

# The Application and Development of Artificial Intelligence and High Technology in Sports Event

Jianhang Chen\*

Department of Cheshire, Cheshire academy, Connecticut, US

\*Corresponding author: [jianhang.chen@cheshireacademy.org](mailto:jianhang.chen@cheshireacademy.org)

**Abstract.** The field of sporting events is seeing a constant change in the use and development of Artificial Intelligence (AI). The primary focus of this research is on using AI to analyze athlete performance and improve training regimens. This includes skill evaluations, tactical improvements, and customized training advice. The results show that AI has advanced significantly in event management, spectator experiences, and referee decision-making all at the same time. This has improved audience engagement, operational efficiency, and referee decision correctness. Even with all of AI's achievements in sports, there are still unanswered questions. Examples of these include improving intelligent training apparatus and making more accurate projections of athlete performance. Future studies will explore these areas in greater detail in an effort to advance and innovate artificial intelligence (AI) in the sports industry. The ongoing evolution of AI suggests a broader and more precise exploration in sports, potentially providing richer and superior experiences for athletes, spectators, and stakeholders while laying the groundwork for future technological innovations. Meanwhile, people should anticipate the collaborative development of artificial intelligence and humans, aiming for equilibrium, mutual supplementation, and interdependence.

**Keywords:** Artificial intelligence, sports events, athletes.

## 1. Introduction

As artificial intelligence undergoes a gradual process of widespread adoption and substantial evolution, societal attention is progressively captured to its influence, alongside related high-technology methodologies on sports events. Artificial Intelligence and related high technology have delivered manifold advantages within the realm of sporting events. However, concurrent misuse of advanced technology in this context has engendered complications, precipitating contentious discourse surrounding the utilization of AI and associated high-tech components simultaneously. It is essential to take into account that artificial intelligence is being applied in the field of sports. This technical advancement has several effects. Firstly, AI can process large volumes of sports data, providing teams and coaches with accurate data analysis and forecasts that help them create strategies and training plans that work better. Second, the use of AI in video replays and referee decisions improves match officials' accuracy, decreasing disputed calls and increasing competition fairness. AI additionally promotes customized exercise and health surveillance, which assists in avoiding injuries, as well as athlete training and physiological monitoring.

With that being illustrated, there are still certain gaps that require further investigation. For instance, in the optimization of sports training, despite some progress, the challenge remains in better tailoring training methods to fit the individual characteristics of different athletes. Furthermore, there is ample space for significant advancements in research aimed at leveraging artificial intelligence technology to enhance the audience experience, particularly in the domains of virtual reality and augmented reality. Simultaneously, AI programs are still becoming better at evaluating athlete performance and maximizing training. This includes evaluating an athlete's abilities, tactics, and physical characteristics as well as offering coaches customized training plans and recommendations. To improve the precision and usefulness of these artificial intelligence systems, more study in this area is necessary.

Furthermore, AI applications in the field of sporting events are developing quickly in areas like improving spectator experiences and event administration. This covers things like data analysis, event

broadcasting, ticketing, and security monitoring. Future studies may concentrate on raising the effectiveness and security of event management while raising audience participation and experiences. In addition, AI technology is progressively becoming available to support referee judgment. AI technologies can aid referees in making more accurate decisions, minimizing disagreements and errors, through the use of video replays and data analysis. The goal of more research in this field may be to improve the accuracy and fairness of sporting events.

While artificial intelligence (AI) has advanced the field of sporting events, there are still many uncharted territories, including more accurate athlete performance prediction, improved intelligent training equipment, and AI applications in a variety of sports. Future studies are therefore well-positioned to explore these facets in greater detail in order to further the development and innovation of AI technology in the sports industry.

According to data from BWF, FIFA, Worlds athletes and past journals and articles, one applied literature review methodology and case study methodology to discover the application and development of Artificial Intelligence and associated high technology. And also through logical reasoning and the development of cause-and-effect relationships, one analyzes the impact of artificial intelligence technology and high technology in four aspects of the sports domain. They outline shortcomings within these four facets and propose solutions, aiming to further the application of artificial intelligence technology in sports (sporting events domain). The goal is to achieve further advancement, fostering a balance between technology and human intervention, enabling mutual assistance, and fostering interdependence.

## **2. Current Application Status of Artificial Intelligence in Sports Field**

### **2.1. Athlete's Performance Analysis and Training Optimization**

Sports performance analysis involves examining skill, physical fitness, strategy, and tactics within modern sports. This assessment relies on human action recognition software to achieve its primary goal: identifying and optimizing athletes' talents, thereby informing competitive strategies.

Sports like rugby and football, due to their high speed and close contact, pose notable challenges for analysis. However, these characteristics align well with AI capabilities. Computer vision, adept at measuring intricate metrics, benefits from the extensive footage available across various sports, aiding deep learning models.

Although each video may vary slightly, all sports adhere to specific rules, enabling AI applications to refine their algorithms. Assessing a player's performance during live sessions necessitates evaluating predetermined game parameters, achieved through player tracking, event recognition, and real-time ball tracking.

Coaches gain actionable insights into enhancing athlete performance and adapting to diverse playing conditions through computer vision and optical sensors [1].

The comprehensive evaluation of athletic performance involves a holistic consideration of six essential components: speed, strength, endurance, flexibility, agility, and skill. Central to the refinement of athletes' capabilities throughout their training regimen is the pivotal role played by advanced technology. This technological integration is instrumental in meticulously analyzing athletes' performance, thereby facilitating a more nuanced and optimized approach to their training methodologies.

In the domain of badminton, the prevalence of smart serving machines has superseded manual serving methods across many nations where badminton enjoys popularity.

During serving practice, these intelligent machines exhibit a remarkable precision in delivering the badminton shuttle to the four lowermost corners of the court, surpassing human capabilities. This precision ensures the shuttlecock remains within bounds while landing in close proximity to the court's periphery, thereby enhancing players' court awareness. Furthermore, the adjustable ball-release angle enables precise control over the trajectory of the shuttlecock, aiding players in adapting to rhythm variations during gameplay and fostering muscle memory for shot returns.

In specialized techniques such as executing swift, flat blocks at the net, the smart serve machine outperforms human servers by delivering the shuttlecock at higher speeds and in more unpredictable trajectories. This challenges players to react swiftly to rapid, flat shots, thereby stimulating enhanced progress and skill development.

Additionally, the machine's adaptable speed settings offer a structured approach to training. Athletes can gradually acclimate to serving speeds, starting at 200km/h and progressively advancing to 250km/h. This incremental adjustment surpasses traditional coaching methods, offering a more methodical and controlled progression for athletes.

In essence, the integration of smart serving machines into badminton training not only refines players' precision and adaptability but also provides a systematic and controlled framework for skill development, thereby augmenting overall performance.

This is a discussion on how high technology initially optimizes athletes' performances. Simultaneously, artificial intelligence collects data such as the recommended speed of the ball server, the arc of the ball, the distance of the ball, etc., and analyzes this data to produce corresponding analyses: about the athlete's speed, endurance, strength, sensitivity, flexibility, and skill data—such as the average time a player takes to move a ball of the same type to hit the ball; the average rate at which a player's movement speed per unit time decreases; the average initial velocity, attenuation speed, and landing speed of a player's ball of the same type; a player's average pure ball reaction time; the average displacement length of a player's stretching action, etc. By feeding back these refined data to artificial intelligence for analysis, players' performance can be more accurately understood, allowing for further optimization of training.

Another fitting example is the application of artificial intelligence and high technology in the field of athletics. Similar to previous mechanisms, advanced cameras can record athletes in track and field (using 100-meter sprinters as an example) from multiple angles. They capture starting reaction times, acceleration, maximum speeds, running posture, stride frequency, stride length, finishing postures, rest durations between training sets, heart rate monitoring related to these factors, breathing patterns, and more. Unlike traditional manual measurements, these data collected through high-tech means offer increased precision, allowing for more accurate assessments of an athlete's performance. Similarly, by feeding this information gathered through high-tech monitoring to artificial intelligence for comprehensive analysis, AI can provide more precise evaluations of athletic performance, identifying inconsistencies and areas for improvement. Consequently, addressing these potential issues, in tandem with AI assistance, coaches and athletes can devise more direct and effective training optimizations—aligning with the Olympic spirit of striving to be "faster, stronger, higher" in athletic pursuits.

## **2.2. Judgement and Referee Auxiliary**

Within the domain of sports officiating, advancements in artificial intelligence and associated high-tech innovations have significantly elevated capabilities. In 2009, the Badminton World Federation introduced a method termed the "Hawkeye Challenge" in refereeing, a classification aligning with high-tech applications. The Hawkeye Challenge system utilizes sophisticated multi-angle cameras and computer image processing technology (figure 1). It meticulously analyzes and verifies the trajectory of a badminton shuttlecock in relation to the boundary line, determining whether it lands within the designated court area or surpasses the bounds.



**Figure 1** The hawk-eye challenge figure from BWF [2]

Compared to conventional manual adjudication methods, this technology empowers players by allowing challenges to human decisions during sporting events, which might otherwise be susceptible to fallibility or subjective biases. Moreover, the challenge procedure necessitates a mandatory pause in the gameplay, affording athletes supplemental intermission periods. Furthermore, the Hawkeye Challenge serves as an engrossing mechanism for spectators, regardless of the challenge's outcome, eliciting sustained interest. Audiences observe players and referees in contentious situations, within the confines of permissible regulations, occasionally witnessing athletes challenging decisions to award points to their opponents as a gesture toward fairness. This facet augments the spectacle of the sport, amplifying its commercial appeal and enhancing its entertainment value for viewers.

Additionally, a similar role is played by VAR (Video Assistant Referee) in football matches. Approved in 2018 by the International Football Association Board, the use of the Video Assistant Referee (VAR) system in football matches was authorized [3]. The implementation of VAR (Video Assistant Referee) constitutes a significant technological stride within football matches. This system, a video-based replay mechanism, serves the purpose of supplementing the primary refereeing team in rendering pivotal decisions. VAR meticulously scrutinizes contentious scenarios during play, encompassing instances like goal adjudications, disciplinary actions involving red or yellow cards, penalties, and more, through the aid of video replays. Deployed at the discretion of the refereeing team, VAR allows for the scrutiny of video footage, aiming to ensure the utmost accuracy in pivotal decisions. The fundamental goal of VAR resides in minimizing refereeing errors, thereby elevating the equity and precision of match outcomes. However, it's pivotal to note that while VAR furnishes an added avenue for referees to arbitrate disputed incidents, its application does not unequivocally guarantee resolution or alteration of all contentious scenarios during gameplay.

### **2.3. Data to Help the Competition Strategy**

When artificial intelligence (AI) and advanced technology engage in comprehensive analysis of historical sporting data and live scenarios, they have the capacity to discern and summarize specific trends or patterns. These may include the success rates of particular teams employing specific tactical approaches or a player's consistent patterns of response to certain types of shots, indicating their performance advantages. Disseminating these insights and analyses to coaches and teams enables them to make more informed and targeted adjustments to their tactics and strategies, thereby optimizing their team's strengths to mitigate the weaknesses of the opposing team.

For instance, in a basketball match, if AI analysis reveals that the opposing team demonstrates a higher efficacy in defending against a particular player or a specific offensive strategy, the coach can adapt their team's offensive approach to circumvent the higher likelihood of effective defense.

Moreover, the strength of AI and high-tech lies in their real-time adaptability and analysis of player information and game dynamics. Prior to the commencement of a match, AI can conduct an analysis of a team's historical data. During the course of the game and the accumulation of live data, AI can continuously process and provide ongoing real-time feedback and strategic advice. Coaches can leverage this up-to-the-minute information to adjust tactics promptly, leading to more precise decisions compared to traditional solely human-guided methodologies. This enables them to gain a significant edge in navigating the evolving dynamics of the game. During the 2021 Arab Cup tournament, a system dubbed the "New FIFA Football Language" was introduced for the first time [4]. This innovative approach blends data analysis and technical expertise to generate "new football intelligence," aiming to enhance the understanding of the game for all players involved. Managed by a team of 50 football analysts, data engineers, and scientists based in Newport, Wales, under the leadership of Chris Loxton, and supported by another team in Doha.

Every member of this analyst team was tasked with monitoring and tracking the individual performance of players on the field. This involved observing player movements, both on and off the ball, the frequency of breaching defensive lines, the pressure exerted on opponents in possession, and various other key aspects. Through this extensive analysis, over 15,000 data points were gathered from each match. This comprehensive approach provides a fresh perspective for team analysts, coaches, players, media, and fans, aiding them in gaining a deeper understanding and appreciation of the game.

## **2.4. Injury Prevention and Rehabilitation**

Artificial intelligence (AI) and advanced technological applications serve pivotal roles in both injury prevention strategies and rehabilitation processes within the realm of sports. These technologies leverage sophisticated data analytics and machine learning algorithms to tailor personalized health plans and recovery regimens, aiding athletes in mitigating injury risks and expediting recuperation from injuries.

In the domain of injury prevention, AI analyzes extensive datasets encompassing athletes' skill sets, training regimes, and physiological markers to discern potential injury factors. Subsequently, during the rehabilitation phase, AI devises customized recovery strategies, aligning with the severity of an athlete's injury and their progress in recovery. By amalgamating individual athlete data with metrics specific to rehabilitation, AI forecasts recovery timelines and progression, guiding tailored training and therapeutic interventions, facilitating the athlete's prompt return to training or competition. Indeed, increasing evidence supports the utilization of deep learning and neural networks to enhance the screening, early identification, and overall outcomes related to cancer. Various applications demonstrate this, spanning AI systems designed for screening, triage, diagnosis, prognosis assessment, decision support, and treatment recommendations. Literature shows a growing body of evidence highlighting the potential of AI systems in screening for skin cancer, lung cancer, breast cancer, cervical cancer, and a wide array of other malignant and pre-malignant health conditions [5].

Moreover, during competitive events, AI provides real-time monitoring of athletes' physiological states and performance metrics. Leveraging data acquired from wearable sensors capturing metrics like heart rate, exertion levels, gait analysis, and postural dynamics, AI promptly detects indicators of fatigue, excessive strain, or potential risks. This real-time monitoring empowers coaches and medical personnel to make instantaneous tactical adaptations or necessary interventions, thereby diminishing the probability of further injury occurrences during the competition.

Additionally, AI contributes to on-the-spot medical support. For instance, in sports like soccer, AI-driven systems aid medical staff in swift identification and assessment of probable injuries, like head injuries, expediting essential medical attention or player repositioning. This rapid response mechanism minimizes injury severity and maximizes athlete well-being during competitive engagements.

### **3. Issues and Risk Analysis of Artificial Intelligence Applications**

#### **3.1. Trustworthiness and Transparency of Technology**

Primarily, the issue of credibility pertains to the level of trust individuals place in the decision-making capacity of artificial intelligence (AI) systems. AI decisions often stem from extensive datasets and intricate algorithms, leading to intricacies and challenges in comprehending the decision-making process. Consequently, skepticism may arise regarding the decision-making procedures of AI systems, particularly in critical domains such as healthcare, judiciary, or finance.

Secondly, transparency refers to the comprehensibility of AI systems' operations and the rationale behind specific decisions. Given that certain AI systems utilize complex machine learning algorithms, these algorithms might pose challenges in explanation and understanding, particularly for non-technical individuals. Therefore, people are less likely to trust the analysis generated from artificial intelligence, including athletes and even coaches when the result generated is ambivalent to what they expected to see on the report. This challenge in comprehending the decision-making process of AI systems might diminish trust in their credibility.

However, at the end of the day, AI cannot solve the issue raised by philosophers in Ancient Greece -namely "who will guard the guardians?" [6]. The concept of "black box" explainability characterizes AI systems as unable to elucidate the processes behind specific decisions. Machine learning algorithms are frequently created in an opaque manner. Sometimes, not even the programmers completely get the reasoning behind a certain decision [7]. In sectors like national security, transparency holds significant value due to the complexity of problems and the need to consider various solutions. Relying solely on AI for decision-making without comprehending the decision-making process raises concerns. It's crucial to question whether both machine and human share a common understanding of objectives and implementation constraints.

Associated with this issue is the lack of trust in these systems. Trust concerns hinder the integration of AI systems, particularly in critical areas where the consequences could be substantial. Even if an algorithm can be explained, it might not offer an ideal solution, especially since explainability in research might differ from practical application. Additionally, the level of transparency required varies across users and domains, and complete transparency might not uniformly benefit all fields [8].

#### **3.2. Human Replaceability: The Status of Coaches and Referees is Undermined**

Artificial intelligence and high technology have the potential to impact the roles of coaches and referees. First and foremost, with the advancement of technology, AI could replace certain responsibilities held by coaches and referees. For instance, tactical decisions made by coaches for a team might be supplanted by decision-making systems based on data analysis. Similarly, the authority of referees, such as line calls in badminton as mentioned earlier, might be overtaken by video-assisted refereeing (VAR) technologies. Consequently, the traditional domains of coaching and refereeing could potentially face substantial unemployment due to the technological displacement of these roles. Concerningly persuasive claims have been made that AI may bring about mass unemployment, increased inequality, the emergence of dystopian surveillance societies, or even the end of civilization [9]. Coaches and referees might need to adapt to this technological shift, potentially leaving their current roles and transitioning to other fields of work. Furthermore, while AI has formed a structured system in the realms of data and algorithms, in the domain of sports events, expertise, experience, and the ability to adapt spontaneously are equally crucial — facets that cannot be replaced by AI for coaches and referees. If younger coaches overly rely on AI-driven tactical analysis or strategies, it could lead to undervaluing the importance of personal experience or professional expertise, potentially resulting in a loss of their ability to make sound coaching judgments.

#### **3.3. Data or Athlete Privacy Disclosure**

When it comes to the collection and analysis of sports data, athletes or teams may face the risk of privacy breaches. First, sports data may contain sensitive information about an athlete's daily

behaviors and routines. If this data is improperly accessed or leaked, it could impact the athlete's personal or professional life. For instance, if certain body parts (such as the knee) of a combat athlete are severely injured or have accumulated long-term issues, upon learning this information, opponents might target these areas during matches, gaining an advantage. This could negatively affect certain athletes' competitiveness or personal image. Additionally, if athletes' data is misused or manipulated—such as for discrimination, excessive advertising, or fixing match results—it can have adverse effects and create unfairness for the athletes or teams involved. Furthermore, there's the potential for hackers to exploit athlete data for extortion, scams, and other criminal activities.

### **3.4. Audience Interactive Experience: New Technology May Cause Dissatisfaction among Traditional Sports Fans**

When facing fan bases across different age groups, older fans might feel discontent with the excessive integration of artificial intelligence in the realm of sports, as it diverges significantly from the traditional form of sporting events. These audiences might be less inclined to attend matches in person, leading to a decline in fan enthusiasm. For instance, in the realm of Go, tactics predominantly driven by AI algorithms are gaining popularity worldwide. To enhance competitiveness, an increasing number of players are adopting strategies akin to those used by AlphaGo. However, this trend undeniably diminishes the spectacle and diversity of matches, resulting in a loss of viewership.

## **4. Suggestions and Prospect**

### **4.1. Co-exist of Technology and Human Roles**

As mentioned earlier, video assistant referee (VAR) systems and hawk-eye challenge systems have become pivotal auxiliary tools in matches, yet the subjective judgment and human decision-making abilities of referees remain crucial. There is no doubt that humans and machines will have to coexist. AI systems will take over jobs that people have historically performed. Artificial intelligence is already capable of translating between languages, diagnosing illnesses, helping in retail (Kaplan 2020c), and many other tasks, often outperforming human labor [10]. The utilization of artificial intelligence technologies, such as computer vision image processing or data analysis, is intended to offer more precise data and information, assisting, and supporting referees in making more accurate decisions. The absence of either component disrupts this delicate balance. For contentious incidents and situations, human judgment and referee skills remain vital as they involve a deeper understanding of match rules and adaptability to circumstances. Therefore, in sporting events of the 21st century, the roles of artificial intelligence and human coaches and referees should work in tandem to ensure fairness, accuracy, and societal integrity in matches.

### **4.2. Guarantee Data Diversity, Quality, and Capacity**

The data used to train artificial intelligence models should encompass diverse demographic data, backgrounds, and experiences. This prevents biases and ensures inclusivity in AI decision-making. For instance, when assessing fan bases, factors like age, gender, location, among others, should be considered. Additionally, regular monitoring of AI systems is necessary to identify any form of bias or unfairness. Periodic assessments aid in refining models to ensure their fairness. Furthermore, diversity within the AI development team from the outset is an influencing factor. A diverse team brings varied perspectives, resulting in more universal, fair, and inclusive AI solutions.

### **4.3. Regulate Use Framework and Standards**

People should regulate the collection and use of artificial intelligence information. Firstly, before gathering data, people should clearly inform the data sources of the intended purpose for collecting their data and obtain their consent beforehand. Additionally, providing clear and comprehensive privacy protection policies is crucial, allowing the subjects to understand how their data will be used.

Secondly, adhering to the principle of data minimization, refraining from disclosing certain crucial information. Simultaneously, collecting and using only necessary information to achieve specific purposes, avoiding excessive collection. Lastly, government bodies can enact legislation or establish relevant regulations to explicitly state and restrict the scope of AI information collection functions to prevent personal privacy breaches.

#### **4.4. Guarantee Equity and Transparency**

Similar to the viewpoint mentioned in section 4.2, people should ensure that artificial intelligence systems have transparency and strive to simplify and explain their decision-making and operational mechanisms. This helps build mutual trust between users (audience, in this case) and stakeholders (teams, in this case), and AI technology, enabling stakeholders to understand the reasons behind AI-generated outcomes. Only when a greater number of teams and audiences understand the operational mechanisms of artificial intelligence, people will not feel fearful or misunderstood about its functioning.

### **5. Conclusions**

The application and development of artificial intelligence (AI) in the field of sports events have become a notable subject. As demonstrated in the previous research, AI technology plays a significant role in analyzing athlete performance and managing sports events. Athlete performance analysis covers skill assessment, tactical improvements, and personalized training recommendations, contributing to athletes' enhancement of competitive levels. Furthermore, AI provides efficient and accurate solutions in sports event management, offering timely medical analysis and real-time tactical formulation.

Research has also revealed AI's potential influence on referee decisions. Through video replays and data analysis, AI assists referees by providing accurate support, reducing disputes and erroneous judgments, thereby enhancing the fairness of matches. These findings underscore the vast potential and promising prospects of AI in the realm of sports.

The impact of AI extends beyond athletes and event management, profoundly affecting the spectator experience. AI systems offer a more personalized and immersive viewing experience, increasing the entertainment value of matches and catering to the audience's preferences. This enhancement in the spectator experience contributes to increased engagement and loyalty among viewers.

However, despite the significant progress of AI in the sports domain, several unexplored areas and challenges persist. For instance, more accurate athlete performance predictions, further advancements in intelligent training equipment, and broader applications of AI across diverse sports disciplines warrant deeper investigation in future research.

Future studies should focus on improving the accuracy and practicality of AI systems. Technologically, further development of advanced algorithms and models is necessary to enhance the precision of data analysis and decision-making. Additionally, while the current analysis touches upon the direct impact of AI on events, such as broadcast and ticket management, more comprehensive explorations could be beneficial. Moreover, the integration of AI and AR technologies warrants additional data-driven analysis.

In conclusion, the application and advancement of artificial intelligence in sports events have achieved remarkable milestones, yet numerous potentials and opportunities await exploration. Continuous research and innovation will enable AI technology to continue playing a pivotal role in the sports arena, delivering more benefits and innovations to athletes, spectators, and the entire sports industry.

## References

- [1] Walsh, Johanna. Improve your players' performance with AI. Gemmo.ai, 28 Dec. 2023. <https://gemmo.ai/improve-your-sports-performance-with-ai/>
- [2] Bwfbadminton. Hawk-eye-to-determine-in-or-out. 14 Apr. 2014, 28 Dec. 2023. <https://bwfbadminton.com/news-single/2014/04/04/hawk-eye-to-determine-in-or-out>
- [3] Gasparetto, Thadeu, and Kirill Loktionov. Does the Video Assistant Referee (VAR) mitigate referee bias on professional football? PLoS ONE, 2023, 18(11).
- [4] Shamih Iman. The first application used in the World Cup to analyze players performance through artificial intelligence. Aljazeera, 14 Nov. 2022, 28 Dec. 2023. [chinese.aljazeera.net/sport/qatar-2022-world-cup/2022/11/14/](https://chinese.aljazeera.net/sport/qatar-2022-world-cup/2022/11/14/)
- [5] World Health Organization. Artificial Intelligence in health. Generating evidence for artificial intelligence-based medical devices: A framework for training, validation and evaluation, World Health Organization, 2021, 7–12.
- [6] Etzioni Amital, Oren Etzioni. Should Artificial Intelligence be regulated? Issues in Science and Technology, 2017, 33(4): 32–36.
- [7] Köbis Nils Christopher, et al. The corruption risks of Artificial Intelligence. Transparency International, 2022.
- [8] Antebi Liran. Challenges in using AI. Artificial Intelligence and national security in Israel, Institute for National Security Studies, 2021, 97–112.
- [9] Franke Ulrike Esther. Not smart enough: The poverty of European military thinking on Artificial Intelligence. European Council on Foreign Relations, 2019.
- [10] Kaplan Andreas. Artificial Intelligence (AI): When humans and machines might have to coexist. AI for Everyone?: Critical Perspectives, edited by Pieter Verdegem, University of Westminster Press, 2021, 21–32.