Journal of Advanced Sport Technology
DOI: 10.22098/jast.2024.13311.1296
Received: **14 July 2023** Accepted: 19 May 2024

ORIGINAL ARTICLE

Advantages and disadvantages of artificial intelligence in sports events

Fahime Momenifar[1*], Fateh Faraziani[2], Ali Karimi[3]
1. Assistant Professor, Department of Sports Management, Payame Noor University, Tehran, Iran. Email: F.momeni@pnu.ac.ir, ORCID: 0000-0002-5074-5655
2. Assistant Professor, Department of Sports Management, Payame Noor University, Tehran, Iran. Email: farazacademia@pnu.ac.ir, ORCID: 0000-0001-8340-4825
3. Assistant Professor, Department of Sports Management, Payame Noor University, Tehran, Iran. Email: alikarimi60@pnu.ac.ir, ORKID: 0000-0001-6836-8176
Correspondence :F.momeni@pnu.ac.ir

How to cite: Momenifar, F., Faraziani, F., Karimi, A. Advantages and disadvantages of artificial intelligence in sports events. *Journal of Advanced Sport Technology*, 2026; 10(2): 78-92. doi: 10.22098/jast.2024.13311.1296

Background:The aim of this study was to identify the advantages and disadvantages of implementing artificial intelligence in sports events.

Methods: The research followed a mixed research design, specifically a sequential exploratory approach, beginning with qualitative research and then transitioning to quantitative research. Data for the study were collected in the field. Study's population consisted of two parts: qualitative and quantitative. For the qualitative section, 15 experts in sports management were interviewed. In the quantitative section, the population included sports management elites, such as faculty members from physical education universities under the Ministry of Science, as well as managers and executive experts in the country's sports industry. The sample for this section was selected using a stratified-random sampling method. To analyze the data and determine the advantages and disadvantages of using artificial intelligence in sports events, the Delphi method was employed in three stages. The result of this process was a questionnaire consisting of 45 indicators across 11 components for the advantages section, and 12 indicators across 4 components for the disadvantages section. The questionnaire was compiled using a Likert scale. The face and content validity of the questionnaire were confirmed by 15 experts, and its reliability was assessed in a preliminary study involving 30 participants, yielding a value of 0.82. Additionally, exploratory factor analysis was conducted using SPSS software to analyze the data.

Results: Based on the research findings, the main advantages of using artificial intelligence in sports events were identified as refereeing, recruitment and selection of technical staff and players, analysis of player performance and information, and news agencies. On the other hand, the main disadvantages were found to be high cost, lack of human interaction between coaches and athletes, and dependence on artificial intelligence.

Conclusions: Artificial intelligence can significantly enhance the efficiency and quality of sports events, particularly in officiating, talent identification, and performance analysis. However, challenges such as high implementation costs, reduced human interaction, and overreliance on AI should be carefully addressed. A balanced integration of AI with human expertise is essential to maximize its benefits.

Keywords: Artificial intelligence, Sport events, Sports management experts.

Introduction

Physical activity is becoming an increasingly important aspect of our lives. It is a necessary and a required ingredient of a healthy life and there is no doubt that it contributes to our wellbeing. While sport used to be a synonym for physical activity performed in a person's free time that might not be true anymore. We can roughly categorize the free time physical activity into recreational sport or recreation, amateur sport, and professional sport. Each of the three categories has a separate place in the society and includes people with different goals. But one thing is common to all of them; the need and the urge for the quantification of their physical activity[1]. By playing "a vital role in becoming the best– on and off the pitch"[2], technology has contributed to making sport potentially more exciting and challenging than ever before. While sports considered a leisure time activity for most of its history, the technology-driven internationalization and professionalization have led to enormous changes: fans and consumers can follow sports events and their favourite teams and athletes across the globe live or on-demand through digital technology or social media basically at any time[3].

The rapid development of Information Technologies (IT) has had an impact on almost all areas of our lives. Computers, smartphones, smart watches, and other mobile and pervasive technologies change the way we work and how we perceive the outer world. Furthermore, robots are replacing human workers in various industries, especially in the era of Industry [4]. There is no doubt that our civilization has to adapt to the many changes that are the consequence of modern technology [5].Technology used in sport is developing very fast; recent day technology possesses properties and functionality only imagined a few years ago. For example, in the past the motion of gymnasts could only be analyzed in certain detail through video recordings, while at present gymnasts can wear a suit with motion sensors [6] that records their moves. Based on the athlete's kinematic model such systems can give a detailed analysis of their motion in three-dimensional space. Similar examples could be found for other sports [6]. Artificial intelligence breaks into all possible areas of our lives. It helps us to automate processes, make decisions and perform tasks instead of a human. In some situations, this technology has become a part of us, and we can no longer imagine our life without it[7]. Surely, many of people have used diet apps, the so-called AI diet consultant. This is also the work of Artificial Intelligence algorithms suggest diets based on your characteristics. Or during COVID-19, we often used apps for doing sports at home, here AI algorithms evaluate your productivity and the correctness of the exercise's performance [8]. Artificial Intelligence in sports is of great benefit, this is a new opportunity to make decisions in just a couple of seconds, without waiting for the end of the match and get accurate analytics[9]. After such an intervention, its effectiveness has become interesting for various sports, so now the market is only expanding. In 2020, the global AI in sports market was estimated at $1.4 billion and by 2030 it is predicted to grow by 30%, which is estimated at $19.2 billion. These numbers really prove it [10].

In recent years a number of inexpensive toys and gadgets aimed for activity tracking have been introduced to the market. Gadgets, such as wrist bands, give statistical parameters and count events of a particular physical activity. For example, they count the number of steps made during the day, they can detect falls, they can monitor sleep quality, etc. Such gadgets usually acquire movements or physiological processes of the user with low frequency and low precision, what is at the end good enough for their intended use. At the other end of sport technology are complex and expensive systems that simultaneously gather and process large amounts of data. For example, a system for a real-time tracking of a football match and the analysis of training [11].

Artificial intelligent (AI) in sports could be an alternative to overcome the lack of facilities and environment in sports education. Various methods of using AI, can provide opportunities for various experiences by overcoming the limitation of space and time [12]. As far as practical applications are concerned, here is an example – AI can be used to analyze large amounts of data to identify patterns and trends. This information can be used to improve player performance, make strategic decisions, and better understand the game.

There are many potential benefits of using artificial intelligence in the sports industry. It can help teams save time and money while also improving performance. For example, AI can be used to reduce the amount of film that needs to be reviewed by coaches. AI can also be used to create custom training programs for athletes based on their specific needs. An unexpected benefit is that it also has the potential to help smaller teams compete

against larger teams by providing them with access to the same data and tools that the more prominent teams have[7]. For example, the National Football League (NFL) has been using this technology to analyze game film and improve player performance. Major League Baseball (MLB) is using AI to help teams make better decisions about player personnel. And the National Basketball Association (NBA) is using AI to improve its scouting process. AI can also be used to create virtual reality environments that can be used for training and player development. It is already being used by some of the biggest names in sports.

Depending on how it is defined, AI can be of great importance in many sports. If AI is defined as "a design for instrumental action that reduces the uncertainty in the cause-effect relationships involved in achieving a desired outcome" [13], then AI is at the root of most sports as a requirement for existence given its constitutive function [8]. Over time, AI will evolve from a constitutive function to a differentiating factor in performance improvements [14] as well as health and safety [4, 15]. Similarly, it has constantly gained relevance in the officiating of sports and adherence to the rules in many sports [16] with inventions such as smart assisted refereeing [17], the hawk eye in cricket or tennis (Collins and Evans, 2021), or instant analyze [18]. The machine learning and artificial intelligence, Chess has inhibited an important role as a natural testbed for innovations ever since Alan Turing created a chess computer program in 1948 [19, 20]. Given this inevitable role of AI in sports, the above outlined lack of academic literature in this field [21] is quite surprising. While this research study at hand does not intend to provide a full-fledged review of the literature, it is important to note that the research field of AI in sports could benefit from an extensive review that provides a structured overview of the different research streams in sports AI and the associated literature. To the best of our knowledge, there is no such literature re view for AI in sports overall available yet. However, there are several literature reviews that cover sub-domains of AI in sports in different areas such as training [22, 23], performance [11], rehabilitation, injury prevention [24], health [25, 26], motion analysis[27, 28], biomechanics[29], wearables[30, 31], machine learning [32], data collection [33], big data[9, 34], virtual reality[9], additive manufacturing[35], innovation [24], sport management , sports fields [36], esports [10] or sports betting[37].

Artificial Intelligence (AI) has become increasingly prevalent in the sports industry, providing valuable insights into player performance, team strategy, and game outcomes. However, while there are numerous advantages to using AI in sports, it is crucial to consider the potential disadvantages as well. Drawing on a comprehensive literature review of existing research studies, reports, and articles, this paper provides a balanced and evidence-based assessment of the topic. By highlighting the potential ethical issues, biases, dehumanization of the sport, technical errors, reduced fan engagement, and lack of transparency, coaches and event organizers can make informed decisions about how to best utilize AI in the sports industry and events [18].

The use of artificial intelligence in the sports industry is still in its infancy, but its potential applications are endless. As it continues to develop, the sports industry and sporting events will continue to find new and innovative ways to use it. This article aims to explore the advantages and disadvantages of using AI in sports events

Methodology

This research employed a mixed research approach, specifically a sequential exploratory design where qualitative data was collected first followed by quantitative analysis. The data was collected in the field, and the study had two sections - qualitative and quantitative. In the qualitative section, 15 sports management experts were interviewed, which is considered sufficient for theoretical saturation according to scientific sources. The sampling for the qualitative section was purposeful and non-random.

For the quantitative section, the statistical population consisted of sports management elites, including members of the faculty of physical education of the Ministry of Science and country's sports managers and executive experts. A random-stratified sampling method was used to select the sample.

To analyze the data and identify the advantages and disadvantages of using artificial intelligence in sports events, the Delphi method was employed in three stages. The research instrument for the qualitative section was a semi-structured interview with an open-ended questionnaire. The experts were asked to express the most important advantages and disadvantages of using artificial intelligence in sports events. After summarizing, coding, and reaching theoretical saturation, the questionnaire yielded 45 indicators in 11

components for the advantages section and 12 indicators in 4 components for the disadvantages section, which were developed on a Likert scale.
The face and content validity of the questionnaire were confirmed by 15 experts, and its reliability was assessed in a preliminary study with 30 subjects, yielding a reliability score of 0.82. The data analysis was conducted using exploratory factor analysis in SPSS software.

Results

The value of KMO for identifying the advantages and disadvantages of using artificial intelligence in sports events was calculated to be 0.751, indicating that the data is suitable for factor analysis. Additionally, Bartlett's test yielded a value of 531.014, further supporting the suitability of the data for factor analysis.
In the inferential part of the study, exploratory factor analysis was conducted to identify the advantages and disadvantages of using artificial intelligence in sports events. Two separate exploratory factor analyses were performed, one for advantages and one for disadvantages, based on existing questionnaires.
First, the data was standardized, and then the analysis was conducted using the correlation method and varimax rotation. The results of the analysis revealed that four factors accounted for approximately 75.02% of the cumulative variance. The pattern of factor analysis is as follows.

$$X_1 - \mu_1 = \ell_{11} f_1 + \ell_{12} f_2 + \ldots \ell_{1m} f_m + \varepsilon_1$$
$$X_2 - \mu_2 = \ell_{21} f_1 + {}_{\ell X_1,\ldots,X_n 22} f_2 + \ldots \ell_{2m} f_m + \varepsilon_2$$
$$X_p - \mu_p = \ell_{p1} f_1 + \ell_{p2} f_2 + \ldots \ell_{pm} f_m + \varepsilon$$

An observable random vector X with p components has mean μ and covariance matrix ∑. In the factor model, it is assumed that X is linearly dependent on several unobservable random variables F1, F2, ...Fm, which are called common factors, and p is another source of variables ε1, ε2, ε3, ..., εp, which are errors or specific factors. Factor) are called.
The factor loadings and variance explained by the four factors, both without rotation and with rotation, are presented in (Table 1).

Table 1- Total variance and factor load explained by the factors

Components	factor load	Cumulative	Cumulative diffraction	Operating load with rotation	Diffraction by rotation	Cumulative diffraction with rotation
The first factor	6.803	32.884	32.884	6.803	32.884	32.884
The second factor	4.472	19.834	52.718	4.472	19.834	52.718
The third factor	3.350	13.601	66.319	3.350	13.601	66.319
The fourth factor	1.468	8.701	75.02	1.468	8.701	75.02

Table 2 displays the factor loadings for each question index in the formation of factors. Based on this table, the four factors are named as follows according to the factor loadings of each variable.
The first factor, referred to as the "judgment" factor, accounts for a significant portion of the cumulative variance at 32.884%. This high percentage highlights the importance of having this factor among the benefits of utilizing artificial intelligence in sports events.
The second factor, labeled as "attracting and hiring technical staff and players", contributes to 19.834% of the cumulative variance.
The third factor, known as "Information analysis and player performance", explains approximately 13.601% of the cumulative variance.
Lastly, the fourth factor is identified as "news agency" and represents about 8.701% of the cumulative variance (Table 2 and Figure 1).

Table 2- Factor loading on question items with varimax rotation

Factor	Indicator	factor load
arbitration	Making unbiased decisions and promoting fairness in competitions	0.99911
	Reducing human errors such as detecting line calls or player fouls	0.915661
	Intelligent assistance in arbitration	0.917284
	Intelligent sensors for diagnostics	0.977444
Recruiting and recruiting technical staff and players	Estimating the value of players and coaches based on their performance	0.838.58
	Measuring personal characteristics and abilities of players and coaches	0.992751
	Assessing club characteristics and factors contributing to price inflation	0.63453
	Predicting the abilities and performance of players and coaches	0.999671
	Tracking and analyzing factors such as player movement patterns and training levels	0.759043

Analysis of player information and performance	Monitoring heart rate, speed, muscle activity, running pace, sleep patterns, and diet of players	0.975523
	Diagnosing and predicting individual and team mistakes	0.61425
	Providing immediate feedback to players	0.971529
news agency	Delivering important game tips quickly	0.991738
	Updating games	0.938609
	Responding to fan inquiries	0.971529
	Sending game reports in various languages at any time	0.544583
	Comprehensive coverage of game reports	0.724233
	Utilizing virtual analysts, reporters, and presenters	0.62123
Sports programs (applications).	Creating fitness programs for each player	0.65336
	Developing diet plans for each player	0.81954
	Designing training programs for various sports disciplines	0.652913
Prediction of individual and team games	Recording the number of passes between teams	0.04614
	Building a cohesive team	0.6325414
	Tracking the number of goals scored and wins	0.94523
	Counting the number of chances created	0.61629
	Reviewing the history of games	0.54539
	Identifying key passes leading to goals in team ball games	0.617043
Ticket purchase	Using facial recognition for ticketless entry into stadiums	0.560295
	Reducing wait times in queues	0.621775
	Monitoring crowd density on stadium grounds and alerting players to overcrowded areas	0.717043
	Analyzing and predicting audience attendance	0.840688
	Predicting the presence time of financial sponsors to manage goods and food supply accordingly	0.60036
Coaching and assistant coaching	Acting as a training opponent using smart equipment	0.698016
	Making strategic substitutions	0.711145
	Analyzing team composition	0.545112
	Identifying weaknesses in opposing teams	0.519982
	Recognizing opponent techniques and tactics	0.989027
	Assigning appropriate positions based on player performance, e.g., one as a passer and the other as a shooter	0.822623
	Conducting talent searches	0.996506
Improving the game experience for fans and players	Utilizing a combination of virtual intelligence and virtual reality	0.61838
Reducing sports injuries and safety	Connecting GPS devices and providing necessary suggestions to players, coaches, and team doctors	0.747392
Sports business, sports teams	Predicting revenue generation from team and player activities	0.53541
	Brainstorming new sports business ideas	0.64406
	Brainstorming strategies to attract sponsors	0.74343
	Brainstorming ideas for developing new sports fields	0.83541

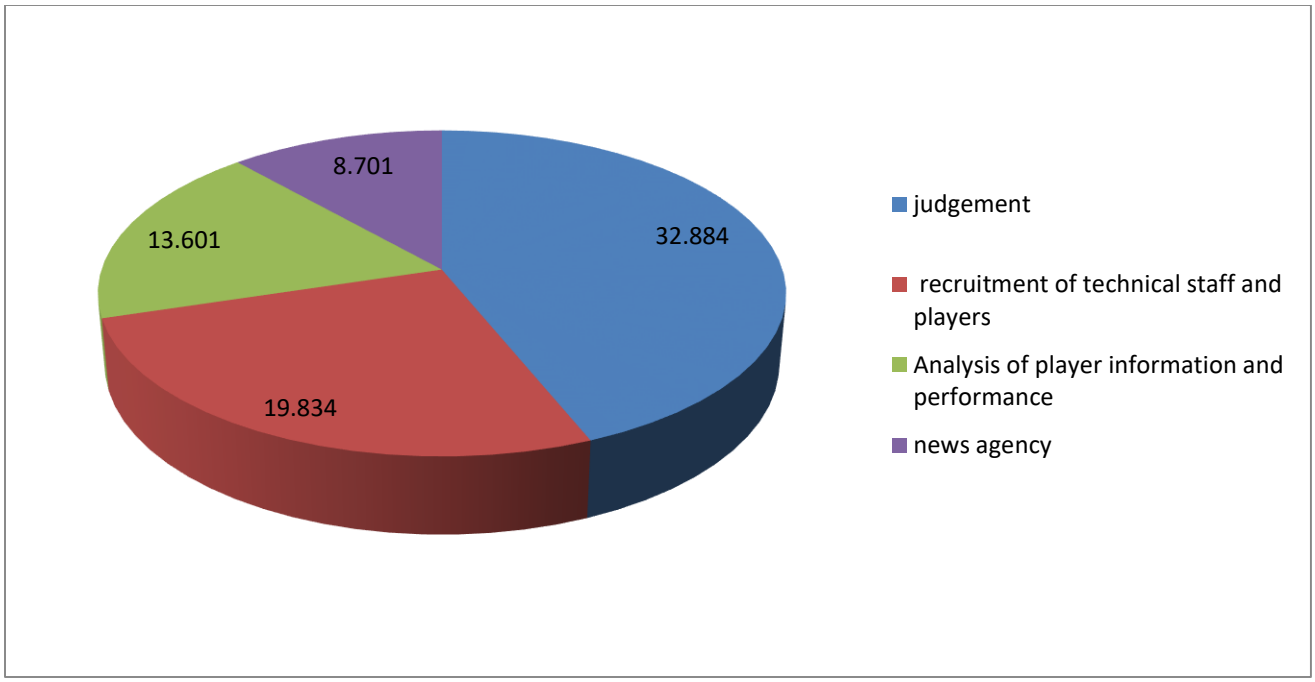

Figure 1 - Pie chart of the main factors of the benefits of artificial intelligence in sports events

The results of the exploratory factor analysis for the disadvantages were conducted using the correlation method and varimax rotation. The analysis revealed that three factors accounted for approximately 70.076% of the cumulative variance. The pattern of the factor analysis is as follows

$$X_1 - \mu_1 = \ell_{11} f_1 + \ell_{12} f_2 + \ldots \ell_{1m} f_m + \varepsilon_1$$

$$X_2 - \mu_2 = \ell_{21} f_1 + {}_{\ell X_1,\ldots,X_n 22} f_2 + \ldots \ell_{2m} f_m + \varepsilon_2$$

$$X_p - \mu_p = \ell_{p1} f_1 + \ell_{p2} f_2 + \ldots \ell_{pm} f_m + \varepsilon$$

In the factor model, it is assumed that an observable random vector X with p components has a mean μ and covariance matrix ∑. This vector X is linearly dependent on several unobservable random variables F1, F2, ...Fm, known as common factors, and p is another source of variables ε1, ε2, ε3, ..., εp, referred to as errors or specific factors. These factors are called factors.

Table 3 displays the factor load values and the variance explained by the four factors both with and without rotation

Table 3- Total variance and factor load explained by the factors

Components	factor load	Cumulative	Cumulative diffraction	Operating load with rotation	Diffraction by rotation	Cumulative diffraction with rotation
The first factor	7.601	40.352	40.352	7.601	40.352	32.884
The second factor	5.402	18.362	58.714	5.4.2	18.362	58.714
The third factor	2.601	11.362	70.076	2.601	11.362	70.076

Table 3 displays the factor load values and the variance explained by the four factors both with and without rotation.
Table 3 presents the factor loadings for each question indicator in the formation of factors. Based on this table, the three factors are named as follows according to the factor load of each variable.
The first factor is referred to as the "high cost" factor, which alone explains 40.352% of the cumulative variance. This indicates that this factor plays a significant role in the disadvantages of using artificial intelligence.
The second factor is known as the "lack of human interaction between coaches and athletes" factor, which accounts for 18.362% of the cumulative variance.
The third factor is the "dependence on artificial intelligence" factor, explaining approximately 11.362% of the cumulative variance (Table 4 and Figure 2).

Table 4-factor loadings on question items with varimax rotation

Factor	Indicator	factor load
High cost	Expensive technology to implement artificial intelligence solutions, including hardware, software, and infrastructure	0.825
	The high cost of hiring skilled professionals with expertise in artificial intelligence	0.948
	The costliness of training artificial intelligence algorithms	0.683
	Ongoing maintenance and updates for AI systems are expensive	0.674
	Smaller teams with limited budgets face a disadvantage compared to their competitors	0.876
	The gap between elite and amateur athletes widens, as only those with access to the latest technology can compete at the highest level	0.956
Dependence on artificial intelligence	Coaches and players rely on artificial intelligence, disregarding their own experience and insight	0.681
	Creativity and spontaneity of coaches and players are compromised	0.672
Removal of ethics and lack of human considerations	Artificial intelligence may be used without considering its impact on players or fans, resulting in unfair outcomes or even harm to individuals	0.965
	Job loss and economic challenges for human resources	0.655
Lack of human interaction between coaches and athletes	Decreased communication and lack of support from the coach for the players	0.825
	Diminished team performance and morale	0.784

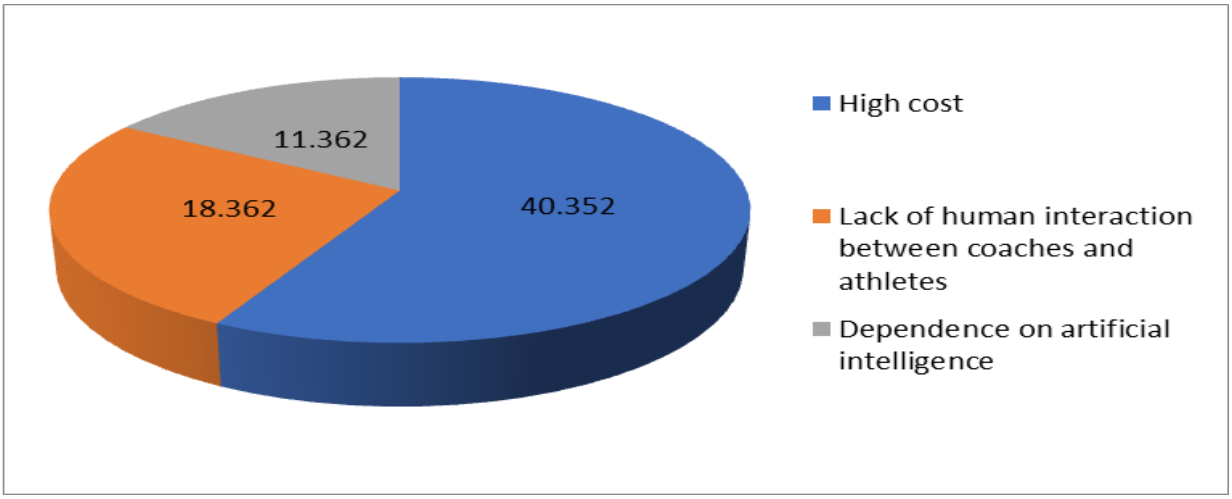

Figure 2- Pie chart of the main factors of disadvantages of artificial intelligence in sports events

Conclusion

Artificial Intelligence (AI) has become an increasingly popular tool in various industries, including sports coaching. The use of AI technology in sports coaching offers numerous advantages, such as the ability to analyze vast amounts of data quickly, develop more effective strategies, and monitor an athlete's progress over time. However, there are also potential disadvantages to employing AI in sports coaching. The purpose of this research was to investigate the advantages and disadvantages of using artificial intelligence in the sports events. Based on the research findings, the main advantages of using artificial intelligence in sports events were identified as refereeing, recruitment and selection of technical staff and players, analysis of player performance and information, and news agencies. On the other hand, the main disadvantages were found to be high cost, lack of human interaction between coaches and athletes, and dependence on artificial intelligence.

One significant advantage of using AI in sports events is the ability to analyze data quickly and efficiently. According to Baca and Winkelman (2019), AI can analyze data from various sources, such as video footage, sensors, and wearable devices, providing valuable insights into an athlete's performance. Coaches can use this information to identify areas for improvement and develop personalized training programs for athletes. AI technology can also help coaches to monitor an athlete's progress over time and adjust their training program accordingly.

Another advantage of employing AI in sports events is the ability to develop more effective strategies. Liu et al. (2019) suggest that AI technology can analyze data from previous games and predict the likely outcomes of future matches. This information can help coaches to develop game plans that are tailored to their team's strengths and weaknesses and those of their opponents. Additionally, AI can help coaches to identify patterns in their team's performance and adjust their strategies accordingly[38]. It is clear that coaches and players are looking for deeper insights to take their game to the next level, umpires/referees require assistance to make the right decisions in moments that matter, and the fans are demanding more personalized experiences and greater connectivity. AI provides an avenue to address all these demands. AI technologies are evolving fast and growing increasingly critical for a sporting organization's ability to win games; improve coaches and players; manage their operations; and grow, serve, and retain their fans. The imperative exists for sporting teams not to just adopt a singular AI technology but rather to have access to an arsenal of AI technologies that will improve their ability to generate and act on critical insights whether it's fan engagement, talent identification, pre -game preparation or in -game real -time facilitation. However, unless sporting organizations plan, deploy, and govern it correctly, new AI technology will provide meagre benefits at best or, at worst, result in unexpected and undesired outcomes. In the future, when we debate about the best players of all time, will we say they were good but they "knew" what to do

and when because they were instructed by the best machine at the time? It's already difficult to compare sporting teams and players from different eras, but this will become increasingly more difficult with AI in the mix… only time will tell.

The integration of AI in news agencies covering sports events offers numerous benefits, including enhanced efficiency, personalized content, and data-driven insights. However, it is crucial for news agencies to address ethical concerns, adapt their workforce, and maintain authenticity to fully leverage the potential of AI while preserving the essence of sports journalism. Striking the right balance between AI technology and human expertise will be key to providing comprehensive and engaging sports coverage in the future.

Despite the advantages of using AI in sports coaching, there are also potential disadvantages. One concern is the loss of human interaction between coaches and athletes. Liao et al. (2018) suggest that while AI technology can provide valuable insights into an athlete's performance, it cannot replace the personal touch of a coach. AI can provide data-driven insights and recommendations, but it cannot replace the personal touch and communication that comes from a coach-athlete relationship. Coaches provide emotional support, motivation, and guidance that cannot be replicated by AI. Without this human interaction, athletes may feel disconnected and unsupported, leading to a decline in performance and morale. It is important to strike a balance between the use of AI and the human element of coaching to ensure the best possible outcomes for athletes. Coaches should use AI as a tool to enhance their coaching abilities, not as a replacement for their expertise and experience. Coaches play an essential role in motivating and inspiring their athletes, which cannot be replicated by AI.

There is also a concern that athletes may become too reliant on AI technology, leading to a loss of creativity and spontaneity on the field. The use of AI in sports events can also lead to a loss of creativity and spontaneity among coaches and players. AI systems are designed to analyze data and make predictions based on statistical patterns, which can limit the ability of coaches and players to make decisions based on intuition and creativity. or example, if an AI system is used to analyze player performance data and provide recommendations for game strategy, coaches may rely too heavily on these recommendations and overlook their own insights and experience. This can result in a lack of innovation and creativity in game strategy, as coaches may become overly reliant on AI-generated recommendations. Similarly, if players are given AI-generated training programs, they may become too focused on meeting specific performance metrics rather than developing their own unique skills and abilities. This can lead to a loss of spontaneity and creativity on the field, as players may feel pressure to conform to predetermined patterns of play rather than taking risks and trying new approaches. Overall, while AI can provide valuable insights and recommendations in sports events, it is important to balance these with the creativity and intuition of coaches and players to ensure a dynamic and engaging experience for fans.

Another potential disadvantage of employing AI in sports events is the cost. Baca and Winkelman (2019) suggest that AI technology can be expensive, and not all teams may have the resources to invest in it. Smaller teams or those with limited budgets may not be able to afford the latest AI technology, putting them at a disadvantage compared to their competitors. Additionally, there is a concern that the use of AI in sports coaching may lead to a widening gap between elite and amateur athletes, with only those with access to the latest technology being able to compete at the highest level. Also, use of AI in events can be costly due to several factors. Firstly, the technology required to implement AI solutions can be expensive, including hardware, software, and infrastructure. Additionally, hiring skilled professionals with expertise in AI can also be expensive, as there is a high demand for these individuals in various industries. Furthermore, the data required to train AI algorithms can also be costly. Collecting and processing large amounts of data, such as fan behavior and preferences, can require significant resources and investment. Additionally, there may be legal and ethical considerations when collecting and using personal data, which can add to the cost of implementing AI solutions. Finally, the ongoing maintenance and updates required for AI systems can also be costly. As technology continues to evolve rapidly, it is essential to keep AI systems up-to-date to ensure they remain effective and relevant. This requires ongoing investment in research and development, as well as regular upgrades to hardware and software.

The use of AI in sports events can lead to a removal of ethics and a lack of human considerations if not implemented responsibly. For example, if AI is used to make decisions without considering the impact on

players or fans, it could lead to unfair outcomes or even injury. Additionally, if AI is used to replace human Resources without proper consideration for their well-being, it could lead to job loss and economic hardship. It is important to ensure that AI is used in a way that prioritizes the well-being of all stakeholders involved, including players, fans, and coaches. This requires careful consideration of ethical implications and a commitment to upholding human values and dignity.

In conclusion, while AI technology offers numerous advantages in sports coaching, it is essential for coaches and teams to weigh the advantages and disadvantages carefully. With careful consideration and implementation, AI technology can be a valuable tool for enhancing the performance of athletes. However, coaches must ensure that they maintain human interaction with their athletes and avoid over-reliance on AI technology. Additionally, teams must consider the cost of implementing AI technology and its potential impact on the competitiveness of different levels of athletes.

AI is transforming the world of sports, from player performance optimization to fan engagement and safety. The growing adoption of AI and machine learning in the sports industry is expected to drive the global sports analytics market to reach $4.6 billion by 2025. While there are some potential drawbacks to consider, the benefits of AI in sports are numerous. As technology continues to evolve, we can expect to see even more innovative applications of AI in sports that will enhance the fan experience and improve player performance and safety.

Acknowledgements

We gratefully acknowledge all those who helped us in conducting this research.. None of the authors declare any conflicts of interest.

Corresponding Author: Fahime Momenifar Assistant Professor, Department of Sports Management, Payame Noor University, Tehran, Iran. Email: F.momeni@pnu.ac.ir, ORCID: 0000-0002-5074-5655

References

1.McGrath, M.J., et al., Wellness, fitness, and lifestyle sensing applications. Sensor technologies: healthcare, wellness, and environmental applications, 2013: p. 217-248.

2.Schmidt, S.L., 21st Century Sports. 2020: Springer.

3.Ratten, V., Sport technology: A commentary. The Journal of High Technology Management Research, 2020. 31(1): p. 100383.

4.Shehadeh, M.A., et al. Hybrid teams of industry 4.0: A work place considering robots as key players. in 2017 IEEE International Conference on Systems, Man, and Cybernetics (SMC). 2017. IEEE.

5.Tegmark, M., Life 3.0: Being human in the age of artificial intelligence. 2018: Vintage.

6.Kos, A., et al., The role of science and technology in sport. Procedia Computer Science, 2018. 129: p. 489-495.

7.Tang, Y., S. Zan, and X. Zhang, Research on system construction and strategy of intelligent sports in the implementation of national fitness. Computational Intelligence and Neuroscience, 2022. 2022.

8.Loland, S., The ethics of performance-enhancing technology in sport. Journal of the Philosophy of Sport, 2009. 36(2): p. 152-161.

9.Nor, N., M. Sunar, and A. Kapi, A review of gamification in virtual reality (VR) sport. EAI Endorsed Transactions on Creative Technologies, 2019. 6(21).
10.Flegr, S. and S.L. Schmidt, Strategic management in eSports–a systematic review of the literature. Sport Management Review, 2022. 25(4): p. 631-655.
11.Grün, T.v.d., et al., A real-time tracking system for football match and training analysis. Microelectronic Systems: Circuits, Systems and Applications, 2011: p. 199-212.
12.Bideau, B., et al., Virtual reality, a serious game for understanding behavior and training players in sport. IEEE Computer Graphics and Applications, 2009.
13.Rogers, E.M., Diffusion of innovations. 2010: Simon and Schuster.
14.Stefani, R., Olympic swimming gold: The suit or the swimmer in the suit? Significance, 2012. 9(2): p. 13-17.
15.Beiderbeck, D., et al., The impact of COVID-19 on the European football ecosystem–A Delphi-based scenario analysis. Technological Forecasting and Social Change, 2021. 165: p. 120577.
16.Kolbinger, O. and M. Lames, Scientific approaches to technological officiating aids in game sports. Current Issues in Sport Science (CISS), 2017.
17.Tamir, I. and M. Bar-Eli, The moral gatekeeper: Soccer and technology, the case of Video Assistant Referee (VAR). Frontiers in psychology, 2021. 11: p. 613469.
18.Vannatta, S., Phenomenology and the Question of Instant Replay: A Crisis of the Sciences? Sport, Ethics and Philosophy, 2011. 5(3): p. 331-342.
19.Hassabis, D., Artificial intelligence: chess match of the century. 2017, Nature Publishing Group UK London.
20.Heath, D., D. Allum, and P. Square, The Historical Development of Computer Chess and its Impact on Artificial Intelligence. Deep Blue Versus Kasparov: The Significance for Artificial Intelligence, 1997. 63.
21.Ratten, V., Sports innovation management. 2017: Routledge.
22.Rajšp, A. and I. Fister Jr, A systematic literature review of intelligent data analysis methods for smart sport training. Applied Sciences, 2020. 10(9): p. 3013.
23.Simim, M.A., et al., Load monitoring variables in training and competition situations: A systematic review applied to wheelchair sports. Adapted physical activity quarterly, 2017. 34(4): p. 466-483.
24.Tjønndal, A., Sport, innovation and strategic management: A systematic literature review. Brazilian Business Review, 2016. 13(Special Ed): p. 38-56.
25.Alqahtani, S., et al., Stakeholder perspectives on research and development priorities for mobility assistive-technology: a literature review. Disability and Rehabilitation: Assistive Technology, 2021. 16(4): p. 362-376.
26.Duvall, J., et al., A review of adaptive sport opportunities for power wheelchair users. Disability and Rehabilitation: Assistive Technology, 2021. 16(4): p. 407-413.
27.Jenny, S.E., et al., The effectiveness of developing motor skills through motion-based video gaming: A review. Simulation & Gaming, 2017. 48(6): p. 722-734.
28.Van der Kruk, E. and M.M. Reijne, Accuracy of human motion capture systems for sport applications; state-of-the-art review. European journal of sport science, 2018. 18(6): p. 806-819.
29.Taborri, J., et al., Sport biomechanics applications using inertial, force, and EMG sensors: A literature overview. Applied bionics and biomechanics, 2020. 2020.
30.Aroganam, G., N. Manivannan, and D. Harrison, Review on wearable technology sensors used in consumer sport applications. Sensors, 2019. 19(9): p. 1983.
31.Mencarini, E., et al., Designing wearable systems for sports: a review of trends and opportunities in human–computer interaction. IEEE Transactions on Human-Machine Systems, 2019. 49(4): p. 314-325.
32.Cust, E.E., et al., Machine and deep learning for sport-specific movement recognition: A systematic review of model development and performance. Journal of sports sciences, 2019. 37(5): p. 568-600.
33.Owen, N., H. King, and M. Lamb, Literature review of race driver fatigue measurement in endurance motorsport. Procedia Engineering, 2015. 112: p. 344-348.

34.Mataruna-Dos-Santos, L.J., et al. Big Data Analyses and New Technology Applications in Sport Management, an Overview. in Proceedings of the 2020 International Conference on Big Data in Management. 2020.
35.Manoharan, V., et al., Application of additive manufacturing techniques in sports footwear: This paper suggests a five-point scoring technique to evaluate the performance of four AM techniques, namely, stereolithography (SLA), PolyJet (PJ), selective laser sintering (SLS) and three-dimensional printing (3DP), in four important aspects of accuracy, surface finish, range of materials supported and building time for prototyping sports footwear. Virtual and Physical Prototyping, 2013. 8(4): p. 249-252.
36.Straw, C.M., et al., A review of turfgrass sports field variability and its implications on athlete–surface interactions. Agronomy Journal, 2020. 112(4): p. 2401-2417.
37.Winters, K.C. and J.L. Derevensky, A review of sports wagering: prevalence, characteristics of sports bettors, and association with problem gambling. Journal of Gambling Issues, 2019. 43.
38.Lu, Y., Artificial intelligence: a survey on evolution, models, applications and future trends. Journal of Management Analytics, 2019. 6(1): p. 1-29.

نشریه فناوری ورزشی پیشرفته
DOI: 10.22098/jast.2024.13311.1296
تاریخ دریافت: ۱۴۰۲/۰۴/۲۳ تاریخ پذیرش: ۱۴۰۳/۲/۳۰
Journal of Advanced Sport Technology
«مقاله مرور ادبیات»

مزایا و معایب هوش مصنوعی در رویدادهای ورزشی

علی کریمی[۳] فهیمه مومنی فر*[۱]، فاتح فرازیانی[۲]
۱،۲،۳. استادیار گروه مدیریت ورزشی دانشگاه پیام نور، تهران، ایران
نویسنده مسئول: فهیمه مومنی فر F.momeni@pnu.ac.ir

زمینه : هدف از این تحقیق، شناسایی مزایا و معایب پیاده‌سازی هوش مصنوعی در رویدادهای ورزشی بود.

روش شناسی: این تحقیق یک طرح تحقیقاتی ترکیبی، با رویکرد اکتشافی متوالی می باشد، داده‌های این مطالعه به صورت میدانی جمع‌آوری شد. جامعه آماری این مطالعه شامل دو بخش کیفی و کمی بود. در بخش کیفی، با ۱۵ نفر از متخصصان مدیریت ورزشی مصاحبه شد. در بخش کمی، جامعه آماری شامل نخبگان مدیریت ورزشی، مانند اعضای هیئت علمی دانشگاه‌های تربیت بدنی وزارت علوم و همچنین مدیران و کارشناسان اجرایی در صنعت ورزش کشور بود. نمونه ها با استفاده از روش نمونه‌گیری تصادفی-طبقه‌ای انتخاب شد. برای تجزیه و تحلیل داده‌ها و تعیین مزایا و معایب استفاده از هوش مصنوعی در رویدادهای ورزشی، از روش دلفی در سه مرحله استفاده شد. نتیجه این فرآیند، پرسشنامه‌ای متشکل از ۴۵ شاخص در ۱۱ مؤلفه برای بخش مزایا و ۱۲ شاخص در ۴ مؤلفه برای بخش معایب بود. پرسشنامه با استفاده از مقیاس لیکرت تدوین شد. روایی صوری و محتوایی پرسشنامه توسط ۱۵ متخصص تأیید شد و پایایی آن در یک مطالعه مقدماتی با حضور ۳۰ شرکت‌کننده ارزیابی شد که مقدار ۰,۸۲ را نشان داد. علاوه بر این، تحلیل عاملی اکتشافی با استفاده از نرم‌افزار SPSS برای تجزیه و تحلیل داده‌ها انجام شد.

یافته ها : بر اساس یافته‌های تحقیق، مزایای اصلی استفاده از هوش مصنوعی در رویدادهای ورزشی شامل داوری، استخدام و انتخاب کادر فنی و بازیکنان، تجزیه و تحلیل عملکرد و اطلاعات بازیکنان و خبرگزاری‌ها شناسایی شد. از سوی دیگر، معایب اصلی آن شامل هزینه بالا، عدم تعامل انسانی بین مربیان و ورزشکاران و وابستگی به هوش مصنوعی بود.

نتیجه‌گیری :هوش مصنوعی می‌تواند به‌طور قابل‌توجهی کارایی و کیفیت رویدادهای ورزشی را، به‌ویژه در داوری، استعدادیابی و تحلیل عملکرد، ارتقا دهد. با این حال، چالش‌هایی مانند هزینه بالای پیاده‌سازی، کاهش تعاملات انسانی و وابستگی بیش از حد به هوش مصنوعی باید مورد توجه قرار گیرد. به‌کارگیری متعادل هوش مصنوعی در کنار تخصص انسانی، کلید بهره‌مندی حداکثری از مزایای آن است.

واژگان کلیدی: هوش مصنوعی، رویدادهای ورزشی، متخصصان مدیریت ورزشی.