Integration of Artificial Intelligence Plus Industry and Sports Industry
A Research on the Innovation and Development Strategy of Sports Industry

Zhaofeng Lv[1],[**] Sixuan Song[1]

[1]School of Kinesiology and Health Promotion, Dalian University of Technology, Panjin, Liaoning 124221, China
[**]*Corresponding author.*

ABSTRACT

The greatest value of artificial intelligence and big data to the Chinese sports industry is that it can complete the transformation of China's economic structure and industrial upgrading. The use of new technologies of artificial intelligence and big data will greatly reduce labor costs, increase productivity exponentially, optimize existing products and services in the industry, and improve quality and added value. At present, the application of artificial intelligence is often based on highly developed big data, followed by corresponding calculations and analysis, and the sports industry needs further development in terms of big data. Therefore, the efficiency improvement that artificial intelligence can bring to the sports industry is currently limited and has not been widely used. This paper is to provide useful reference for the integration development strategy of sports industry and artificial intelligence.

Keywords: artificial intelligence, sports industry, industrial integration, Internet plus

I. INTRODUCTION

On March 5, 2018, "artificial intelligence" became the primary issue of Premier Li Keqiang's "National People's Congress Government Work Report" this year. "Artificial intelligence" was formally written in the "Government Work Report" for the first time: "It is necessary to fully implement the strategic emerging industry development plan, accelerate the development of new materials, new energy, artificial intelligence, integrated circuits, biotechnology and pharmaceutical transformation, fifth-generation mobile communications and other technologies, and larger and stronger industrial clusters [1]. "In July 2018, the State Council issued the" Outline of the New Generation Artificial Intelligence Development Plan, "which sets out the guiding ideology, strategic goals, key tasks and safeguards measures as well as the development, deployment, and construction of new generation artificial intelligence in China by 2030. And it is also important to create first-mover advantage of artificial intelligence in China. It needs to speed up the construction of world-class science and technology in innovative countries. In the era of the rise of the network society, new information technologies such as

big data and cloud computing under the Internet are constantly updated. Effectively promoting the development of the artificial intelligence industry is a favorable condition for the integration of artificial intelligence technology and sports. The application of artificial intelligence technology in sports is of great significance for the development of competitive sports, mass leisure sports and the sports industry. This article analyzes the background, development status, internal logic and optimization strategies of the integrated development of artificial intelligence + sports industry.

II. DEFINITION OF NOUNS

A. The meaning of artificial intelligence

It is a method of research, development simulation, and extension of human intelligence, as well as new technology of technology and applications. Artificial intelligence is intelligence that is manually implemented on a machine (computer) or that simulates human intelligence on a computer [2]. Artificial intelligence can be obtained by developing machines or devices with certain functions similar to human thinking, and can perform intellectual activities that usually require human capabilities. It is necessary to create artificial entities intelligently through software and hardware; artificial intelligence is a cutting-edge discipline developed on the basis of computer science,

cybernetics, information theory, systems science, philosophy, and other disciplines. But there is no clear definition of artificial intelligence. This point can be understood: artificial intelligence is a discipline that studies how to build intelligent computers or intelligent systems, enabling them to simulate and expand human intelligence. In a narrow sense, artificial intelligence is the science of making the research system have the ability to listen, speak, read, write, think, and learn and other human thinking skills through intelligent computers.

III. THE DEVELOPMENT STATUS OF ARTIFICIAL INTELLIGENCE IN SPORTS

A. *Application of artificial intelligence in competitive sports*

In 1896, the first modern Olympic Games officially used the 1912 Stockholm Olympics and electronic stopwatches as well as those used in high-end cameras. The first computer was used in the Munich Olympic Press Center in 1972. Big data appears at the modern Olympics. Every electronic device update is a data revolution. Artificial intelligence can also improve tactics, sports level and sports performance to varying degrees, which is of great significance to the realization of China's sports strength [3].

Alpha (Alpha Go): The smart robot appeared in the Go arena in 2016 and caught everyone's attention. In March 2016, Alpha Go artificial intelligence and professional nine dan chess player Li Shishi fought a world-renowned man-machine battle [4]. Artificial intelligence beat humans for the first time, with a total score of 4 to 1; shortly after, it appeared on the Chinese chess website and "Master" was used as a registered account to compete with dozens of players in China, Japan and South Korea. There were no losses in 60 consecutive games; in May 2017, at the Chess Summit in Wuzhen, China, it played against world No. 1 Go champion Ke Jie with a total score of 3 to 0. In the Go world, people recognize that Alpha Go has the highest level exceeding human professionalism. In the World Professional Go ranking published on the Go Ratings website, it surpassed the number one Keji.

In the same field of competition, artificial intelligence has overcome table football, they can accurately calculate the possibility of humans to play and find a solution. Corinthians Football Club of Brazil announced an agreement with IBM to transform the club with artificial intelligence, and FIFA introduced the goal line technology at the World Cup.

The application of artificial intelligence in tennis is mainly "Eagle Eye Technology", also called "Instant Playback System". Its technical principle is not complicated, but it is very accurate. The system consists of 8 or 10 high-speed cameras, 4 computers and a large screen. First, with the powerful computing power of the computer, the three-dimensional space in the competition is divided into millimeter-level measurement units. Secondly, high-speed cameras are used to simultaneously capture the basic data of the tennis flight trajectory from different angles and generate data and pictures in three-dimensional space. Finally, the image uses feedback imaging technology to clearly display the tennis's motion path and landing point from the large screen. Due to prolonged tennis matches, technical officials are prone to visual fatigue and inevitably misjudgments outside the bounds. The use of Hawkeye technology makes up for the shortcomings of technicians, and athletes have limited opportunities to use Hawkeye technology. They have surpassed human wisdom in some areas. Although there is a large gap between appearance and people's perception of the same, its fighting performance in this century is even more thought-provoking.

B. *Widespread use of artificial intelligence in mass leisure sports*

In the context of the "new era" in which the Chinese government vigorously promotes national fitness, people's awareness of fitness has rapidly increased. Fitness enthusiasm is getting higher and higher, and many entrepreneurs and investors see the value of investment in the sports industry. In particular, the "artificial intelligence" environment makes the development prospects of the sports industry much broader. With the development of economy and technology, according to Maslow's Demand Theory, the material demand is the most basic demand. After meeting material needs, psychological needs begin to become a necessity. Artificial intelligence can greatly improve the participation of the whole people in fitness, and understand the experience and fitness effects of fitness workers, and effectively help exercisers to strengthen their physique. At the same time, as the public uses smart devices in fitness activities, they will generate a large amount of personal fitness data and health data. These data can be used as an important reference for assessing the physical condition of Chinese citizens and formulating sports policies.

The emergence of artificial intelligence will promote the development of more sports, and provide a more scientific basis for accurate training of athletes, fairness of referees, and scientific training of people. The development of artificial intelligence is inseparable from big data, and the sports industry will pay more attention to data collection.

1) Online apps: "AI (artificial intelligence) Personal Education APP" is fitness personal education software. Nowadays, artificial intelligence has a place in various fields. It also helps coaches schedule lessons

and intelligently assess people's physical health. AI Personal Education App serves the main fitness instructor and is a professional personal education office app. The coach opens the AI personal education application and can arrange courses at any time, view member information, and develop exercise plans for each member, making personal education management work smarter and more convenient.

2) Sensors provide data: From the perspective of data collection, the relationship between artificial intelligence and sports mainly includes dimensions such as heart rate, speed, cadence, and height difference. The heart rate is the most accurate and stable measure of exercise intensity. "Artificial intelligence" is suitable for physical exercise to measure and evaluate the physical health of the body before exercise. During exercise, users can grasp the current aerobic and anaerobic exercise status, heart rate safety interval warning, etc .; after exercise, it can analyze the exercise situation to understand whether the exercise effect has reached the expected effect, and formulate a training plan according to the exercise goal to achieve a more scientific training purpose. In the first three quarters of 2018, China's offline smart bracelet sales rankings, the monthly average growth rate of MIUI Bracelet 3 single product reached 286%.

3) Internet sports plus wearable intelligence: The "13th Five-Year Plan" Sports Development Plan pointed out that the contradiction between multi-layered and diversified needs and insufficient sports supply is still salient, and has become a challenge for national fitness. How to break through the bottleneck requirement of national fitness has important strategic significance for promoting healthy China. As new sports models based on sports apps and smart wearables are popular around the world, the coupling relationship between national fitness and artificial intelligence has been enhanced. Sports apps are increasingly affecting people's sports behavior and lifestyle due to their social entertainment, interaction and scientific guidance. In addition, emerging smart wearable devices have become the new favorite of sports enthusiasts and people can record daily sports data by wearing smart devices. And it can calculate the consumption of fat, calories, response to sleep quality, etc., can synchronize the data with the Internet, and give scientific fitness guidance and health assessment based on this [5]. At the same time, Jiangsu, Beijing, Inner Mongolia and other provinces have also launched interactive platforms for public health services. The platform terminal is divided into an artificial intelligence part and a manual solution part, which realizes the connection between the lines. It can improve the

science of the national fitness system and meet the diverse needs of sports enthusiasts. Secondly, as the new sports model becomes a fashion element, more sports resources actively cooperate with the development of the platform, so that the platform has formed a sustainable development trend. Carrying out national fitness data mining and forming a national fitness data resource database can provide data support for government decisions at all levels.

The smart bracelet sensor is combined with the mobile terminal APP, and the wristband sensor uploads the collected data to the APP client. Users can collect their shooting average, dribble, calories burned and other sports data in real time. It is worth mentioning that through algorithms and intelligent recognition, the bracelet sensor and scoring device can also edit the highlights of the user's basketball game in real time and upload it to the phone. Users can not only review their own video actions, but also watch opponents.

IV. COORDINATED DEVELOPMENT OF ARTIFICIAL INTELLIGENCE AND SPORTS INDUSTRY

Artificial intelligence is called the next industrial revolution. According to market research reports, it is estimated that by 2020, the global AI market size will be about 400 billion yuan, and it is expected to reach 800 billion yuan by 2025 [6]. The huge market prospects have led to the deployment of many industrial giants. The field of artificial intelligence has become a hot spot for investment. According to a recent report from Forrester Research, AI investment in 2017 increased by more than 300% year-on-year. People's health continues to improve [7]. In 2030, the average life expectancy will reach 79.0 years of age, and the average life expectancy will increase significantly. The nationwide fitness exercise needs to be widely carried out. Through artificial intelligence, the public can effectively and quickly obtain fitness data and formulate scientific fitness plans, thereby improving the health level of the entire population. In order to further achieve healthy development in 2030, it is necessary to fully implement the principles of health first, reform and innovation, scientific development, fairness and justice. It is necessary to give intelligent sports products intelligent monitoring, data statistics and other functions to enhance the use value of the products. In the future, the development of sports intelligent products should focus on serving the health of the people. Through the connection of offline and online consulting systems, consumers who use the product will get specific personalized fitness programs to increase the service value of the product. The demand for sports products has led to the development of the sports industry [8].

In 2014, the State Council issued several views on accelerating the development of the sports industry and promoting sports consumption. The sports industry is an important force for economic transformation and the healthy development of people's livelihood. In 2025, the scale of the sports industry will exceed 5 trillion yuan, the per capita sports area will reach 20,000 square meters, and the sports population target will reach 500 million. It is necessary to transform government functions, cultivate market players, adjust industrial structure, enrich industrial forms, promote integration and development, and improve related policies, etc. [9].

A. Smart sports functionalization

New technologies such as the Internet of Things, big data and artificial intelligence need to be integrated with each other, and the actual needs of consumers can be deduced from consumer consumption data [10]. This can be used as a reference to create products that better meet consumer needs. AI Sports combines existing technology with the sports industry to enhance the traditional sports industry. Sports intelligence makes it easy for athletes to choose materials and scientific training; intelligence turns people's previous work in competitive sports into computer programs; test data obtained from testers can be used to see if they meet standard large-scale training data to help the masses sports; the biggest obstacle to the development of sports intelligence is that people's acceptance is not enough. The role of artificial intelligence in competitive sports can also meet the needs of sports training, the needs of talent transportation networks, and the needs of sports science development [11].

B. Smart sports combine the primary, secondary and tertiary industries

By booking online, you can sell sports-related tourism, smart clothing and other products, so that the primary and tertiary industries can be perfectly integrated. At present, the online marketing of sports smart products is no longer a matter of e-commerce, but a series of processes including sports tourism and the Internet. The sports industry will be fully integrated through the Internet. The secondary industry is the core of the three major industries. According to the mode of labor production, the sports industry can be divided into: Business-oriented sports industry: the industrial sector, run by social groups, businesses and sports figures, operates leisure and recreational sports; semi-operating sports industry: public sports services organized or funded by the government; non-operating sports industry: for example, mass sports activities funded by the government and social organizations. This can maximize the functions of the sports industry.

C. Smart sports use Internet operations as a consumption model

O2O is online to offline. It refers to the combination of offline sports products and the Internet, making the Internet a platform for offline transactions. Integrating sports, health and life can promote the development of the sports industry. Through mobile Internet technology, the O2O model brings together a large amount of sports information on the Internet, reducing the distance between users and products, and enriching sports and fitness. The sports industry adopts the online and offline O2O model, making the mobile Internet a favorable platform for realizing the added value of the sports industry. Realizing sports O2O is the future direction of Internet sports development.

The "New Generation Artificial Intelligence Development Plan" proposes that by 2030, the theory, technology and applications of artificial intelligence will reach the world's leading level and become the world's major artificial intelligence innovation center. It is necessary to expand and strengthen emerging industry clusters, implement big data development measures, strengthen the development and application of next-generation artificial intelligence, promote medical care, and support the elderly. It is also necessary to utilize new technologies, new forms, and new models to vigorously transform the sports industry and develop artificial intelligence in education, culture, and sports. By 2030, the core industry of artificial intelligence will exceed 1 trillion yuan, driving related industries to exceed 10 trillion yuan. Faced with such a large market, the sports industry in which it is located will inevitably "rise".

V. INTERNAL LOGIC INNOVATION OF ARTIFICIAL INTELLIGENCE TO SPORTS

A. Uncertainty over the results of the game

Competitive sports are regulated, entertaining, challenging and uncertain sports. There are various rules to prevent unfairness. This is an artistic creation that gives a strong, beautiful, harmonious, and beautiful feeling. The charm of competitive sports lies in the uncertainty of the outcome of the competition. For example, FIFA (Fédération Internationale de Football Association) introduced goal line technology at the World Cup to determine if football crosses the goal line to determine if the goal is valid. However, FIFA has always refused to perform live large screen video playback because it can completely eliminate false positives and mistakes, but this also makes football games lose excitement and suspense. The uncertainty in competitive sports in the Olympic Games is that at the Olympic Games, anything can happen. Uncertainty is an indispensable landscape of the Olympic Games. The results of the game mainly include five aspects:

technology, tactics, experience, psychology and status. Artificial intelligence has only a set of fixed game system models, and can't be as rich in emotion as humans. In fact, in sports, the most attractive point of a sports game is the uncertainty of the game result. Once the game determines the result, sports activities will eventually perish.

B. *Ethics between artificial intelligence and sports*

The development of modern technology is slowly moving towards the cover, which shields the most precious things of human beings. The original "imagination" and "beauty" of sports are gradually being worn down and moved towards barrenness. In such an era of technical bossy and worship of technology, it is particularly necessary to explore the significance of sports. The nature of sports is still difficult to digitize, and it is also a unique and intelligent way for humans to understand sports. Only returning to the original starting point of sports activities will awaken this era of technological bossy. In the final analysis, sports competition is still a competition between people, which can't only highlight the accuracy of the data but lack the charm of "people". In sports, the main body of the game is still a person, and the result of the game should ultimately be completed by someone. If too much artificial intelligence is involved, the sorrow, joy and emotional ups and downs brought about by sports competitions will be greatly reduced. Eventually, sports will lose its charm and everything will be without any suspense.

C. *It affects the audience's appreciation and emotional experience of competitive sports*

Competitive sports have become more and more competitive with the development of competition, but they have not lost their entertainment characteristics. For participants, victory or fair participation can provide psychological satisfaction. Artificial intelligence is not just a simple computer, but a comprehensive replacement of consciousness, self, thinking, and so on. Robots do not have the selective pressure people do. In the competition, people have to face various aspects of preparation, such as psychological, physical, social and other aspects of influence. However, artificial intelligence doesn't reflect these emotions. The purpose of exercise is physical activity, positive energy expenditure, physical and mental load, and frequent discomfort. In order to create a sense of physical and mental pleasure, it advocates an action life of "doing it yourself to get enough food and clothes". Sports intelligence can only end in the objective aspects of sports method design and can never replace human subjective operability. The role of sports must not only continue to bear the physiological benefits of maintaining the human exercise genome, but also improve the psychological,

spiritual, and even healthy development of society. On December 9, 2015, the Adidas Speedfactory concept plant in Bavaria, southern Germany, was put into operation. Except for a few technicians, the factory uses intelligent robots to produce shoes. In September 2016, Speedfactory's first product was officially unveiled. It designs more suitable shoes based on the pressure and relaxation of your skin or bones. Adidas is expected to launch its second Speedfactory in Atlanta, USA in 2017, and the Atlanta plant will reach 50,000 pairs per month in the second half of next year. If all goes well, Adidas' robot factory will produce 1 million pairs of sneakers per year in the future.

VI. OPTIMIZATION STRATEGY OF CURRENT ARTIFICIAL INTELLIGENCE IN SPORTS INDUSTRY

A. *Exploitation and development of various sports practical systems*

It is necessary to guide sports workers to gradually understand and master intelligent technology, develop intelligent systems with higher intelligence, and promote physical and practical artificial intelligence from abstract to concrete. The exploitation and development of the new system should consider the level of consumers, and formulate sports product strategies, price strategies and promotion strategies that meet consumer levels.

B. *Training of scientific and technological personnel in the field of artificial intelligence plus sports*

It is needed to emancipate the mind, scientifically innovate, and improve the research level of researchers. Humans have long been eager to thoroughly understand the mechanism of human intelligent behavior and create intelligent machines that can simulate intelligent behavior. Efforts should be paid to focus on intelligent engineers, and provide the necessary prerequisites for artificial intelligence to penetrate the sports field. Artificial intelligence technology is very advanced. It requires developers not only to have special knowledge, but also comprehensive read and write capabilities in many areas such as systems engineering and software development. Researchers in the field of artificial intelligence will gradually understand sports, discover sports problems, and continue to try to use technical methods in the field. In recent years, China's physical education, especially high-level physical education, has made great progress, training a large number of master and doctoral students with strong research capabilities [13]. The continuous development of young sports scientific researchers has provided necessary talent support for the development of AI sports. An important way to achieve professional researcher training is to establish "Artificial Intelligence Major" in universities.

C. Basic theory of sports practical AI

The development and application of artificial intelligence is no doubt important. Scientific arguments can be obtained only with a certain theoretical basis. Only when a solid basic theory is laid can sports artificial intelligence in China be widely and scientifically adopted. Strengthening sports and practical artificial intelligence, such as basic theoretical research on the formation of sports intelligence and competitive psychology, development rules, and expression of skills and knowledge, are the basis for the survival and development of new disciplines.

VII. CONCLUSION

The popular application of artificial intelligence can more clearly understand the psychological needs of consumers, and then the sports industry can make rapid and corresponding adjustments according to the psychological needs of consumers. Through the Internet, you can quickly learn how satisfied consumers are with the results of adjustments, and then make further improvements. You can even customize services according to the special requirements of some consumers. It can be seen that the high demand of consumers makes the convergence of artificial intelligence sports industry faster and faster. In addition, artificial intelligence can provide advanced technological means for the innovation and development of the sports industry. For example, the progressive development of virtual reality live broadcasts in China, online smart virtual events and smart device platform competitions will provide new means and technologies for the sports industry. At the same time, these new sports innovation products and services also call for a large number of artificial intelligence engineers to participate in product development, system maintenance and other work. Industrial integration is the need for economic development, and the integration of the sports industry is also a requirement of the current era. Combining artificial intelligence and the sports industry can better meet the needs of modern society, and the current integration of artificial intelligence and the sports industry has got a good start, and the sports industry O2O model has gradually formed. The emergence of this model has enabled more sports enthusiasts to obtain faster and better fitness services through artificial intelligence, and has also provided sports businesses and stadiums with conditions to increase income and utilization, and make the sports industry develop faster and better.

References

[1] Li Keqiang. Government Work Report 2018 [EB/OL]. http: //www.gov.cn/zhuanti/2018lh/2018zfgzbg/mobile.htm. (in Chinese)

[2] Lei Yingjie. Artificial intelligence (AI) programming (Object-oriented Language) [M]. Beijing: Tsinghua University Press, 2005. (in Chinese)

[3] Kou Xiaona. Brief talking about the influence and enlightenment of artificial intelligence on the development of competitive sports in China [J]. Contemporary Sports Science, 2018 (28): 203-204. (in Chinese)

[4] Sun Li. Research on the value, dilemma and countermeasures of artificial intelligence applied in sports: the inspiration of Li Shishi's defeat to Alpha Go [J]. Journal of Nanjing Institute of Physical Education, 2017 (10): 98-101. (in Chinese)

[5] Han Song. Thoughts on building smart sports in China based on mobile internet [J]. Sports Science Research, 2016 (5): 36-42. (in Chinese)

[6] Zhang Junfang. Research on the development of artificial intelligence industry and globalization of resource allocation [J]. China Soft Science, 2017 (1): 131-141. (in Chinese)

[7] Artificial intelligence generation. Forbes named the top 10 most popular AI technologies in 2017 [J]. Information and Computer, 2017 (1): 21-22. (in Chinese)

[8] Cao Yu, Liu Zheng. The value, dilemma and countermeasures of artificial intelligence applied to sports [J]. Sports Culture Guide, 2018 (11): 31-35. (in Chinese)

[9] Zhu Wei, Chen Huihui, Tian Siyuan, et al. Artificial intelligence: from scientific dream to new blue ocean — analysis and countermeasures of artificial intelligence industry development [J]. Science & Technology Progress and Policy, 2016 (11): 66-70. (in Chinese)

[10] Lei Shangjun, Li Yongjian. Promoting the deep integration of the Internet, big data, artificial intelligence and the real economy [J]. Economic Research Reference, 2018 (8): 55-58. (in Chinese)

[11] Yan Zhiming, Tang Xiaxia, Qin Xuan, et al. The Connotation, key technology and application trend of educational artificial intelligence (EAI) [J]. Journal of Distance Education, 2017 (1): 26-35. (in Chinese)

[12] Liu Mina. "Number" and "way": new technology and the future trend of sports [J]. Sports and Science, 2016 (3) .1-5. (in Chinese)

[13] Ma Yuhui, Bai Maolin, Zhou Zheng. Exploring the development path of China's artificial intelligence education application in the era of wisdom education [J]. Educational Research on Electronics, 2017 (3): 123-128. (in Chinese)