Research on Basketball Players' Training Strategy Based on Artificial Intelligence Technology

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Abstract: The current artificial intelligence technology, as a new frontier science and technology, can track and analyze a single sports goal in the training methods of basketball players, and use convenient training strategies to achieve the best training effect. This article first elaborates the current development trend of artificial intelligence technology, and also analyzes the development of artificial intelligence at home and abroad, expounds the current status of artificial intelligence in sports, and finally focuses on the training strategy of artificial intelligence in basketball players. In-depth analysis and research have been done in the application of other aspects, the purpose is to provide theoretical support and guidance for the further development of modern basketball. Based on artificial intelligence, the basketball player training system should fully understand and evaluate the athlete's physical condition and athletic ability, timely measure the basketball player's sports skills, give training strategies for the basketball player's sports situation, and optimize the training plan for the athletes. In the software and hardware architecture, the Baum-Welch algorithm should be contacted to collect athletes' sports data, and a data management platform should be established to fully explore the athletes' exercise laws and strengthen the athletes' daily training. The experimental research results show that the use of artificial intelligence technology can greatly improve the training efficiency of basketball players and fully stimulate the potential of basketball players. The use of artificial intelligence technology can not only provide basketball players with convenient and effective strategies, but also develop different training plans according to the physical fitness of each basketball player.

Keywords: Artificial intelligence technology, basketball players, basketball training strategy, Baum-Welch algorithm

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1. Introduction

Artificial intelligence (AI for short) researches and develops theoretical methods for simulating the expansion and expansion of human intelligence. Technology and application systems are a new technological science, and artificial intelligence is a branch of computer science [1]. The goal is to understand the nature of intelligence and produce a new type of intelligent machine that can make people react in a similar way. Research in this field includes robotics, language recognition, image recognition, natural language processing and expert systems [2]. With the rapid development of artificial intelligence, it will rapidly change people's current social life and change the world [3]. The sports coaching system based on artificial intelligence technology should feed back multiple training goals in real time, track the athlete's training process and make a series of sports suggestions. In the training of athletes, the tracking indicators are constantly compared, and once they deviate from the sports training goal, they must provide real-time feedback for the athletes to ensure the athletes' scientific training and improve the athletes' skills [4].

Basketball is a component of sports competition in society. The development and wide application of artificial intelligence will greatly affect the traditional organizational forms of sports training, sports selection, sports competition, and competitive sports management [5]. In today's digital age, few things cannot be quantified. With the continuous and in-depth development of big data technology and artificial intelligence technology, not only can traditional structured data be used more efficiently and valuably in basketball player training strategies, but also more and more unstructured Data (including videos, pictures, natural language, etc.) can make analysis and prediction of different basketball players' training strategies, making it easier and more convenient [6]. Anything that can be quantified can be accurately predicted through data analysis and artificial intelligence [7].

The sports world is full of these quantifiable elements, making it an ideal place for artificial intelligence applications. In recent years, the application of artificial intelligence in basketball player training strategies has become a common phenomenon. This technical field will enter the field of basketball player training methods more deeply and more extensively through continuous iterative improvement of capabilities [8]. The analysis of the training strategy of basketball players based on artificial intelligence technology is a huge and complex project, but its application prospects are broad. The analysis objects are mainly the different physical fitness of each basketball player. Different research strategies are formulated according to their individual. So as to make corresponding decisions for the basketball players, by analyzing the movement trajectory and behavior changes of each player in the team, judge and study the different training system based on each person, so as to formulate the corresponding training strategy, for a single pair Big data analysis for players can improve the player's predictive ability and make corresponding training strategies [9-10].

2. Method

2.1 Baum-Welch algorithm

The Baum-Welch algorithm is a supervised model learning and training algorithm. It is assumed that a given training data value contains S observation sequences of length\(0_{1},0_{2},...0_{s}\) without a corresponding state sequence, Learn the parameters of the model\(\lambda = (A,B,\pi)\) through the above.
conditions. The observation sequence data is regarded as observation data D, and the state sequence data is regarded as unobservable invisible data I, so the following formula is shown:

\[ P(O, \lambda) = \sum_{I} P(O|I, \lambda)P(I, \lambda) \]  \hspace{1cm} (1)

Its parameter learning can be realized by EM algorithm. Step E of the EM algorithm: Find the Q function \( Q(\lambda, \lambda) \)

\[ Q(\lambda, \lambda) = \sum_{I, \lambda} \log P(O|I, \lambda)P(I, \lambda) \]  \hspace{1cm} (2)

Among them, \( Q \) is the current estimated value of the model parameter, and force is the maximum model parameter. Then the function \( Q(\lambda, \lambda) \) can be summed with:

\[ Q(\lambda, \lambda) = \sum_{\lambda} \log P(O|\lambda)P(I, \lambda) + \sum_{I}(\sum_{t=1}^{T-1} \log a_{i,t+1})P(O|I, \lambda) + \sum_{\lambda}(\sum_{t=1}^{T} \log b_{i}(O_t))P(O|\lambda) \]  \hspace{1cm} (3)

The M step of the EM algorithm: Maximize the Q function \( Q(\lambda, \lambda) \) to find the model parameters \( \lambda=(A, B, \pi) \). Finally, combining the above formula, the formula that can be obtained is as follows:

\[ b_{j}(k) = \frac{\sum_{t=1}^{T} P(O_t = j|I_t) P(I_t = \nu_k)}{\sum_{t=1}^{T} P(O_t = j|\lambda)} \]  \hspace{1cm} (4)

Since there are many data sets of the same type in a given sample, and the training parameter model is based on a single sample, it may cause the model data to fall into the local maximum, while the recognition rate of other samples is low. For the first simulation, two solutions were proposed. First, the mean training method is used for the data fusion of model input, that is, the observation data of the sample. After training the average of the training data, training is performed. Second, the frequency weighted training method is used to linearly measure the frequency of the sample observation sequence in the model.

2.2 Colleges and universities use artificial intelligence technology to reasonably train basketball players

In the context of artificial intelligence technology, in the training of basketball players, the establishment of physiological indicators is often used as a research method. For example, in the training of offensive breakthrough, basketball players collect heart rate data during a certain period of time in the process of offensive breakthrough to explore the relationship between athletes' strength training, aerobic training and athletic performance. The research of artificial intelligence technology can optimize the model of basketball players' physiological indicators, further solve the problem...
between overtraining and effective training, and help basketball players develop more appropriate training strategies. In the daily training of basketball players, wearing a monitor of physical indicators can accurately understand the athlete's acceleration, heart rate, etc., and comprehensively analyze the sports indicators to grasp the relationship between the athlete's fatigue and health status, and then use these sports indicators as sports The evaluation basis of training results is used to analyze whether basketball players can continue training.

2.3 Speed up research on an artificial intelligence-based basketball coaching system

The application of artificial intelligence technology has gradually matured and achieved particularly significant results. Especially at the level of improving the training level of basketball players, most of them are always in the research stage. The existing functional wearable devices on the market have not yet played the role that artificial intelligence technology should exist. By fully tapping the potential of artificial intelligence, as a basketball coaching system that can enrich the potential of artificial intelligence in the future, develop a more comprehensive artificial intelligence basketball coaching system, as the key research direction of the future artificial intelligence basketball coaching system. For current basketball players, basketball coaches based on artificial intelligence need to be equivalent to excellent human coaches. They can provide the following system sports assistance: a pair of athletes' physical fitness and athletic ability understanding and evaluation; second, an evaluation of basketball players Sports technology; the third is the ability to supervise the implementation of athletes to provide targeted training; the fourth is to make appropriate adjustments and optimizations to the entire sports plan based on the actual situation of the basketball players.

3. Experiment

3.1 Experimental research objects

In order to have a deeper understanding of the research of artificial intelligence technology in the training strategy of basketball players, this article selected 20 junior basketball players from the University of Physical Education. Before the experiment, the experimental group (N=10) and the control group (N=10) Record the basic information of athletes, including height (cm), weight (kg), fat weight (kg), age (years), and training years (age). And the basic condition indicators of the two groups were statistically analyzed and tested to ensure that there was no significant difference between the two groups in the experiment (p>0.05). The physical examination standards of basketball players in the experimental group and the control group are shown in Table 1.

| Age (years) | Test group (N=10) | Control group (N=10) | T  | P   |
|-------------|-------------------|----------------------|----|-----|
| 22 ± 0.5    | 22 ± 0.38         | 0.711                | >0.8|     |

Table 1. Physical standards of junior basketball players in the control group and the experimental group
3.2 Research design and research methods

3.2.1 Research design

This research is aimed at two groups of basketball players in sports universities to conduct investigations and studies. The experiment adopts the form of practice teaching first and then investigation report. This article uses a newly researched artificial intelligence-based basketball coaching system for the experimental group, which is the traditional coaching model used by the control group. And this experimental investigation report is aimed at the 20 selected experimental investigation and research objects after the end of the practical teaching to wipe sweat. A total of 20 questionnaires were distributed in this experimental survey, and 20 valid questionnaires were returned, and the recovery rate was 100%.

3.2.2 Research methods

This article focuses on the research of artificial intelligence technology in the training strategy of basketball players. First, the literature survey method is used to investigate more than 20 domestic and foreign literatures on the training strategy of this technology in basketball players. The description of the theory sentence provides thinking.

Secondly, mathematical statistics were used to perform statistical analysis on the results obtained after the two groups of experimental subjects were selected for the experiment before and after the training. The data content included in the experiment was saved in the computer in the mode of EXCEL table. Among them, the average deviation and standard deviation of the descriptive statistical parameters of each indicator are calculated, and the literature survey method is integrated to analyze and study the article.

4. Results

4.1 Experimental research findings

Table 2. Changes in test data of experimental group and control group before and after practical teaching
| Test items             | Test group (N=10) | Control group (N=10) | T       | P     |
|-----------------------|------------------|----------------------|---------|-------|
| 20*5 round trip       | Before training  | 35.36 ± 0.73         | 37.31 ± 0.21 | -0.319 | >0.08 |
|                       | After training   | 31.11 ± 0.03         | 33.25 ± 0.09 | -0.156 | <0.08 |
| Full sprint           | Before training  | 23.59 ± 3.21         | 24.91 ± 0.07 | -0.098 | <0.08 |
|                       | After training   | 19.31 ± 0.01         | 20.25 ± 0.57 | -0.003 | >0.08 |

As shown in the data shown in Table 2, before the practical teaching of sports college basketball athletes, the average value of the experimental group is 2.79 seconds, while the average value of the control group is 3.31 seconds. The performance of the experimental group is better than that of the control group. After the T-test, the P value of the experimental group is greater than 0.08, while the average value of the control group is less than 0.08. Therefore, the experimental group's basketball coaching system using the new research artificial intelligence has better effects in all aspects after actual use. Control group. After one month of training, the average test score of the control group was 2.21 seconds, the average score of the experimental group was 2.75 seconds, the score of the control group improved slightly, and the score of the experimental group improved significantly, and after the T test, the P value was less than 0.08 , This shows that in this test index, traditional coaches can improve the movement speed of basketball players, which is greater than the artificial intelligence coaching system based on new research for training core training.

![Figure 1](image_url)

**Figure 1.** The increase of the artificial intelligence coaching system in the two experimental groups
From the data in Figure 1, it is learned that the control group A of sports college basketball athletes after traditional strength training has a test score of 1.07%, which is not high; while the experimental group has a test score after a month of core training. 1.28%, compared with the 2.12% increase in the test scores of the control group, it can be said to be a significant increase, which also proves that artificial intelligence technology can greatly improve the training methods and strategies of basketball players.

4.2 Development direction of basketball player training strategy based on artificial intelligence

Strengthen the construction of basketball coaches who are familiar with artificial intelligence technology. Improve the professional level of basketball coaches. Coaches are explorers and practitioners based on artificial intelligence technology training strategies. Most basketball players believe that current coaches have the level of artificial intelligence technology. Not high is the main factor restricting basketball training strategies. Improving coaches' awareness of artificial intelligence is the main way for countries around the world to improve the level of coaching skills of basketball coaches. Therefore, the current training development direction of basketball players is based on the direction of artificial intelligence, so as to achieve the shortest time to achieve the greatest training effect.

5. Conclusion

The application of artificial intelligence to the training strategy analysis of the players in the basketball team is a huge and difficult task. It requires the establishment of various databases through the system, but it can not only improve the team's tactical strategy and improve the player's technical level. The system also makes the training effect more obvious and has immeasurable application value. But all in all, this research analyzed the basketball coaching system based on artificial intelligence. According to the overall architecture of the system and the demand analysis of functional modules, the analysis results show that the system can realize the evaluation of the functionality based on the acquisition of relevant data and information. Basketball sports technology and sports mode, build a multi-target feedback training method, and then effectively improve the level of basketball players. It focuses on the analysis of functional action evaluation improvement, sports technology evaluation improvement, multi-training target feedback and auxiliary training of the basketball coaching system based on artificial intelligence. Artificial intelligence is widely used, and many aspects of its integration with computer technology can be applied. The basketball coaching system based on artificial intelligence, with the advantages of being more scientific, standardized and intelligent, monitors athletes' basketball player data in real time, corrects the mistakes made by basketball players in training, and promotes the improvement of athletes' sports skills. In addition, the sports coaching system based on artificial intelligence helps to promote the fairness, fairness and science of sports, and it has extraordinary value and significance for single athletes or collective sports.

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