Journal of International Education and Development
2024, VOL. 8, NO. 12, 167-172
DOI: 10.47297/wspiedWSP2516-250029.20240812

The High-Quality Development of AI-Empowered Sports Events: A Case of the Paris 2024 Olympic Games

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ABSTRACT
There has been a phenomenal increase in artificial intelligence since the middle twentieth century. Countries have been developing and deploying events-assistance tools based on artificial intelligence with hopes of them having positive capabilities. This study explains how artificial intelligence can support sport events in an increasingly complicated and demanding sports environment, using the Paris Olympics as an example.The findings show that artificial intelligence has been shaping many respects of sports events, such as collecting and integrating data, assisting athletes' sporting performance, boosting the fairness and accuracy of judging and refereeing, enhancing viewer experience, protecting and safeguarding athletes from cyber abuse, enriching Olympic broadcast coverage, and streamlining operations within the Olympics.

KEYWORDS
Artificial Intelligence; Sport Events; Paris Olympic Games

1 Introduction

Artificial Intelligence (AI) is going to change the world more than anything in the history of mankind. That's true. According to a research by scientists at the University of Oxford, AI will be better than humans at writing high-school essays by 2026, driving a truck by 2027, selling things by 2031, writing a bestselling book by 2049, and treating diseases by 2053[1]. In the sphere of sports, AI has not only contributed to existing sports but also paved the way for entirely new sports disciplines[2]. It has had a substantial impact on the expansion and development of sports industry. According to market research firm Mordor Intelligence's calculations, the market size for AI+sports in 2024 is approximately 6 billion, and by 2029, the market size is expected to grow to 21 billion, with a compound annual growth rate of about 28.69%[3].

AI refers to the simulation of human intelligence in machines that are programmed to think like humans and mimic their actions. People viewed AI applications involving big data (e.g. astronomy, law, pharmacology) positively, but viewed applications for tasks involving human judgement, (e.g. medical treatment, psychological counselling) negatively[4].Though people have negative or positive attitudes toward AI, which can significantly influence their adoption of AI,AI will become an integral part of every field of sports in the long term, such as physical education, sports management, sports media and sport events. IOC's president Bach said that our continued success depended on how we embraced the ever accelerating development of digital technology and in particular AI in his speech at the opening ceremony of the 141st IOC Session. On April 19, 2024, the IOC released the Olympic AI Agenda in London, England. The Agenda describes the impact that AI could have for the

Olympic Movement, as well as the IOC's ambition, guiding principles, and regulatory responsibilities in leading the process of integrating AI with sport. The Paris Olympics has become the first Olympic Games to use AI technology on a large scale, which is reflected in many aspects. This article will highlight what AI can be used for in sport events, how it promote high-quality development in the sports events, and some ways that it might be applied in future events.

2 Method

This investigation is conducted using a case study of the Paris 2024 Olympic Games to provide a comprehensive comprehension of the application of AI that influence the high development of sports.

3 Results

3.1 Paris 2024 Olympic Games

Paris 2024 Olympic Games can be considered as a "new era" for the Olympic and Paralympic Games, as not only the first planned and delivered in line with the reforms of Olympic Agenda 2020, but also the first presented with the transformative power of AI.

Paris use technology in sports can trace to the 20th century. As early as Paris 1900 Olympics, Étienne-Jules Marey, a French scientist pioneered the use of high-speed chronophotography to snap sprinters and long-jumpers in motion and then analyzed the body's biomechanics to discover the secret of superiority of certain athletes.

AI plays a significant role in the Paris Olympics, especially through an intelligent chatbot named "AthleteGPT," which provides real-time guidance and support for athletes. AthleteGPT can scour thousands of information pages very quickly, and be available 24/7 to answer questions. AthleteGPT is just one way in which AI is leaving its imprint on Paris Olympics.

Besides AthleteGPT, Paris 2024 Olympics use AI in many aspects, such as protecting and safeguarding athletes from cyber abuse, assisting athletes' sporting performance, boosting the fairness and accuracy of judging and refereeing, enriching Olympic broadcast coverage, enhancing viewer experience, and streamlining operations within the Olympics.

The use of AI technology in the Paris Olympics is a milestone initiative, marking significant progress in sports events on multiple levels, and bringing the Olympic Movement into a new era.

3.2 The application of AI in sports events

AI entered elite sports approximately 30 years ago[5]. It focus initially on sports performance and predicting injury[6]. The advancement of AI brings new applications. Some applications of AI are listed as follows.

3.2.1 Data collection and integration

Artificial intelligence plays a crucial role in sports data collection and data integration. In terms of data collection, AI can collect sports data from various sources such as open datasets, sensor data and social media. Diverse sports data sources help provide comprehensive information, aiding models better learn and understand sports data features. In terms of data integration, AI can automatically identify and match the correlations between different sports data sources through data mining and machine learning techniques, and interpret textual information in different data

sources using natural language processing techniques to achieve faster and accurate sports data integration. In addition, AI can automatically identify and resolve conflicts and errors in the data integration process through automated decision-making technology for more effective data integration. In terms of cross-platform data transmission, AI technology can improve the speed and stability of cross-platform sports data transmission through network optimization technology, achieving faster and more reliable data transmission. It can automatically convert the sports data formats between different operating systems and platforms, achieving data transmission between different systems. Furthermore, AI can encrypt and decrypt sports data transmitted across platforms in an automated manner, protecting data security and privacy.

The Paris 2024 Olympic Games has for the first time applied AI technology to the international public signal production of table tennis. AI dynamic data acquisition, combined with ultra-high-definition production and broadcasting technology, allows many details in the game to be restored one by one. Through the TV screen and AI technology, the trajectory, landing point and direction of rotation of a table tennis ball with a diameter of only 40 millimeters can be clearly presented, which helps viewers better understand why the ball is invalid or or why it appears out of bounds but scores.

3.2.2 Optimization of training techniques and tactics

The application of AI in optimizing training techniques and tactics is multifaceted, involving motion tracking and analysis, data-driven decision-making, personalized training plans, tactical simulation, injury prevention and rehabilitation, psychological and physiological monitoring, real-time feedback and adjustment, automated video analysis, as well as intelligent equipment and facilities. AI can track athletes' movements and analyze technical details through computer vision and sensor technology; by collecting and analyzing a large amount of sports data of global outstanding athletes, including performance data, physiological indicators, and match videos, it helps coaches and athletes make intelligent training suggestions and training plans; by analyzing the individual characteristics and performance of athletes, it customizes personalized training plans to improve the specificity and efficiency of training; by simulating different match scenarios and tactics, it helps coaching teams test and optimize tactical plans; by analyzing training data and physiological indicators, it can predict the risk of athlete injuries, adjust training intensity and content in a timely manner, and reduce the occurrence of injuries; by monitoring athletes' physiological and psychological states through wearable devices, it provides personalized adjustment suggestions to optimize athletes' performance; by providing real-time feedback on matches and training, it helps athletes adjust their technical movements and tactical execution in a timely manner; by automatically editing match videos and quickly generating highlights, it saves time for coaches and analysts, allowing them to focus more on tactical analysis and decision-making. For example, the 3D+AI diving training system developed by Baidu uses AI technology for real-time data capture, helping athletes improve training efficiency. TacticAI, developed by Google DeepMind in collaboration with Liverpool Football Club, was trained on data from 7176 corner kicks in the 2020 to 2021 Premier League season, including player positions over time and their height and weight, provides tactical suggestions by analyzing corner kick data to increase the success rate of corner kicks[7].

When the Chinese national team was preparing for the Paris 2024 Olympic Games, the national swimming team used a 50-meter 3D intelligent collection and AI quantification analysis system both above and below water to comprehensively and multi-angle intelligently monitor the entire process of athletes' swimming, capturing the details of athletes' movements, and helping athletes to conduct each training session accurately and quantitatively. The national climbing team adopted a speed climbing time comparison system and a 3D posture analysis system for real-time and precise

quantitative assessment of high-speed and complex speed climbing movements. The national track and field team used a real-time 3D trajectory calculation and AI quantification analysis system to automatically collect throwing movements from the front and side, and to quantify and analyze the release speed, release angle, air time, and throwing distance of the shot put, outputting feedback results within 3 seconds on site. The national badminton team used professional video collection software and AI algorithms to conduct in-depth analysis of athletes' performance in competitions, helping athletes to better understand their own and their main opponents' performance in the game.

3.2.3 Assistance of events referee

Referees can not only analyze the video footage of the game scene and reevaluate the controversial scenes to make the right call through the high-definition images and slow-motion replay provided by AI. They can also automatically detect and track the players and balls in the game through AI image recognition algorithms, to better understand and evaluate the game situation, and to assist them in making the right call. In contact sports, it is not easy for a referee to make an accurate decision on whether or not a player has committed a foul in a split-second action. Therefore, in terms of refereeing and real-time data analysis, AI is already supporting referee decision-making in sports such as soccer through information recorded by a series of cameras around the stadium and chips implanted in soccer balls.

For the first time, the Paris Olympics have adopted an AI-powered slow-motion playback camera system provided by Aliyun. For example, innovative technologies such as "bullet time" playback and 3D freeze frame images allow spectators to enjoy the details of the event from different angles and in all directions, as if time had stood still. During the Paris Olympic Games, the World Anti-Doping Organization also used AI technology to conduct anti-doping tests to ensure a fair and equitable competition.

3.2.4 Enhancing the viewing experience for audiences

AI technology can demonstrate an interactive, AI-powered fan activation to take spectators on a journey of becoming an Olympic athlete. It can not only recognize key moments and automatically picks out the most relevant clips to generate highlights based on audience interests, but also capture and render real-time holograms of the athletes by an AI processor to provide an immersive experience for the audience. Furthermore, AI technology can realize an 8K ultra-high definition live broadcast, providing a visual feast for those who can not be there in person. In terms of audience knowledge base, AI can restore precious historical images of the Olympics to provide viewers with a richer history.

During the Paris 2024 Olympic Games, over half of the world's population is expected to have engaged via broadcast or digital channels. OBS's online content delivery platform (Content+) has become the primary method of delivering short-form and social media content to the MRHs – more than 17,000 pieces are available. More Olympics fans than ever before used the IOC's various digital and social platforms to follow the Paris Olympic Games: Unprecedented results on Olympics social media handles, with over 12 billion engagements, more than double that of Tokyo 2020, and over 32 million new followers joined Olympics social media during Paris 2024, more than tripling the growth seen during Tokyo 2020[8].

3.2.5 Boosting the operational efficiency of management

AI technology plays an important role in improving the efficiency of tournament operations. By

equipping staff with AI tools, AI can provide race staff with accurate race information by collecting and analyzing data in real time, which will help the staff make better decision-making and task automation. Besides, by transcribing meeting notes, facilitating multilingual translation, organizing contracts and archives, and so on, AI technology can streamline internal communication. This boosts collaboration, participation and efficiency within the IOC and among organizations across the Olympic Movement. Whats more, AI can reduce the broadcast footprint through lower power consumption and physical space. AI technology is used to automatically generate tournament highlights, assist video editing work, and improve the efficiency of production and editing. AI live production technology is being used in ice hockey, which is still in the development stage, but shows great potential.

At the Paris 2024 Olympic Games, by identifying and marking abusive messages, AI helps IOC to monitor social media to protect athletes from online abuse. The table tennis table adopts a variable lighting system with its own chip, which can be adjusted by cell phone or remote control device to change the lighting. The Paris Olympics also uses AI technology for crowd management, analyzing spectator behavior in real time and identifying potential safety hazards through an intelligent monitoring system.

At the "China House" of the Paris Olympic Games, there are two AI guests who can communicate without barriers in Chinese, English, and French. The appearance, physique, and even the expressions of the AI virtual humans are almost identical to the real person. Tourists standing in front of them feel as if they are talking to a real person. With advanced speech synthesis, speech recognition, semantic understanding, lip prediction, image processing and other AI technologies, they can accurately answer every question from the audience.

3.2.6 Creating an environmentally friendly society

The application of AI in sports events have had a substantial impact on social well-being. Athletes ' support, safe sport and fair play are some relevant considerations. Through the intelligent energy management system, AI can help the efficient use and energy saving by participating the construction of competition venues and monitor and regulate the real energy use of the venues in time, such as the intelligent building management system of the National Aquatics Center- the first renovated venues for the Beijing 2022 Winter Olympics, effectively controls and monitors the indoor temperature, humidity, lighting, acoustics and other variables. The monitoring platform for total energy consumption and carbon emission effectively controls carbon emission and turn the venue into a green and low-carbon one. Moreover, AI can optimize transportation routes and vehicle scheduling to reduce traffic congestion and emissions, and reduce the impact on the environment.

At the Paris 2024 Olympic Games, energy consumption is monitored in real time and the data obtained will be used to guide future planning. The Internet of Things (IoT) system and machine learning algorithms implemented by Intel and Atos are used to monitor and optimize the energy consumption of Olympic venues. These technologies collect real-time data on energy usage and make decisions to reduce unnecessary consumption.

There are a large amount of smart sensors deployed to monitor critical environmental factors, including but not limited to noise levels, air quality and water conditions. In the example of water quality control of the Seine river, a network of IoT sensors is implemented to replace the traditional methods of grab sampling and lab analysis.

4 Conclusion

Considering the widespread application of AI at the Paris 2024 Olympic Games in the aspects of

data integration, scientific support for athletes' training and competitions, referee assistance, spectators' viewing experience, management effectiveness, environmental protection and sustainability, the findings in this study indicate that AI technology has great potential in the field of sports. These innovative practices of AI at the Paris Olympics adds technological charm to the current Olympic Games and sets a new benchmark for future sports events. While every coin has two sides, we should keep the Olympic values in mind, promote responsibility and sustainability, and foster fairness to support athletes and to drive the sustainable development of the sport events[9].

Funding

This work was supported by Sport Philosophy and Social Science Key Research Base of General Administration of Sports of China under the project titled Theoretical Logic and Path Selection of Artificial Intelligence Driving the Sustainable Development of Sports in China, grant number 2024ZXSK005.

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References

[1] Katja Grace, John Salvatier , Allan Dafoe, et al. (2018). When Will AI Exceed Human Performance? Evidence from AI Experts. https://www. fhi. ox. ac. uk/will-ai-exceed-human-performance-evidence-ai-experts/. Accessed on 10 November, 2024.

[2] Ozan KARAKUŞ, Mehmet Mustafa YORULMAZLAR, Arif Çetin, Damla ÖZSOY(2023). Examining The Attitudes of E-Sports Players Towards Artificial Intelligence Techologies.INTJORASS.7(1): 18-25.

[3] AI in Sports Market - Artificial Intelligence - Share, Companies & Size (mordorintelligence.com).

[4] Astrid Schepman, Paul Rodway(2020). Initial validation of the general attitudes towards Artificial Intelligence Scale. Computers in Human Behavior Reports (1), 100014. https://doi.org/10.1016/j.chbr.2020.100014.

[5] Lapham AC, Bartlett RM. The use of artificial intelligence in the analysis of sports performance: a review of applications in human gait analysis and future directions for sports biomechanics. Journal Sports Sci1995;13:229–37.

[6] Claudino JG, Capanema D de O, de Souza TV, et al. Current approaches to the use of artificial intelligence for injury risk assessment and performance prediction in team sports: a systematic review. Sports Med - Open 2019;5.

[7] Zhe Wang,Petar Veličković(2024).TacticAI: an AI assistant for football tactics. NatureCommunications.5:1906. https://doi.org/10.1038/s41467-024-45965-x.

[8] International Olympic Committee(2024). Paris 2024: Record-breaking Olympic Games on and off the field. https://olympics. com/ioc/news/paris-2024-record-breaking-olympic-games-on-and-off-the-field. Accessed on 26 November , 2024.

[9] Minew(2024). Smart Olympics: How IoT Technology is Transforming the Paris 2024 Olypic Experience. https://www. minew. com/how-iot-technology-is-transforming-the-paris-2024-olympic-experience/Accessed on 8 November , 2024.