Research on the Application of Artificial Intelligence in College Physical Education

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Keywords: Artificial Intelligence, Physical Education, Intelligent Sports

Abstract: With the development and progress of artificial intelligence (AI) and sports in China, artificial intelligence technology has also been frequently used in professional sports venues, but it is rarely used in campus sports. Therefore, in order to promote the deep integration of AI and college physical education, enrich the teaching methods of college physical education courses, and further promote the overall development of college physical education, it is of great strategic significance to adopt reasonable methods to study the application of AI in college physical education.
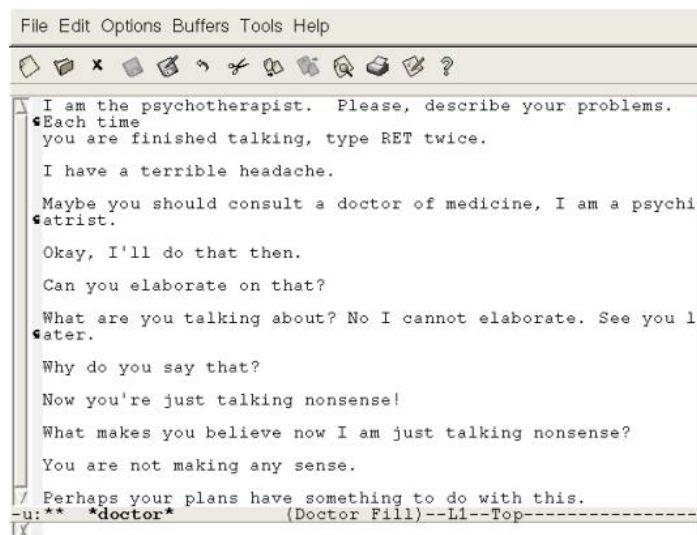
With the development of science and technology such as artificial intelligence and the wide application of its corresponding products, the intelligent sports industry has developed rapidly, and various sports products have become increasingly advanced. In July 2016, the 13th Five-Year Plan for the development of Sports industry issued by the General Administration of Sport of the People's Republic of China clearly proposed to encourage the research and development of new sports equipment, wearable sports equipment and virtual reality sports equipment; In July 2017, the State Council issued the Development Plan for the New Generation of Artificial Intelligence, which proposed to accelerate the innovative application of artificial intelligence around the urgent needs of people's livelihood such as education; In August 2019, the General Office of the State Council issued the Outline of Building a Sports Power, which mentioned that we should accelerate the in-depth integration of the Internet, big data, artificial intelligence and sports real economy.

It is the research direction of AI in education and teaching to improve the quality of talent cultivation and students' quality through AI and meet the personalized teaching needs. Universities also hope to help education and teaching reform through the advanced technology of AI and realize intelligent teaching. Science and technology cannot replace human beings, but in the era of AI, teachers can use scientific and technological means to reform the educational model and improve the teaching quality. "AI+ physical education" has triggered a subversive change in education, and the deep integration of AI and physical education may become a major thrust of physical education reform.

1. Overview of AI Development

In 1956, the proper term of artificial intelligence was formally created. Marvin Minsky and John McCarthy hosted the Dartmouth Summer Research Project on Artificial Intelligence (DSRPAI) for about eight weeks at Dartmouth College. They reunited researchers from all fields to create a new research field and build machines that can simulate human intelligence. Participants included the computer scientist Nathaniel Rochester, who designed the first business science computer IBM 701 as the main designer, and mathematician Claude Elwood Shannon, who founded information theory[1].

AI has made great progress in the past two decades after the Dartmouth Conference. A typical example is Eliza (Figure 1), the most famous software in AI history. It was written and created by Joseph Weizenbaum from 1964 to 1966. It is a natural language processing program that can simulate the dialogue with humans, and it is one of the first programs that can try to pass the Turing test[2].

Figure 1: Eliza operation overview diagram

In the 1980s, the field of artificial intelligence began to focus on providing different systems with professional knowledge in their fields and tried to reach the level of experts through the combination of professional knowledge and reasoning mechanisms. Edward Albert Feigenbaum, known as the father of expert systems, summarized that the strength of intelligent systems came from their knowledge rather than specific rules and theories[3]. At the end of the 1990s, the study of deep learning rose. In 1998, the Convoluted Neural Network (CNN) proposed by Yann LeCun was one of the representative algorithms of deep learning.

After entering the 21st century, the development of AI has become increasingly mature. Machine learning and deep learning have become the mainstream of AI research. Theoretical research has achieved fruitful results and has also been widely used[4]. In 2006, Geoffrey Everest Hinton and others put forward the concept of deep learning[5]. In 2015, Yann, LeCun, and others showed in their research that deep learning allows computing models composed of multiple processing layers to learn data representation with multiple levels of abstraction. These methods have greatly improved the latest technology level in speech recognition, visual object recognition, object detection and many other fields [6]. In the same year, the program AlphaGo, developed by the team led by Demis Hassabis, the DeepMind company of Google, uses the principle of deep learning to achieve its high performance[7]. Today, artificial neural networks and deep learning form the basis of most applications under the label of artificial intelligence as we know it.

2. Current Situation and Dilemma of College Physical Education

2.1. Old Teaching Concepts

In recent years, China's colleges have vigorously promoted the reform of physical education curriculum, but there are still some colleges that are only formal reforms. The main reason is that many physical education teachers have not fundamentally changed their teaching concepts, limited to various kinds of teaching and scientific research pressures. For a long time, they lack continuing education and learning, lack the study and practice of curriculum reform, theory, and teaching concepts are gradually backward.

2.2. Ambiguous Teaching Objectives

In teaching practice, many physical education teachers have formulated teaching objectives that are very vague and unclear. They often mistakenly equate teaching objectives with the learning objectives of college students, which will make the teaching objectives rigid. Moreover, many physical education teachers are bound by the traditional physical education teaching concept and regard, promoting the healthy development of college students as the only goal of teaching, but ignore the psychological health and social health development function of physical education teaching.

2.3. Single Teaching Method

At present, many college physical education teachers have deficiencies in the research and application of teaching methods. The teaching methods are single and the teaching mode is fixed. In practical teaching, they pay more attention to the explanation and demonstration of sports technology and ignore the teaching of theoretical knowledge. In addition, teachers in the Ministry of Physical Education believe that simple teaching content and traditional teaching are more conducive to the experiential learning of college students and are unwilling to accept the application of new technologies in physical education.

3. The Current Situation and Progress of the Application of AI in Sports

3.1. Overview of the Development of Intelligent Sports

Since the 1990s, the theoretical research of artificial intelligence in the field of sports has developed rapidly, and the early research of artificial intelligence prediction in foreign countries is mostly [8]. However, due to the broad market prospect of AI in competitive sports, the research on AI assisted training has been on the trend of coming from behind in recent years [9]. The deeper research and application of AI technology in the field of sports has become a research hotspot in the field of sports.

Intelligent sport has also developed rapidly in China. At the end of the 20th century, some scholars began to pay attention to the application of AI in the field of sports. At the beginning of the development of AI technology in our country, some scholars tried to introduce AI technology into the field of sports and try to promote the further development of sports scientific research. However, at that time, AI technology was not mature, and the sports industry was not the focus of the national development. This is an important reason that hinders the development of smart sports in China. In 2010, the General Office of the State Council promulgated the Guiding Opinion of the General Office of the State Council on Accelerating the Development of Sports Industry. After that, the

output value of China's sports industry is increasing year by year (Figure 2). People gradually recognized that the development of sports industry is of great importance to promoting the transformation of China from a major sports country to a strong sports country and promoting the coordinated development of economy and society.
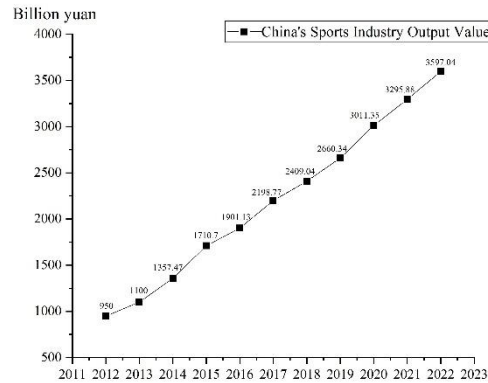

Figure 2: China's sports industry output value

With the promulgation of the State Council's Several Opinions on Accelerating the Development of Sports Industry to Promote Sports Consumption in 2014 and the reemergence of AI technology represented by in-depth learning, the "Sports+AI" research in China has been revitalized. Among them, the market value of representative AI medical products showed explosive growth after 2014 (Figure 3).At present, AI technology is gradually used in school physical education teaching, professional athlete training, auxiliary competitions, and sports product manufacturing. The development of intelligent sports will also bring far-reaching impact and all-round changes in the field of sports.
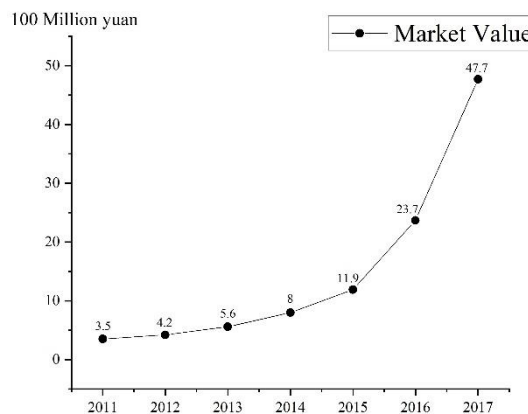

Figure 3: AI medical products market value

3.2. Application of Intelligent Sports Products

Sport is a very practical subject. From the beginning of the development of AI to now, sports has been a common experimental application site for various programs and software. From the specific application level, the AI products currently mainly applied in the field of sports mainly include wearable devices to obtain athletes' sports performance, AI programs for data collection and analysis of competitions, intelligent sports fitness equipment, smart stadiums and sports mobile phone applications.
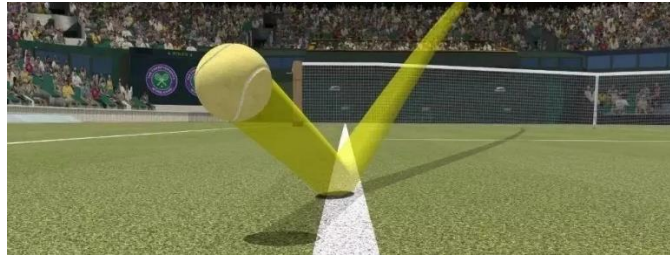
Figure 4: The Hawk-eye

Wearable devices refer to small electronic devices that can be worn or worn on the human body based on computer, communication and sensor technologies [10]. They can roughly include sports bracelets, smart watches, smart sports vests, oximeters, biosensors, etc. They can transmit data to a mobile APPS or computer software to meet people's daily sports needs, and can also help complex scientific research[11]. AI program refers to a computer program that can analyze and calculate the situation adaptively. It is mainly used in the field of sports to collect and analyze the competition data, to predict[12], to adjudicate the judgement of assistant judges, to analyze the techniques and tactics of assistant coaches, and to disseminate auxiliary media, the Hawk-eye technique in tennis matches is a good example (Figure 4). Intelligent sports fitness equipment refers to a new type of product that applies artificial intelligence and other technical or high-tech materials to traditional sports equipment[13]. Intelligent stadium refers to the stadium which is completed on the basis of the original space and equipment of the stadium, supplemented by information technology products. It is the product of the information age, and is also a fine combination of modern architectural design and information technology. Mobile applications, which are applications developed for mobile devices, are often referred to as applications and are designed by third parties to run on mobile devices such as smartphones and tablets. With the help of sports APP, the scale of online sports goods in China is also expanding year by year (Figure 5).
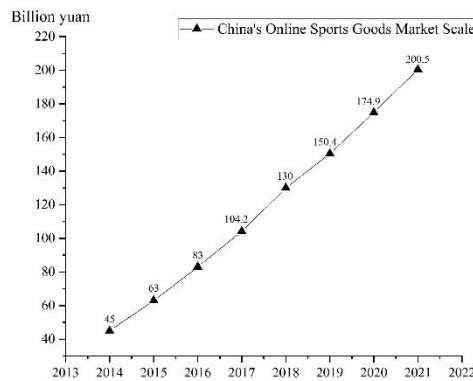

Figure 5: China's online sports goods market value

4. Prospect of Application Scenario of AI in College Physical Education

4.1. Intelligence of Physical Education Teaching Environment

Intelligence in university physical education needs to realize the intellectualization of the sports environment. First, make the network cover the entire campus, especially the sports fields with a wide range of venues. With the basic guarantee of network coverage, physical education teachers can better carry out online teaching in and out of the classroom. Secondly, to achieve the integration of AI and stadiums, intelligent stadiums and gymnasiums are the typical form of integration. Their spatial layout, teaching equipment, physical environment, electrical safety, and network have

intelligible attributes, which can obtain classroom information in real time, improve the teaching efficiency of teachers and students' learning efficiency, and improve the convenience and scientificity of teachers and students' evaluation.

4.2. Intelligence of Physical Education Research Platform

College physical education research should also keep up with the development of intellectualization. Intelligent physical education research has the characteristics of openness and sharing, which is the necessary guarantee to carry out intelligent physical education activities. Physical education teachers in colleges and universities should make full use of online teaching and research platforms both inside and outside the school, actively participate in various types of online research and continuing education learning, and carry out online lesson preparation activities, to continuously enrich their own teaching methods and improve teaching level.

4.3. Visualization of Sports Activity Data

Physical education teachers can visualize data in the following ways. One is the visualization of course content data. Physical education teachers can collect students' class activity data through wearable devices, build a data analysis platform for college students' sports class learning, make a difference analysis of all kinds of data of students according to the course progress and content, improve teaching content, update teaching means, and carry out targeted teaching guidance for the specific problems that are analyzed. The second is the visualization of physical health data. Now that colleges are continuously strengthening the physical health work of college students, they should actively introduce intelligent physical health testing equipment, ensure the accuracy and authenticity of monitoring data, and set up students' personal physical health files to improve the management of students' physical health. The third is the visualization of extracurricular activity data. Because there are fewer hours in physical education courses in college, the main way for college students to participate in physical education is extracurricular sports activities. Reasonable use of the sports Apps in extracurricular activities can provide a more portable sports data service. Colleges can cooperate with App design enterprises to design specific running routes and sports for different schools. Through real-time data on app, students can analyze their own sports situation, choose a more suitable sports mode, and control the amount of exercise. App's function can basically meet the needs of College Students' after-class physical activities, improve the autonomy and enthusiasm of after-class physical exercise, and promote the healthy development of students' physical and mental health.

5. Conclusion

In College Physical Education teaching, the more detailed the teachers know about each college student's physical condition, the more specific the teaching contents and methods are, and the higher the teaching quality is. Intelligence in physical education is the general trend. AI will become an important part of the development of physical education in the future. After studying the application of AI in Physical Education in colleges and universities, it can better help the progress of physical education and the development of physical education.

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