LEGAL AND ETHICAL CONSIDERATIONS OF ARTIFICIAL INTELLIGENCE IN SPORTS

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Abstract

Sport era is a tool made and used by people to carry out their sporting aspirations and ideas. Athletic equipment, academic materials, and biomedical era have all changed as a result of the development of sports technology, endangering game fairness. Though artificial intelligence (AI) has only recently entered the world of sports, it has already had a sizable impact. It is expected that AI will play a pivotal part in influencing changes in sports in the years to come. As seen in training and refereeing, the slow eradication of humans in favor of high-tech systems and artificial intelligence (AI) is already happening in recreation. There exist a multitude of advantages AI can offer to game enterprise like extra high quality education, monitoring for doping, damage prevention, and so forth. However, there are dangers related to using AI in sports activities sports. The two which can be most urgent are probably the manipulation of athletes and opposition. AI offers a variety of blessings to recreation, which includes education improvement, training with help, tracking for doping, and damage prevention, among different matters. However, there are risks associated with applying AI to sports activities. The most pressing might be the manipulation of athletes and opposition. The goal of this essay is to identify different AI applications in sport and put forth a legal and ethical framework facilitates appropriate utilization of artificial intelligence (AI) in the realm of sports.

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Introduction

Sports can be categorised in line with the type, intensity, reputation, monetary value and the governing federation. Sports have evolved significantly over the years from being a simple source of pride, pastime and entertainment into an exceedingly commercialized and lucrative enterprise.[1] Artificial intelligence (AI)[2] is commonly used in the context of technology to describe machines that possess "cognitive capabilities," which refers to a person's intellectual abilities related to acquiring knowledge and solving problems. During a conference in 1955 at Dartmouth College, John McCarthy, who is widely regarded as the founder of AI, introduced the term "artificial intelligence." The event was facilitated by a group of leading experts in the burgeoning field of AI.[3] From 1955, there has been a notable sense of positivity towards AI, however, it is undeniably true that the industry has also undergone difficult times marked by melancholy, remorse and financial setbacks, commonly referred to as an "AI.Winter". However, Alpha Go (a computer program that simulates a board game move) was developed in 2015.[4] It evolved using deep learning technology and was subsequently discovered by Google. When Alpha Move (which employs a Monte Carlo tree to search for information and bases its decisions entirely on data or information previously obtained through a synthetic impartial community through extensive training from both human and computer play) successfully defeated an experienced move player, Artificial Intelligence once again attracted intense and tremendous amounts of attention on a global scale.[5] (AI) research is concerned with a set of objectives, commonly referred to as the standard issues or goals, which encompass facets such as information representation, cognitive processes relating to thinking and knowing, strategic planning, natural language processing, conceptual understanding, and the manipulation of objects through motor skills. The concept of General Intelligence pertains to the overarching objectives that are pursued over an extended period of time. Artificial Intelligence ((AI)) can leverage a diverse toolbox encompassing manifold types of artificial neural networks, search

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[1] Emmanuel OluwafemiOlowononi, *Sports Law & Practice* (Princeton & Associates 2022) 3
[2] Hereinafter referred to as A.I.
[3] Kaushiki Mishra, ShipraNayal and AmitSrivastava, 'Scope of Artificial Intelligence in Sports' (2022) (3)(4) *International Journal of Research Publication and Reviews;* 2344
[4] *ibid*
[5] *ibid*

algorithms, mathematical optimization techniques, and probabilistic, data-driven, and economic-based methodologies. Artificial intelligence is required in numerous diverse areas, counting data designing, math, pc innovation, logic, etymology, and an extraordinary numerous others.[6] Algorithms are frequently used in AI (a set of rules is a predetermined set of instructions that a computer device executes). AI has been employed in various fields, such as self-driving vehicles and drones, clinical diagnosis, artistic creation, strategic board games such as chess, mathematical theorem proofs, search engines such as Google, spam filtering, digital assistants like Siri, forecast of flight delays, hypothesis of court rulings, online advertising, and energy conservation.[7]

AI works in four basic ways, providing:

- i. Automated intelligence
- ii. Assisted intelligence
- iii. Augmented intelligence
- iv. Autonomous intelligence

AI can perform automated tasks, help do things better and more quickly, assist with better decisions and ultimately, automate decision-making processes that can be done entirely without people. Essentially, AI technologies mimic humans' ability to Sense, Think and Act.[8]

The idea of artificial intelligence is positively affecting sports and elevating it to a new success level. Measurements and quantitative research have been proven true by the facts. They have held a prominent position in sports for a long time. AI basically has an impact on how games are organized, conducted, and crowd-sourced. This pattern is prevalent throughout baseball, as well as sports like basketball, tennis, football, and many others.[9] AI has entered the storage space with better information about the opposition, mentor recommendation with better models and your

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[6]*ibid*

[7]*ibid*

[8] 'Artificial Intelligence: Application to the Sports Industry' <https://www.pwc.com.au/industry/sports/artificial-intelligence-application-to-the-sports-industry.pdf> accessed 5 January, 2023 at 3:21pm

[9] Rahul Reddy Nadikattu, 'Implementation of New Ways of Artificial Intelligence in Sports' <https://www.researchgate.net/publication/341741455_IMPLEMENTATION_OF_NEW_WAYS_OF_ARTIFICIAL_INTELLIGENCE_IN_SPORTS/link/5ed15f9645851529451bbcb9/download> accessed 10 January, 2023.

TV screens with faster functions.[10] Everybody now has a better opportunity to win at sports thanks to artificial intelligence from athletes to telecasters, with constant game insights for players and fans, game strategies forecast to empower the player to pick the correct course of action and even alarm the player if there is an occurrence of a potential decrease in execution or injury. Technology has become inescapable in sports and a vital contributor to its growth both inside the arena and enabling each player and group to perform at their absolute peak outside.Umpires/officials anticipate offering assistance to help players and coaches make the best decisions in crucial moments, while fans ask for more specialized experiences and more widespread availability to take their fan base to the next level. Each of these requests can be met thanks to artificial intelligence. Computer-based intelligence advancements are advancing quickly and becoming more and more important for a dressing association's ability to win games, develop coaches and players, handle their tasks, and develop, serve, and retain fans. A. I. has improved accuracy in sports because it is simple to predict results, player movements, and fan behavior by way of A. I.[11]

What is A.I?

Artificial Intelligence (AI) has been advancing since the latter part of the 20th century. A diverse range of components, tools, and technological apparatus are encompassed. The notion that (AI) encompasses a vast and expansive scope may be posited. The definition presented by the European Commission is given due consideration:

> Artificial intelligence (AI) is the term used to describe systems that exhibit intelligent behavior by analyzing their surroundings and acting in some autonomy in order to accomplish predetermined goals. AI-based systems can be entirely software-based and operate only in virtual environments (e.g. voice assistants, image analysis software, search

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[10]F. Magera, & J. Vounckx, *Artificial Intelligence for the Automation of Robotic Cameras in Live Sports* (Society of Motion Pictures and Engineers, 2018)

[11]AakashPorwal, 'Artificial Intelligence Impact on the Future of Sports' <https://www.linkedin.com/pulse/artificial-intelligence-impact-future-sports-aakash-porwal> accessed 10 January, 2023.

engines, speech and face recognition systems) or AI can be embedded in hardware devices (e.g. advanced robots, self-driving vehicles, drones, or Internet of Things software).[12]

The term "AI" is vague, which can result in a few genuine errors. Recognizing at slightest between AI as independent frameworks and AI within the shape of machine learning is pivotal to avoiding this.[13] In its broadest sense, manufactured insights (AI) ordinarily alludes to the creation of machine learning, manufactured neural systems, information handling, and investigation frameworks. In other words, counterfeit intelligence-imitated frameworks carry out human-like errands, but more rapidly and successfully. As we have as of now seen, AI machine learning frameworks are regularly utilized in sports.[14]

A sophisticated selection of robotics and high-tech systems are already available thanks to the growing popularity of mechatronics, a multidisciplinary field that combines several types of engineering, especially robotics and electromechanical engineering.[15] This is the technology behind the robots used at the Tokyo Olympics to welcome competitors, transport them around Olympic venues, and other things. The worldwide robot soccer players known as Robocop, whose creators have stated the following as the initiative's ultimate goal, are also supported by this high-tech system:

> By the mid-point of the twenty-first century, it is anticipated that a group of fully self-directed humanoid robots, engaged in the sport of soccer, will achieve victory over the World Cup championship team in a game adhering to the official regulations of FIFA.[16]

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[12] Communication from the Commission to the European Parliament, the European Council, the Council, the European Economic and Social Committee and the Committee of the Regions on Artificial Intelligence for Europe, Brussels, 25.4.2018 COM(2018) 237 final

[13] European Group on Ethics in Science and New Technologies 'Statment on Artificial Intelligence, Robotics and Autonomous systems' (2018) p.6 <https://ec.europa.eu/research/ege/pdf/ege_ai_statement_2018.pdf.> accessed 10 January, 2023.

[14] Alberto CarrioSampedro, 'The case of AI in Sport: Some Ethical concerns at play' (2021) 5 *International Academic Journal on Olympic Studies* ; 22

[15]*ibid*

[16]*ibid*

The danger with these smarter systems is that the less control humans have over them, the more autonomy and independence they will have. In this regard, it is important to note that since the goal of machine learning reinforcement is to maximize positive reward and adapt their behavior, the combination of autonomous systems and robotics in the near future could easily spiral out of control.[17] The increasing closeness of human and machine interaction, as seen in digital twins and cyborgs, points to a bright future. As we have seen before, the first, a digital representation of both living and non-living physical entities, was put to the test at the 108th Tour de France. The integration of intelligent machines inside the human body, or cyborgs, is a reality in sports as well. The interaction between humans and machines puts us in a win-win situation where human and AI cooperation is more effective than either of them separately. Who ultimately controls human-machine integration, though, is the question, if it is even possible?[18]

Ai in the Sports Sector

The usage of artificial intelligence in everyday life is increasing. Contrary to belief, sport is just like other fields. Sports are the industry that is poised to experience an exponential and unconstrained growth in the use of AI technology. Tasks such as coaching, data storage, and training are most effectively managed using AI systems. In the succeeding paragraphs, we shall provide a concise overview of some of the most common applications.

Training Preparation

The significance of artificial intelligence (AI) in the realm of Athletic training is progressively increasing in both the professional and amateur settings. It is verifiable that non-professional individuals display significant interest in utilizing applications and additional technological innovations that employ artificial intelligence mechanisms. Machine learning techniques are increasingly employed in professional sports for the purpose of grouping and categorizing sport-specific data, including sequence movement evaluations, endurance, and performance metrics. Furthermore, there is a growing trend in utilizing neural networks for analytical evaluation and predictive solutions in this domain. There exists a collaborative effort between athletes and

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[17] *ibid*
[18] *Ibid;* p.23

nascent Enterprises to explore the utilization of artificial intelligence (AI) in sports with the intent to elevate the efficacy of (AI)-based applications and subsequent outcomes. Athletic individuals persistently strive to enhance their performance and achievement. It is common for companies to collect data from athletes during their training in pursuit of particular objectives. Enterprises adopt Machine learning systems to acquire and evaluate vast quantities of data points concerning various physical activities comprising jumping, throwing, balancing, among others. The operational functionality of the 3D athlete tracking system may be explicated as follows. Ashton Eaton, a distinguished Olympic athlete with multiple gold medals to his name, has been engaged in the role of evaluating and bolstering the effectiveness of 3DAT technology through a professional collaboration with Intel. This trend of utilizing Athletic expertise to improve business systems has been observed in a number of other companies as well. Consequently, it can be argued that significant Athletic gatherings provide a fitting milieu for assessing the efficacy of said systems. The utilization of various technologies predominantly, if not comprehensively, pervades among Olympic sports with the aim of optimizing Athletic performance to realize superior levels, forecasting the potential impacts of atmospheric conditions on performance, as well.as bolstering tactical approaches.[19]

Extended Coaching with Assistance: Massive databases of facts are managed via AI systems. Coaches have normally made selections based on their experience. However, they have got usually favored out of doors suggestions and help. Coaches are almost omniscient thanks to AI systems. Athlete talent, stamina, and consistency are assessed with the aid of AI systems. Teams in sports activities compare participant passes, inclusive of frequency and accuracy as well as who's making and receiving them. To create and decorate strategies, AI structures are employed. There are already apps utilized in sports activities like football, basketball, rugby, biking, and more that provide coaches with actual-time information and even permit them to make decisions approximately participant contribution, expect how the sport will develop inside the following mins, have interaction with a spread of variables, change strategies and player lineups, or follow extra or much less stress to the opposition. Louis Van Gaal's (former Dutch Coach) use of facts

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[19] J. Mccullagh, 'Data Mining in Sport: A Neural Network Approach' (2010) (4)(3) *International Journal of Sports Science and Engineering* ;131-138.

inside the 2014 world Cup final appears some distance away and perhaps naive in the context of state-of-the-art hastily developing AI systems and programs. As you could keep in mind, Van Gaal suddenly modified the goalkeeper in the one hundred and twentieth minute, proper earlier than the decisive penalty shootout. Because the Costa Rican shooters have been pressured by the trade and lacked expertise of the new goalkeeper on the time, the Dutch crew changed into offered the 2014 FIFA international Championship trophy. For the reason that the data hole might have been without difficulty fixed, the outcome of this transformation today is probably no longer the identical. In reality, Gareth Southgate, one of the most well-known coaches for his achievement main the England country wide group to victory in the UEFA 2020 Championship, has stated the critical role AI performs in pursuing moderate blessings in modern-day football competitions. In truth, Southgate attempted a Van Gaal-like method in the death seconds of the game through introducing Rashford and Jadon Sancho as accomplished penalty takers. Unluckily, the records this time did no longer aid the success of the penalty try, and Italy defeated England. Seeing that then, Southgate has made a point of describing what he values most: how facts analysis by AI structures offers empirical evidence and supports tasks and choices while improving coach-player communication.[20]

Monitoring for Doping: Wearable technology is already assisting WADA in its monitoring of doping. Even though the usage of some modern-day wearable gadgets to geolocate athletes has given upward thrust to a number of disputes, WADA has made ongoing efforts to combat doping with the resource of cutting-edge and AI systems. Unrelated to this, WADA is presently investing at the least four AI research projects. A few of them searching to improve EPO detection accuracy. The objectives of the others are similar to steroids. Olivier Niggli, the director of WADA, said that notwithstanding the pandemic state of affairs forcing a halt on this research, it is nevertheless supposed to pick out suspicious athletes and make certain that they may be very well tested.[21]

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[20] <https://www.forbes.com/sites/stevemccaskill/2019/11/27/gareth-southgate-how-big-data-and-cloud-helps-england-prepare-for-euro-2020/> accessed 13 January, 2023

[21] Alberto CarrioSampedro (n.12) p.23

Injury Avoidance: Each for man or woman athletes and for groups of athletes, AI can assist to improve harm prediction and damage risk. Those systems, which might be based on gadget learning algorithms, permit for the damage forecasting, stopping terrible outcomes for person athletes and groups in addition to losses for sport control. With this goal in thoughts, some agencies are growing AI systems. Those AI groups usually take 3 steps to prevent injuries.

i) information gathering through the education's technological gear;

ii.) Analyses of harm hazard for athletes; and

iii). Making recommendations that help their prediction and prevention to coaches and physicians. This is essential for the duration of COVID durations when athletes need to return to opposition after a prolonged absence from the important coaching and training.[22]

Assisted Refereeing Video: Video Assistant Referees (VAR) is already a standard issue of assisted refereeing in many sports activities. Football is one of the sports wherein technology integration takes the longest, as is customary. According to FIFA itself, the 2018 international championship noticed the professional implementation of VAR and was one of the cleanest in history. Despite the fact that VAR isn't usually nicely obtained by football fans, it has emerged as a vital device in present day football. Its occasional over-accuracy for football purposes is the difficulty, even though. Because of this, the English League made modifications to VAR for the 2021–22 season to prevent razor thin calls, which occur whilst a participant's feet or armpit is most effective partly at the back of a defender. The objective of FIFA, however, appears to be the alternative. In an effort to prevent errors in figuring out off sides and throw-ins, FIFA had formerly announced the establishment of a branch to analyze the use of robots, cameras, and computers in vicinity of linesmen. FIFA has recounted that the entire replacement of human beings with robots may arise in the near future.[23]

Broadcasting and Streaming: AI has the capability to convert not only sports for the athletes and sports activities managers, however additionally live broadcasting and the spectator experience. The way broadcasters monetize sporting occasions is also expected to get replaced

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[22] *ibid*

[23] Kenneth Leung, 'Analyzing English Premier League VAR Football Decisions' https://towardsdatascience.com/analyzing-english-premier-league-var-football-decisions-c6d280061ebf> accessed 15 January, 2023

by AI. AI systems can be hired for rapidly selecting the perfect camera attitude to provide at the viewer's screens based on the activities happening on the field. The AI gadget also can routinely create subtitles for live activities in numerous languages based on the viewers' place and preferred languages. Moreover, broadcasters can efficiently use monetization opportunities from ad sales via the usage of AI systems to determine the nice times to reveal advertisements based on the extent of target audience excitement in sporting venues.[24]

Scouting and Recruiting: Regardless of the reality that human beings are not in particular treasured in phrases of objective, quantitative metrics, their performance can surely be evaluated quantitatively. Sports activities teams are increasingly using players' lone overall performance statistics as a gauge of ability and match, whether or not it's in baseball, football, or some other recreation. However, the overall performance data used for scouting prospective recruits does now not simply mean the use of the widely recognized stats like home runs, dreams, or passes, but alternatively the use of more composite metrics that bear in mind a diffusion of factors. People cannot constantly exactly document and evaluate those metrics, although, due to their visceral boundaries. Massive statistics and artificial intelligence at the moment are being utilized in sports control, making it simpler, extra accurate, and definitive to record and degree those predictors of future fulfillment. Before investing money in players, AI can predict their future potential using historical statistics, that is well known inside the sports industry. Moreover, it could be carried out to make the best offers even as snagging sparkling expertise by means of approximating players' market values.[25] For instance, professional football clubs and organizations use the AI-based platform AiSCOUT to find and scout players using video recognition technology. The platform analyzes and rates players' performance, including their technical, physical, cognitive, and psychometric skills.

Prediction of AI scores: AI is getting close to being able to predict every match's outcome, despite the fact that it cannot yet do so perfectly. Thanks to predictive algorithms and computer vision, it can also forecast match outcomes much more accurately than humans. For instance,

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[24]Kaushiki Mishra, ShipraNayal and AmitSrivastava (n.1) p.2345
[25]*ibid*

Kickoff. AI is an AI/ML platform that forecasts football game outcomes. Additionally, AI gathers and analyzes data based on various factors such as the quantity of passes made between teammates, chances generated, and passes that resulted in goalscoring opportunities using computer vision. The outcome of upcoming matches is then predicted by AI using that knowledge and data.[26]

Personalized Training and Advanced Diet Plans: AI can provide athletes with individualized training and diet plans thanks to machine learning and deep learning algorithms. For instance, an AI diet plan can alter various meal plans based on the player's present requirements and schedule. When a player is recovering or has a match the following day, AI may offer specific dietary recommendations. FoodVisor is one of the most well-known AI-assisted diet apps. Through object recognition, it can distinguish between various food types and provide users with a nutritional breakdown. In addition to AI-assisted dietary apps, athletes can benefit from AI-assisted fitness apps. Computer vision techniques allow algorithms to recognize human joints and detect human poses in real-time, allowing them to give the player precise exercise instructions. For instance, the well-known AI apps FitnessAI and AlfaAI aid in the training and scheduling of athletes.[27]

Better Fan Engagement: Giving fans the best possible experience has grown in importance and significance in recent years, more so than ever. Fortunately, artificial intelligence is revolutionizing the sports industry by assisting clubs in conveying and providing unrivaled customer engagement. Fans can interact with their favorite and most cherished players and learn more about them more easily thanks to chatbots and digital assistants. By providing fans with access to their favorite teams via an app, artificial intelligence can further increase fan engagement. They can keep track of their tickets, receive notifications when new merchandise is available, find check-in locations on game days, and keep an eye on the schedule.[28]

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[26]LorySeraydarian, 'Sports and AI. Eight Uses of AI in Sports' <https://plat.ai/blog/uses-of-artificial-intelligence-in-sports/> accessed 18 January, 2023.
[27]*ibid*
[28]*ibid*

Ticketing: Stadiums frequently experience issues with fans arriving late for sporting events. Thankfully, AI can solve this problem. Stadiums offer smart ticketing services, for instance. Additionally, Wicket uses facial recognition and biometric verification to let fans enter stadiums without having to show their tickets. AI predictive analytic tools can also predict how many people will attend the game and when they might be expected to arrive at the stadium. This information also aids in enhancing security and organizing goods and food in accordance with the number of visitors.[29]

Automatized sports journalism. When reporting on sports news, journalists are crucial. All over the world, there are countless sporting events happening every day. For journalists, covering this in a short amount of time can be difficult. Therefore, to lessen such heavy workloads, AI bots are being used to track numerous events, write match reports, explain crucial events, and provide precise data and statistics. For instance, Automated Insights' Wordsmith platform uses artificial intelligence to transform raw data into narratives through the use of natural language processing.[30]

Examples of AI Applications in Sports

The potential application of artificial intelligence (AI) predictive assessment in the domain of sports has garnered considerable attention, with a specific emphasis on enhancing health and fitness outcomes. The utilisation of wearable software program offers a viable means of monitoring the physical wear and tear of athletes, thereby serving as an effective tool in promoting and sustaining their overall health and well-being. During gameplay, artificial intelligence has the capability to discern patterns in operations, strategies, and weaknesses. The installation of the Connexion kiosk, which was facilitated by the National Basketball Association (NBA), incorporates artificial intelligence (AI) to analyze health-related data of players and notify respective teams of any injuries or impediments.[31]The synthetic intelligence-powered platform Arccos Caddie serves as the player's digital caddie and provides statistics at the wind's

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[29]*ibid*

[30]*ibid*

[31]KeremGülen 'Does AI spoil the naturalness of sports?' <https://dataconomy.com/2022/11/artificial-intelligence-in-sports-examples/> accessed 20 January, 2023.

route and the best club to use. The route to hit, in addition to different critical information like location and others.[32]The integration of artificial Intelligence (AI) in the realm of sports has demonstrably affected strategies pertaining to both pre and intra-sport activities. The implementation of computerized assessment techniques is often employed to exert an impact over the decision-making process involved in the identification of optimal player configurations, both preemptively and contemporaneously with sporting competitions. The enhancement of athletic performance can be facilitated through the utilization of several metrics, encompassing variables like spin, velocity, serve placement, and player posture and movement, by means of artificial sports Intelligence. Artificial Intelligence (AI) has proven to be a valuable asset for managers and coaches, as it aids them in the making of sound decisions pertaining to various games and significant competitions.[33]

Chatbots: This program is used to respond to fan questions. All game histories as well as the history of sports in general are searched. It then saves it to the home page, but Facebook Messenger is linked to the app. As a result, users of the app can connect with it via Facebook and access pertinent data. This app has been effective in maintaining and increasing fan understanding of the sport's history.[34]

Connected Shoes: These shoes were created in such a way that they are equipped with Bluetooth or sensors.[35] One can track the athlete thanks to these features easily. This is assisting in the modernization of an industry that previously monitored athletes physically. In the future, A. I. Applications that will be used will improve the procedures in this industry. Since they will understand how the game is played, the fans will be more impressed with sports facilitated for them.

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[32]*ibid*

[33]*ibid*

[34] Rahul Reddy Nadikattu (n.9) p.5986

[35] A. Smith & H. Westerbeek, 'Sports Competitions of the Future: Free Markets and Freak Markets' (The Sports Business Future 2004) 50-72.

Football with Sensors: FIFA officials integrated the Adidas "Al Rihla"("the journey") ball, which possesses an embedded sensor, to substantiate precise adjudication during every match - this ball is the inaugural football to showcase such technology. The recently introduced sphere was equipped with an Inertial Measurement Unit (IMU) sensor, thereby facilitating the precise identification of offside rulings during gameplay. The sphere's central region houses a sensor that conveys data at a frequency of 500 occurrences per second to the control room for video processing. Referees possess the capability to discern the precise location from which the ball was propelled at any point in time, rendering them vital sources of evidence that bear significant weight in determining close offside verdicts. The aforementioned technology is called connected ball software.[36]

FIFA's New AI-Based Semi-Automated Offside Technology: FIFA has advanced its technological capabilities by implementing a novel AI-based, semi-automated offside technology (SAOT). In Qatar's stadiums, there exist 12 tracking cameras positioned beneath the roof that possess the ability to track and monitor the movements and the locations of both the players and the ball. The tracking cameras have a noteworthy ability to perform tracking movements up to 50 times within a singular second. Through the surveillance of players' limbs and extreme appendages, regulatory bodies aspire to enhance the promptness and precision of offside determinations. The Soccer Analytics and Online Tracking (SAOT) system can effectively operate in conjunction with the Inertial Measurement Unit (IMU) sensor affixed to the World Cup ball to establish a precise temporal correlation between the instances of ball Kick-off and the respective locations of the defending team's final defender and the offensively-oriented striker of the competing team. A level of precision of considerable magnitude is critical for situations in close proximity where the referee may encounter difficulty in rendering a fair and accurate decision. The amalgamation of technologies utilized during Portugal's encounter with

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[36]Samiksha Jain '4 Cutting-Edge Technologies Used In FIFA World Cup Qatar 2022' <https://www.jumpstartmag.com/4-cutting-edge-technologies-used-in-fifa-world-cup-qatar-22/> accessed 21 January, 2023

Uruguay, proved pivotal in determining the true scorer of Portugal's initial goal, ultimately vindicating Bruno Fernandes instead of Cristiano Ronaldo.[37]

Differentiating Between Sports' Acceptable and Unacceptable Uses of AI

Through itself, technology is neither precise nor terrible. Excessive-tech systems and artificial intelligence aren't an exception. AI has many beneficial applications in the daily lives of athletes, coaches, and referees. However, they also have a poor effect on privacy rights and result in biased judgments. AI systems are essential within the combat against doping and unlawful betting.[38] In reality, the sooner uses of AI in sports also had a dark side. The majority of them have the ability to be abused, which includes via cheating, unlawful betting, and, greater particularly, through manipulating competitions and minimizing the worth of athletes as people. Due to this, ethical consideration that allows us to evaluate each of these uses must be the riding force in the back of developing the use of AI. On this regard, it's far important to note that there are no legitimate arguments against the use of artificial intelligence (AI) and other modern-day technological devices within the international world of sport. AI can enhance sport in some of methods if it's far used responsibly and ethically.[39] But, it's essential to ensure that it's implemented fairly and with the intention of advancing distributive equality as well as the wellbeing of humans and the environment. However, there are some moral issues that AI brings up that we should be aware about. Mainly when the statistics is about the fitness of athletes, large databases with crucial records can jeopardize people's privacy. The effect that AI can also have on choice-making approaches and how it might impede the emergence of democracy in recreation governance is some other vital issue for Sport Government bodies (SGB). However, it is important to remember that as AI structures assist us increasingly, they'll subsequently end up uncontrollable for humans. Due to this, it is essential to stop its consequences on people's lives earlier than they get out of manage. A distinct division between various uses is required in order to address these ethical challenges in the most effective manner possible. Indeed, one need

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[37]*ibid*

[38]M. FIERENS & J. DE BRUYNE (2020), 'Artificial Intelligence in Sport: The Legal and Ethical Issues at Play' <https://www.lawinsport.com/topics/regulation-a-governance/item/artificial-intelligence-in-sports-the-legal-and-ethical-issues-at-play?category_id=154> accessed 15 January, 2023.

[39]*ibid*

not go into great detail to understand that some uses do not impair human rights while others are hotly contested. To put it another way, a proper categorization and distinction of AI's uses is required due to the generality, ambiguity, and vagueness of the technology. In fact, that is the approach taken by governmental organizations like the European Union, which recently unveiled a number of initiatives aimed at arranging and categorizing uses and applications of AI.[40] With this in mind, various AI applications and uses are categorized into three groups based on risk, namely: i) unacceptable risk, ii) high risk, and iii) low or minimal risk. The first one is outright forbidden in the EU, the second one is permitted under certain conditions, and the third one only requires that certain fundamental rules are followed.[41] The first one is outright forbidden in the EU, the second one is permitted under certain conditions, and the third one only requires that certain fundamental rules are followed:

i)   Are categorically forbidden, such as those involving children, intended to alter a person's behavior or profit from a physical or mental impairment.

ii)   Involve a high degree of risk and strict compliance obligations, such as when athletes' privacy and health are at risk and their current and future careers are at stake.

iii)   Are trustworthy but must adhere to the moral principles of good sports governance and follow the appropriate procedures.

In order to advance the evolution of AI systems in the realm of sport, it is essential to establish a framework that is accountable, consistent with human rights, and complies with the fundamental principles of sound sport governance.

Ethical Guidelines For Using AIin Sports

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[40] European Commission, White Paper on Artificial Intelligence - A European approach to excellence and trust, COM(2020) 65 final, 2020. European Council, Special meeting of the European Council (1 and 2 October 2020) – Conclusions, EUCO 13/20, 2020,.European Parliament resolution of 20 October 2020 with recommendations to the Commission on a framework of ethical aspects of artificial intelligence, robotics and related technologies, 2020/2012(INL).
<https://ec.europa.eu/commission/sites/beta-political/files/political-guidelines-next-commission_en.pdf> accessed 20 January, 2023.
[41] A. Carrio, 'Equality in Sport revisited' In Sport, Ethics and Philosophy (in press 2021)

A dependable and ethical use of AI in sports is required, in addition to a commitment to human rights. The Montreal Declaration for a Responsible Development of Artificial Intelligence[42] and the European Group on Sciences and New Technologies (EGE), as well as the AI High-Level Expert Group, all share this goal. As a necessary condition for a responsible and safe use of AI, each of these organizations has put forth a set of fundamental ethical principles.The present study advances a proposed framework of principles that serves as the minimal standard for an ethical application of artificial intelligence in sports. This set of guidelines is formulated in alignment with the recommendations disseminated by various pertinent organizations and grounded on the fundamental bioethical principles articulated by Alberto CarrioSampedro.[43]

i) Principle of respect for human autonomy,

ii) Principle of nonmaleficence,

iii) Principle of beneficence

iv) Principle of justice.

v) Principle of transparency and accountability

Respecting Human Autonomy in Sport: A fundamental moral requirement for putting AI at the center of human flourishing, keeping human self-determination, and stopping the subordination of humans to an unchecked development of AI is the precept of respect for human autonomy.Which means that the position of AI structures in sports activities ought to be human-centered, encouraging meaningful stories in physical training and sport, and not impeding on human creativity and amusement in sports activities practice and competitions. On the other hand, this precept also requires human oversight of AI automatic decision-making strategies and the very last say over how they're utilized in sports governance.[44]

The Principle of Non-maleficence in Sport: The ethical obligation to refrain from deliberately injuring athletes, whether or not the harm is real or potential, and whether or not it's far performed by using commission or omission, is imposed by means of the principle of nonmaleficence. Negligent AI packages and uses in sports could critically damage athletes'

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[42]<https://www.montrealdeclaration-responsibleai.com/the-declaration> accessed 16 January, 2023

[43] Alberto CarrioSampedro (n.12) p.25

[44]A. Laitinen 'AI Systems and Respect for Human Autonomy' <https://www.frontiersin.org/articles/10.3389/frai.2021.705164/full> accessed 16 January, 2023

health, destiny plans, and valid sporting aspirations. Medical doctors, scientists, nutritionists, and trainers are specifically impacted with the aid of this principle. Sports for youngsters and people with disabilities benefit significantly from it.[45]

The Principle of General Beneficence in AI Applications: The beneficence principle means that SGBs have a duty to use AI to the benefit of athletes and other stakeholders in sports. One may want to consider this principle to be the antithesis of the preceding nonmaleficence precept. The precept of beneficence is commonly understood to have an extra restrained scope, whereas the obligation of non-maleficence is a well-known responsibility to avoid doing damage. In healthcare systems, that is genuinely true, however not for AI packages. Truthfully, the principle of standard beneficence is a result of human equality and a prerequisite for the precept of fairness. As a result, the goal of reaping rewards can be applied to unique athletes and stakeholders in addition to the lengthy-term viability of sports activities.[46]

Principle of Fairness in Sports: Fairness ought to be incorporated into AI applications and future sports improvement. On the one hand, the fairness precept mandates that SG bodies guarantee an equitable distribution of AI advantages among all stakeholders. However, it necessitates that they forego any AI applications that would bring about unfair bias, opportunities, and person or organization discrimination. Using artificial intelligence (AI) in sports can be fine and can improve normal equity if all of this unfair distribution is prevented. Consider a combat, as an instance.

Transparency and accountability principles: Two fundamental principles of good governance are accountability and transparency. As previously stated, the opportunity to challenge and receive an adequate remedy in opposition to the Sport Government Bodies' decisions is necessary for the procedural aspect of fairness. The Sport Government Bodies must be open with information, share it, and of course be held responsible for the decisions and deeds they carry out

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[45] Alberto CarrioSampedro (n.12) p.26

[46]Tiernan Ray, 'Ethics of AI: Benefits and risks of artificial intelligence' https://www.zdnet.com/article/ethics-of-ai-the-benefits-and-risks-of-artificial-intelligence/> accessed 16 January, 2023.

if they are to do it right. Building and maintaining trust in SGBs depends on these fundamental requirements.[47] Because corruption is frequently linked to a lack of transparency, it unfortunately has long-lasting, detrimental effects on the governance of sports. Given the influence that AI applications have in sports, integrating AI into sports requires open and effective communication about the goals as well as a clear explanation of any potential effects. Due to the opaque nature of AI systems and the "black box" nature of the majority of algorithms, this is especially crucial. As a result, AI applications demand ongoing transparent communication and accountability of any unfavorable effects that may result from inaccurate outputs.[48]

Conclusion

Artificial intelligence is having an effect on almost all expert sports, and it is now achieving amateur athletes. For AI in sports activities, a completely robust vision is required. Handiest while there are great technological advancements inside the discipline of AI are a successful final result possible. AI should offer particular information analysis and scientific plans to be able to growth the effectiveness of athletes' education with the right managing and alertness of AI and its applications. The potential of a sporting business enterprise to win games, manages various operations, and draws, maintain, and serve their lovers and followers relies upon more and more at the speedy development of AI technologies. High-tech and AI applications in sport can be top or horrific depending on their dreams and targets, much like in all other spheres of human lifestyles. Sports activities may also advantage greatly from the ethical use and application of AI. There may be no justification to oppose applications of AI due to this. AI systems and excessive-tech devices are not in price of what people need. Whilst it comes all the way down to it, AI systems outperform people in phrases of mastering new things and coming to powerful choices—two matters which can be essential in sports activities. But in view that ethics is plenty extra complex than algorithms, we must keep manipulate over AI structures. Certainly, ethics and fairness are standards that AI structures are not able to realize or, as of but, educate themselves. Unpredictable consequences ought to end result from an artificial intelligence palms race in sports if it is used unfairly and carelessly. However, we should additionally be conscious that as AI structures turn out to be more independent, it is impossible to have a clear understanding of ways their mastering competencies will enhance, in an effort to position anyone in a subordinate position. Sports have always been a trying out ground, thankfully or unluckily

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[47] Alberto CarrioSampedro (n.12) p.25
[48] *ibid*