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RESEARCH ARTICLE

The Sports Field from an Artificial Intelligence Perspective

Khaled Baouche[1], Saber Benaissa[2], Abderrahmen Tahchi[3], Fatah Guezgouz[4], Amine Saidi[5], El-Hocine Guerroumi[6]

[1] University of Bouira, Laboratory of Modern Sciences in Physical and Sports Activities (Algeria),
E-mail: k.baouche@univ-bouira.dz
[2] University of Biskra, Laboratory of Studies and Research in the Sciences and Techniques of Physical and Sports Activities (Algeria), E-mail: Saber.benaissa@univ-biskra.dz

[3] University of Constantine 2, Laboratory for the Analysis of Social and Institutional Processes (Algeria), E-mail: abderrahmen.tahchi@univ-constantine2.dz
[4] University of Bouira, Laboratory of Modern Sciences in Physical and Sports Activities (Algeria),
E-mail: f.guezgouz@univ-bouira.dz
[5] University of Bouira, Laboratory of Modern Sciences in Physical and Sports Activities (Algeria),
E-mail: a.saidi@univ-bouira.dz
[6] University of Bouira, Laboratory of Modern Sciences in Physical and Sports Activities (Algeria),
E-mail: e.guerroumi@univ-bouira.dz

Abstract:

Anyone who follows current sporting events knows that artificial intelligence (AI) has revolutionised the world of sports, impacting everything from athletic performance and injury prevention to refereeing, tournament organisation and management, and much more. This article explores AI by examining its emergence, definition, and benefits in the sports field. It then provides examples of AI applications in sports, including practical experiences in both team and individual sports.
Keywords: Sports Field; Artificial Intelligence; Technological Applications.

Introduction

Artificial intelligence has driven technological transformation across various fields, particularly in sports. Sports surpassed the fact of competing between players on the field, and becoming an arena where human skills and modern technology converge. AI has proven its worth as a tool for discovering new talent, enhancing performance, and improving injury prevention strategies. Furthermore, it equips coaches, managers, and players with the tools to make smarter, more practical decisions in areas that were previously difficult (Antar, 2025).

Currently, sports teams are scouting emerging talent, monitoring player performance, predicting injuries, and proactively implementing preventative measures, directly impacting all aspects of the game (Jacobs, 2024). For example, coaches can analyze video content and sensor readings to program training that leverages each player's and the team's strengths (Brefeld et al., 2022). Artificial intelligence and machine learning also facilitate performance analysis through intelligent sports training methods that incorporate Internet of Things algorithms to optimize training systems (Rajšp & Fister, 2020).

This is what has given artificial intelligence a superior ability to revolutionize sports and to become an essential element in sports competition.
Based on the above, this article addresses:
- The emergence of artificial intelligence.
- The definition of artificial intelligence.
- The benefits of artificial intelligence in the sports field.

- Examples of artificial intelligence applications in the sports field.
- Practical experiences in team and individual sports.

1. The Emergence of Artificial Intelligence:

In 1947, Alan Turing's lecture on computer programming catalyzed research into artificial intelligence (AI). That possesses the capability to address challenges across diverse fields. Its integration has progressively facilitated advancements. Notably, interest and funding surged in 2012, accompanied by an enhanced comprehension of the technology. By 2020, substantial advancements had been realized in this discipline. The proliferation of AI in the 21st century correlates with societal and economic transformations, reflecting an increasing amalgamation of data and AI systems in various life sectors, influencing health, governmental aims, industry, and education. This endeavor aligns with the Sustainable Development Goals pursued by nations globally (Ali, 2025).

2. Definition of Artificial Intelligence:

Arnous (2007, as cited in Layadi & Asheb, 2021, p. 91) sees it as a branch of computer science that deals with intelligent systems exhibiting characteristics of intelligence and decision-making, similar to human behavior in this field, including language, learning, thinking, problem-solving, etc.

3. Benefits of artificial intelligence in the sports field:

According to Jacobs (2024) and Antar (2025), the benefits of artificial intelligence include:

* Talent Discovery: Talent is objectively identified through the analysis of key performance indicators (KPIs) and statistical models that assess the potential of future athletes. Sports clubs no longer rely only on scouts; they now utilize massive amounts of data from recordings and videos to estimate the chances of success for any interested player.

* Analyzing Athlete Performance and Game Strategies: Artificial intelligence is linked to technological outlets and wearable devices to monitor player movements, distances covered, and heart rate, providing crucial information for the game. This information enables coaches and managers to make effective strategic decisions. In the NFL, approximately 250 sensors are used in each game, collecting around 200 data points. This helps predict game strategy and the league's overall competitiveness.

Since speed and accuracy in decision-making can make the difference between victory and defeat, artificial intelligence (AI) has been used in tactical decision-making and game strategy development. This involves evaluating team formations, identifying weaknesses in the opponent's defensive formations, dynamically adjusting game strategies, and responding to the evolving nature of the game. AI systems process massive amounts of data in real time, reducing the time required to process footage and providing coaches with actionable insights during matches, thus surpassing traditional methods of accurately tracking and measuring athletic performance.

Furthermore, AI models that undergo intensive learning have demonstrated superior accuracy in predicting player performance compared to traditional methods that typically rely on static datasets. Techniques such as time series analysis and regression have been replaced by more robust deep learning methods, improving the reliability of performance predictions (Zhou, 2022). For example, in football, AI combines statistical learning and game theory to analyze player behavior, optimize team strategies, and provide insights that can significantly impact match outcomes (Tuyls et al., 2021).

The use of big data can facilitate critical decision-making, innovative planning, assembling the best possible team with available players, and increasing competitiveness across all sports (Kaur et al., 2017). In basketball, several studies have shown that artificial intelligence can improve player training, help coaches develop appropriate playing strategies, prevent sports injuries, and enhance game enjoyment (Li & Xu, 2021).

* **Training and Recovery Programs:** Many sports companies use artificial intelligence (AI) to provide customized training, nutrition, and recovery programs for athletes. Each athlete has a specific role within the team; therefore, it is essential to prioritize each athlete's well-being to ensure optimal performance without overtraining-related injuries.

* **Predicting and Preventing Sports Injuries:** AI is making significant progress in predicting sports injuries. Systems can predict potential injuries by analyzing vital and physiological data beyond human capabilities. These systems also generate early warnings of fatigue and stress-related injuries by analyzing data, sleep patterns, and recovery times. Through machine learning models, AI can identify subtle patterns that may indicate susceptibility to injury. Wearable sensors also monitor subtle changes in athletes' movement, which often precede injury (Antar, 2025; Seshadri et al., 2021), enabling teams to manage player health proactively (Brefeld et al., 2022).

4. Examples of AI Applications in Sports:

* **Zone7:** This technology provides daily injury predictions, enabling athletes to achieve their goals while minimizing the risk of injury (Antar, 2025).

* **SAP Sports One:** The 2014 World Cup, won by Germany, was a prime example of the use of big data analytics. The German Football Association (DFB) collaborated with the software company SAP, which developed the Match Insights application. This application allowed coaches to filter video recordings of players' performances in specific situations and analyze their match data. This was complemented by a mobile application called SAP Team One, which allowed players and coaches to share videos, photos, and tactics, as well as communicate internally. After the World Cup, SAP marketed this software under the name SAP Sports One and sold it to football clubs (Layadi & Asheb, 2021, pp. 97-98).

* **PozeAR®:** This is an AI technology from Meta that uses augmented reality training for martial arts. Computer vision, or AI-enhanced visual capture, can track movement data. This training allows athletes to learn from professionals and train virtually, enabling them to face highly skilled opponents, even if they are in other parts of the country or the world (Jacobs, 2024).

* **Catapult STATSports:** An example of this is football, where wearable devices are used to monitor players' physical output during matches and combine the data with video analysis to provide comprehensive tactical insights (Antar, 2025).

* **Player Tek Shirts:** The Australian company Catapult developed a device called "Player Tek," worn on players' shirts to monitor their physical fitness. This lightweight device does not affect athletic performance during training or matches. Using GPS technology, the device measures a player's fitness level by calculating distance traveled, maximum speed reached, and the number of times it was reached. It also measures heart rate and exertion, allowing the fitness coach to assess each player's individual fitness. The device also records the player's position and the number of times they stop during training or matches, and displays a heat map of their movements (Layadi & Asheb, 2021, p. 98).

* **Hudl and Pro Football Focus Hudl:** AI platforms are essential tools for coaches and analysts in evaluating selection probabilities (Antar, 2025).

* **Riddell InSite Smart® technology:** This AI-powered equipment enables the transmission of data related to the impact of an athlete's helmet on their head. AI and machine learning algorithms can then be used to determine when and how a player should perform non-contact drills or exercises, thereby enhancing player safety (Jacobs, 2024).

* **Goal Line Technology (GLT) and VAR:** AI has contributed to the development of sports facilities by providing goal-line technology and VAR technology, which offer additional support to referees (Layadi & Asheb, 2021, p. 101).

5. Practical experiences in team and individual sports:

* **In the field of soccer:** The Norwegian first division club Hamarkameratene, colloquially referred to as "HamKam," undertook an

experimental initiative that local media outlets characterized as improbable. During a friendly encounter, they implemented a virtual coach (artificial intelligence), which adopted a 4-5-1 tactical formation. This strategy initially proved advantageous for HamKam, who swiftly gained the upper hand through a successfully converted penalty kick. Nevertheless, the circumstances quickly unraveled when the artificial intelligence executed dubious tactics, instructing the players to engage in a collective pursuit of the ball, consequently facilitating a rapid equalization by the opposing squad. Subsequently, the virtual coach mandated a 1-0-9 formation for its team and directed the goalkeeper to execute throw-ins, asserting that he possessed the most extensive reach among the players. In the end, the artificial intelligence experienced a significant defeat, concluding the match at 6-1. The Norwegian club regarded this undertaking merely as an experiment conducted by its sponsor, Eidsiva, a technology and energy firm that deployed its advanced technology to develop the virtual coach. Martin Hof Pedersen, a senior communications consultant at Eidsiva, remarked: "This initiative illustrates that technology in isolation is insufficient, particularly in a critical role where the human element is paramount. It is now appropriate for the human manager to reclaim a central position." While artificial intelligence has begun to supplant human employment across numerous sectors, in the realm of football, it unequivocally underscores the necessity of the human touch in the beautiful game ("A crazy experiment... A Norwegian team hires an AI coach", 2025).

* In the field of swimming: In 2020, a project was launched in Wiesbaden aimed at providing rescue services in swimming pools using artificial intelligence to provide a safe environment. This is done by monitoring the movements of abnormal swimmers, which are recorded by four cameras equipped with smart sensors. The cameras analyze these movements and alert lifeguards to a problem by sounding a whistle on their smartwatches and displaying three or more images on a screen attached to the ceiling of the covered swimming pools, enabling lifeguards to save swimmers in danger and enhancing safety and security for swimmers (Naja, 2025, pp. 95-96).

Conclusion

In conclusion, the use of artificial intelligence in the sports field is increasingly geared towards enhancing player and coach performance through advanced analytics and predictive modeling. The integration of human effort and artificial intelligence enables more informed decisions in talent identification, training, athletic performance improvement, and injury prevention. While the integration of artificial intelligence in sports offers significant potential, its overuse could undermine the role of the human element, which is characterized by its experience and creative touch.

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