artificial neural network belongs to a mathematical operation model. Each node of the model represents a specific output function, and the connection part between two nodes represents the weighted value of the connection signal. The network output mainly relies on the network connection method, the weight value varies depending on the output function. In tennis training, using artificial neural network to record tennis

training data for many times can get kinematic time series, and using the neuron output space can achieve the purpose of analyzing the athletes' movement pattern situation[6].

3.3 Ski Training

Skiing is a sport that makes it extremely easy for the athlete's leg joints to be injured during exercise, especially when making turns, and turning skills are one of the most difficult skills. The Ski Robot system can solve the problem of athlete when making turning, help athletes train together, acquire turning skills, and complete the task of turning training. The ski robot design principle is simulating the leg joint activities of athletes during ski turning. The robot has six movable joints in each leg, which is similar to human athletes. In the design process, the ski robot was made to skate on artificial turf, and researchers guided the robot to make various movements through the control of computer programs. In the design process, the ski robot was made to skate on artificial turf, and the computer program was used to guide the robot to make various movements, so as to study the relationship between the leg joints, the reaction force and the trajectory of the turn, and it was found that during the skiing process, the basic joint movements of the athlete are abduction - abduction and bending - hip extension and knee and ankle joints. The ski robot can help the athlete to turn in a balanced state and ensure the safety of the athlete in the training process[7].

3.4 Vertical Jump Training

Vertical jump training is a sports training program, and the classification of athletes' test scores is an important way to improve athletes' performance. The database driven neurocomputing framework for vertical jump pattern classification is a comprehensive classification framework that is important for athlete test performance classification. The main principle is determining the athlete's single and double leg standing test performance based on limb animal biomechanical data and obtaining biomechanical data from ankle to knee and 8 LE muscles, which consist of 3D kinematic and electromyographic features. The vertical jump pattern classification database drives the neurocomputational framework based on a fully connected multilayer perceptron feedforward neural system with three different training algorithms. Dividing the data from three training trials into design and test data sets can provide an objective aid for vertical jump training[8].

3.5 Kinetics

Using neural network intelligence to solve kinetic problems is an effective way to provide theoretical support for athletic training programs. In sports, kinetics is an important element, which primarily uses dynamic data during the execution and separate ninety-degree cutting movements. The principle of neural network intelligence is to use feedforward neural networks to predict the joint moment and ground reaction between hip, knee and ankle joints, record the motion trajectory and joint angle, and use them as input data for neural network intelligence. In the actual sports training process, the relevant system between the athlete training data and the system prediction data has a strong connection between the joint angle of the athlete as an input parameter in the process of sports. The joint moment prediction has a high degree of accuracy. The ground reaction force prediction has obvious accuracy based on the marked motion trajectory. And the neural network intelligence technology can predict the motion mechanics parameters with rapid changes in direction. It can help athletes improve the sports training program by using inertial sensors[9].

3.6 Key Posture Recognition

In physical training, key bar recognition is an important component of motion analysis, which can provide athletes with effective motion analysis and training aids. In the early stages, key posture recognition was mainly used to track each individual athlete and use each athlete's characteristics to study group problems. But in the later stages of development, its main purpose is to process and sample group images, obtain global information, process the collected data and classify abnormal and normal conditions. However traditional techniques are no longer adequate the request of classifying

abnormal and normal situations. The key pose recognition method based on deep learning model can eliminate a lot of background interference in video images. The operation method is mainly divided into three parts: firstly, the foreground extraction of video frame images is used to form the FCN network. Secondly, the CNN network is fine-tuned to obtain a suitable weighted video classification network model of interest. Thirdly, according to the classification results, the classification result selection strategy is designed to extract the key pose, so that the sports training can play a practical role.[10]

4. Prospects for the Use of Artificial Intelligence Technology in Physical Training

4.1 Multimedia Computer Technology

The application of multimedia computer technology in physical training activities is an important direction of development, mainly referring to the simultaneous acquisition, processing, editing, storage and display of two or more different types of information media technologies. Multimedia computer-assisted instruction based on artificial intelligence and the development of complex programs. It can use multimedia computer technology to make the three-dimensional models, flat models and facilitate interaction between the two sides of the instructional process come true in physical training. The main purpose is to provide athletes with different stimuli in the process of physical training. By controlling the direct teaching environment, keeping their nervous system being excited, making them interested in physical training, helping athletes broaden their horizons, developing their intelligence, promoting their personality development. Multimedia computer-aided teaching is a new trend in the development of physical training technology, which effectively creates a relaxed training environment for athletes and enables physical training to play a realistic role.

4.2 Expert Systems

Expert system is an important branch of artificial intelligence system, which can realize artificial intelligence from theoretical research to practical application and solve specialized problems by using specialized knowledge from general thinking. Expert systems are at a mature stage of research, leading their integration into physical training activities can play an important role in the effectiveness of physical training. The main principle of expert systems is to introduce the knowledge of sports experts, create a computer intelligence program system with expertise and experience, and use expert problem solving methods to achieve the level of problem solving ability with experts. The expert system is an important breakthrough in the field of artificial intelligence research technology in physical training applications. By incorporating the expert system, the artificial intelligence technology is guided from abstract to concrete, so that athletes gradually can learn the intelligent technology and improve their sports performance in the process of physical training [10]

4.3 Virtual Reality Technology

Virtual reality technology is a kind of computer system simulation technology to create and experience virtual worlds, which mainly integrates computer graphics, multimedia technology, artificial intelligence technology and human-computer interface technology to provide support for creating and experiencing virtual worlds. Virtual reality technology enables athletes to deeply understand sports-related knowledge through virtual technology. In the virtual environment, they can transform from emotional to rational, so that they can deeply understand the spirit of physical training, actively explore and collect information and give full play to their imagination. Virtual reality technology has a wide range of applications in the process of sports training. Firstly, virtual reality technology is used to establish a sports prescription website to jointly analyze the actual development of sports. Secondly, virtual reality technology is used to create a three-dimensional space and build a human movement model so that robots can train with athletes and find out the problems of athletes

in the training process. Thirdly, virtual reality technology is used to simulate the real world and use it to transcend the real world so that athletes can achieve efficient training in the virtual environment, enhance their feelings about the virtual environment, strengthen their understanding and mastery of sports knowledge.

5. Conclusion

In summary, in the process of integrating AI technology into physical training, the effect of physical training has been improved and AI technology has been developing. Currently, China has important research breakthroughs in activities such as basketball training, tennis training and ski training. In the future the integration of AI technology in the process of physical training is an important development direction.

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