

Research on the Application of Big Data and Artificial Intelligence in College Tennis Training

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ABSTRACT

Big data and artificial intelligence are important core development technologies of Industrialization 4.0, and are also the focus of current research in various fields. They are applied to all walks of life in the country to help the development of the industry. This paper studies and analyzes the application of big data and artificial intelligence in college tennis, and proposes a framework and implementation path of combining data-driven and artificial intelligence in college tennis training. Applying this framework can transform college tennis teaching from traditional experience-oriented to data-driven guidance, and create high-quality college tennis training methods. So as to further expand the application of data-driven, provide suggestions for the development of data-driven service in sports discipline, and promote the digitalization and intelligence of the strategic development of sports discipline.

Keywords: Big data, Artificial intelligence (AI), College tennis, Data analysis, Intelligent collection.

1. INTRODUCTION

With the rapid development of big data and artificial intelligence technology, more and more successful cases have been applied in many fields. The sports industry, as one of the most important industries in the country, is also assisted by two major technologies. Tennis, as a popular competitive sport, is increasingly popular in China. Many colleges and universities have set up tennis professional courses and public courses in line with the trend of the new era. However, compared with other traditional sports, the opening time is relatively short, and the relevant research is also less. In particular, there is still a lot of research space to make full use of and integrate modern information technology and improve the intelligent level of college tennis teaching. In particular, the report of the 20th National Congress of the Communist Party of China clearly put forward the goal of "promoting the comprehensive development of mass sports and competitive sports, and accelerating the construction of a sports power". Under the background of the accelerated advancement of education modernization and sports digitalization, the systematic promotion of the

reform and innovation of college sports teaching and training represented by tennis bears an important historical mission and social responsibility.

2. RESEARCH STATUS OF TENNIS TRAINING AND TEACHING BASED ON BIG DATA AND AI

In July 2017, the State Council issued the Development Plan for the New Generation of Artificial Intelligence, proposing the development goal of "by 2030, AI theory, technology and application will reach the world's leading level and become the world's major AI innovation center". Applying AI to the sports industry, especially the sports education of all kinds of sports in colleges and universities, is conducive to the coordinated development of competitive sports and sports industry, and ultimately realize the sports power.

In the aspect of AI integrated physical education, Wang Penghao studied the application of AI assistant in tennis teaching, found out the advantages and influence factors of AI application, and provided theoretical reference for the implementation of AI assistant in school tennis

teaching [4]. Xu Chunning and others studied the promotion of artificial intelligence courts on tennis [5]; Bao Qin et al. discussed the application of AI in tennis technical action analysis, and pointed out that building a knowledge base is the future prospect of AI application in tennis technical field [6].

The arrival of the era of big data makes the design concept of "let data speak, use data to make decisions, and rely on data management" deeply integrated with the education and scientific research fields, and vigorously promote the personalization and intelligence of current education development, which is a new idea and new model of education development under the current background of big data. Further strengthen the reform of school physical education teaching, make full use of and integrate big data technology, give full play to the convenient, intuitive and quantifiable characteristics of data, actively promote the application of data-driven learning in school physical education teaching, and promote the two-way integration of physical education learning and physical education to achieve new results.

Shi Fuying and others have developed a data collection and automatic analysis system related to tennis techniques and tactics, which is the result of using association rules to study tennis techniques and tactics [7]. William et al. proposed a hierarchical Markov model, which produced a preliminary estimate of the probability of each player winning the professional singles tennis match. The model provides a fair basis for the comparison between players by analyzing the match statistics of the opponents that two players have met in the past [8]. Stephanie et al. developed a shot level Monte Carlo matching simulation method to estimate the duration under a given matching format. The model is based on the use of Hawk-eye tracking data and public shooting of tennis match statistics. The results show that longer matches are beneficial to better players and make the match results more predictable, and this method can be a useful resource for tennis management agencies to evaluate new matches [9]. The software SlamTracker is a visual platform for real-time score statistics and analysis built by using IBM SPSS prediction and analysis technology, including the collection, analysis and distribution of multiple game data contents such as scores in each game, players' ACE balls, serve speed, success rate and double errors.

To sum up, there are few studies on the application of big data and artificial intelligence to tennis, especially tennis teaching and training in colleges and universities. The existing research still has some limitations, such as: most of the research methods are relatively simple, the research depth is still insufficient, and there are still some aspects that can be further improved; the research model is also very limited and has not yet formed a system.

3. RESEARCH FRAMEWORK OF COLLEGE TENNIS TEACHING AND TRAINING BASED ON BIG DATA AND ARTIFICIAL INTELLIGENCE

The strategic task of the "Outline for Building a Strong Sports Country" points out the need to improve the comprehensive strength of competitive sports and assist in the construction of a healthy China. Tennis, badminton, and table tennis, as advantages of national competitive sports, are increasingly being valued in physical education teaching in universities. With the arrival of the era of big data and the development of artificial intelligence technology, it has injected fresh blood into the innovation of college physical education concepts, and the combination of college physical education has become a trend, providing excellent development opportunities for the construction and innovation of college physical education and teaching evaluation system.

In terms of current development, there are still many bottlenecks in tennis teaching in colleges and universities, and the performance is also obvious. China's tennis curriculum system and talent training are relatively lagging behind, and there are still many weak links in terms of teacher allocation, curriculum system construction and professional characteristics. The application of big data and artificial intelligence methods in sports tennis teaching is less, and the promotion role of information technology in college tennis training is not fully played. Due to the late start of tennis in China, the teaching system is not mature; There are great differences in the teaching methods and evaluation methods implemented by universities in different regions; College students' tennis course examination methods are mostly based on the final examination results or a final evaluation as the main reference standard. The assessment and evaluation methods are too single and lack of rationality; there is great subjectivity in the evaluation methods of students' tennis courses, and

the evaluation methods are not objective enough, lacking quantitative analysis and management.

In the context of the rapid development of big data and artificial intelligence technology, universities should build a scientific and reasonable research system and framework, and truly achieve the goal of information technology to help college tennis education, so as to improve the high-quality development of the whole physical education. The main idea of this framework is: on the one hand, in the aspect of tennis training in colleges and universities, teaching departments should improve the current situation of sports training by using

artificial intelligence expert system and virtual reality technology, increase the application of artificial intelligence technology, and build a platform for training sports talents. On the other hand, in the teaching of tennis courses in universities, it is necessary to shift from a traditional experiential hypothesis based approach to a data-driven approach, with data-driven as the core, and form an accurate and quantitative evaluation mechanism.

Therefore, the research framework shown in “Figure 1” is constructed:

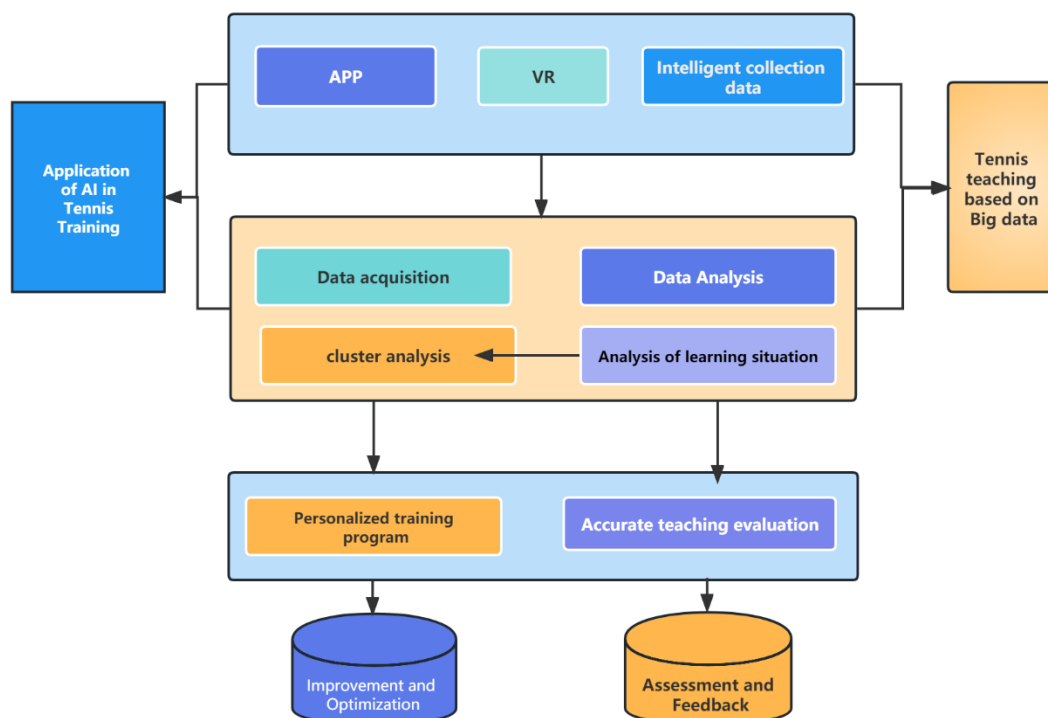


Figure 1 Tennis training and teaching framework based on AI and big data.

In view of the basic objectives, comprehensive evaluation model and evaluation criteria to be achieved by tennis courses, it is urgent to establish a complete, scientific and operable research system and framework based on AI and big data technology. From the perspective of big data and artificial intelligence, guided by intelligent guidance and based on data-driven, the research is carried out from two aspects. Build the research framework and form the research path, that is, starting from high-quality college tennis training and curriculum teaching. In terms of artificial intelligence, through the application of intelligent APP, intelligent equipment (such as VR tennis training assistant) and intelligent data acquisition

instrument in tennis training (special and public sports tennis), the real-time sports body data, physical fitness data and indicator data of athletes are collected and collected to prepare for the next big data analysis. In terms of big data application, it is mainly combined with curriculum teaching to establish a student-centered curriculum teaching system and evaluation system, make full use of various teaching resources, teaching data, situational data, etc., build a data-driven teaching model, and realize continuous optimization and improvement throughout the process.

4. RESEARCH PROSPECTS OF COLLEGE TENNIS TEACHING AND TRAINING BASED ON BIG DATA AND ARTIFICIAL INTELLIGENCE

The research on tennis teaching and training in universities based on big data and artificial intelligence has broad prospects and is full of hope. Big data and artificial intelligence have the potential to completely change the way tennis is taught and trained in universities. With the help of advanced analysis and machine learning algorithms, it can not only assist coaches in teaching more effectively, but also enhance students' better learning, including: player physical and psychological performance analysis, game strategy analysis, injury prevention, etc.

4.1 AI Helps College Tennis Training

By combining big data with artificial intelligence technology, the performance of tennis players can be effectively analyzed, improving teaching and training efficiency.

Firstly, based on big data technology, comprehensive and detailed data of tennis players can be collected, including their training records, competition records, technical statistics, and other information. By analyzing these data, players' strengths and weaknesses can be identified, their training priorities and difficulties can be determined, and coaches can better understand the characteristics and needs of players. At the same time, it can also compare and analyze the performance of different players, grasp the development trend of tennis, and provide reference for player selection and training.

The basic connotation of this research framework is to adhere to the feasibility of the application of AI technology in sports training. In this regard, it is mainly through intelligent devices, sensors and other hardware terminals for acquisition and in-depth learning. For example, in the process of sports training and competition, the machine is used to recognize facial expressions in videos and images, and predict emotions according to the facial features detected by the machine, which can predict the state and health of athletes in advance; It can also use the advanced preprocessing technology and machine learning algorithm provided by sports indicators to estimate the injury risk of athletes.

4.2 Big Data Helps College Tennis Teaching

Another basic connotation of this research framework is to adhere to the fact that the learning process data contains a lot of value that can be mined. By building an evaluation framework and establishing a hierarchical indicator system, students' learning data can be analyzed and the learning effect can be accurately quantified.

Based on the perspective of big data, it is of practical significance to integrate data analysis and quantitative methods into college tennis curriculum research. The construction of accurate training, hierarchical teaching and scientific and reasonable evaluation system with data-driven as the core can enable students to clearly understand the learning objectives and basic action points of tennis, and help students learn various skills and tactics that should be mastered in tennis at the fastest speed. Paying attention to the importance of data in the learning process can not only build a scientific and quantitative evaluation method, but also accurately guide students' subsequent learning direction and training direction. It plays an important role in promoting students to develop good learning habits, sports spirit and learning interest.

4.3 Research Prospects

From a practical point of view, the integration of AI and big data technology with tennis training and teaching is of great practical significance for improving the quality of education and teaching, establishing and improving the talent training system.

The precise teaching of physical education driven by big data, which attempts to show the whole picture of physical education from the overall perspective, and effectively takes into account the differences and personalization of physical education, can become an important grasp and effective way to improve the quality of physical education classroom teaching, optimize the effect of physical education and enhance the scientific decision-making ability of physical education.

Based on the concept of data-driven teaching, based on the general process of the implementation of physical education teaching activities and the basic structure of the physical education teaching model, this paper constructs the main body of the physical education precision teaching model from

three dimensions: the determination of teaching objectives, the design of teaching process framework, and the teaching evaluation and prediction.

Overall, integrating big data and artificial intelligence into university tennis teaching and training has the potential to greatly improve the effectiveness of coaching practices, thereby better developing players and ultimately improving court performance.

From the perspective of big data and artificial intelligence, it is innovative and progressiveness, which is mainly reflected in: a scientific and reasonable quantitative evaluation system to solve the contradiction between the single evaluation method of traditional tennis courses, the limitations of teaching concepts and teaching methods, and the increasing popularity of tennis; Optimize teaching feedback, teaching evaluation and goal

achievement; It is planned to adhere to long-term quantitative evaluation and form a virtuous circle. It can judge and predict students, teachers, teaching contents and teaching forms based on data, and timely adjust teaching strategies according to the data feedback mechanism. The student evaluation system of tennis training and course teaching based on data-oriented and quantized methods, through precise quantification and data acquisition and digital application, is a simple intelligent collector for acquiring real-time images of the court, as shown in "Figure 2", which is conducive to promoting the transformation of teaching evaluation of public tennis courses in colleges and universities from "empirical decision-making" to "data-driven decision-making", and improving the level of training and teaching, It can be used for reference for other sports training and teaching in colleges and universities.



Figure 2 Intelligent acquisition equipment of tennis court.

5. CONCLUSION

The effect of sports training is constantly improving, and AI technology and big data are developing rapidly. Integrating big data and AI technology into college tennis training and teaching, the research perspective is unique and cutting-edge, and is also the current important development direction. It is the trend of the times, and has a very bright future.

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