

SEMINAR SUBMISSION REPORT

ARTIFICIAL INTELLIGENCE IN
SPORTS

SUBMITTED BY-

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TO

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ABSTRACT

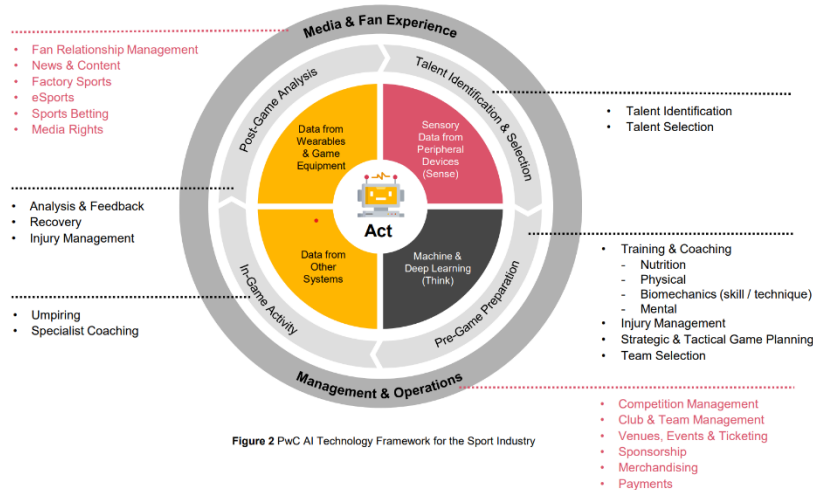
Nowadays, artificial intelligence is used in all spheres of life, and competitive sports are no exception. Examples include virtual reality video technology, AI used in competition and player data analysis, AI equipment used to aid in player training, AI used to create strategies, etc. However, artificial intelligence has also caused issues including disruptions in game viewing, the meaninglessness of intellectually competitive sports, and threats to the standing of industry professionals. Contrary to popular belief, artificial intelligence will not have the unintended negative repercussions that many people fear it will. After debate and analysis, conclusions were drawn using references to news and literature, online surveys, and interviews with business professionals. The competitive sports business has benefited from innovation and impact from artificial intelligence. The benefits outweigh the dangers and issues by a significant margin. At the same time, artificial control can be used to address these undesirable issues. The competitive sports business will continue to expand its use of artificial intelligence, which will aid in the better growth of competitive sports.

INTRODUCTION

The engineers quickly switched from the massive PC boxes to 5–6 inch neatly constructed small LED computers. Before we could fully comprehend how technology, particularly software application technology, had altered our lives, a significant revolution in artificial intelligence had already taken place. Artificial intelligence and big data are the most popular and fascinating technologies right now. Through numerous applications, they helped every industry make speedier judgements on many issues and enabled people to take better care of their health, just to name a few. Artificial Intelligence and Big Data are expanding and changing the world of technology to improve our lives as a result of the significant developments. However, in recent years, the **sports** business has had the exciting opportunity to benefit from the numerous applications of manufactured technologies. The current level of AI integration in sports goes well beyond what one could anticipate. By examining player performance, nutrition, and other factors, it not only helps sports organisations grow their fan bases but also helps teams locate the best players. These are just a few of the numerous applications of artificial intelligence now being used in sports. The uses of artificial intelligence are not only limited to those listed above. It actually has a tonne of room to expand in the years to come. Artificial intelligence play a significant part in sports analytics. The Global Sports Analytics market, which was estimated to be worth USD 135.23 million in 2016 and is likely to reach USD 2,432.30 million by 2025, is forecast to rise at a staggering Compound Annual Growth Rate (CAGR) of 37.86% from 2017 to 2025 (and is anticipated to continue to grow). Sports analysts gather information on a specific sport. The primary goal is to boost a team's effectiveness. Through a variety of themes, the sports business has celebrated the significance of artificial

intelligence. The ideas emphasise enhanced productivity and involvement.

The following diagram depicts where AI technology can be used within the sporting landscape:



Application of AI in Sports Analytics

The sports industry has reached a position where it is prepared to implement any AI strategy and enhance decision-making through the accomplishment of data-driven goals. In reality, the NBA analysed over 25,000 games between 2015 and 2018 and discovered over 2,000 missed or improper actions. This comes up to 1.49 percent of close games' final decisions being incorrect.

The AI-dependent technologies that allow authorities to monitor a very close game using probabilistic and visual data have now saved this deciding factor. Furthermore, AI-based solutions benefit the sports industry in countless other ways.

1. Participant performance

Predictive analytics are utilised in sports to improve performance and health. The players can learn more about strain and tear levels and further prevent serious injuries with the use of wearable technology. Additionally, this aids the team in developing effective tactics and methods that maximise strength.

Thanks to AI, player performance analysis has become even more advanced. Even coaches can benefit from using data and visualisations to obtain insights into the players' strengths and weaknesses and adjust game plans.

This is applicable to all sports, including tennis and football. Using video clips, Computer Vision, a potent AI tool, is employed for human motion sensing and tracking. Three outcomes are produced by this:

1. Tracking and detecting motion
2. Tracking of colours and colour-template combinations
3. Using human posture estimate, one common real-world use of AI in sports involves assessing a swimmer's performance below the water's surface.
4. The swimmer's body is manually annotated in this technique, which replaces the conventional quantitative evaluation method.

2. Personalized exercise and diet programmes

AI is on the right route to succeeding in sports, as evidenced by the fact that it has advanced personal training. Machine learning is used by an AI diet plan to tailor various meal plans for various players based on their requirements and availability. And that's only the start. Not to mention the market's overabundance of fitness applications powered by AI. With the aid of these tools and techniques, algorithms can now be trained to recognise human poses instantly. Women's fitness app development is one well-known instance, where human joints are identified using key point skeleton models for online yoga and Pilates.

3. Recruitment and scouting

By incorporating artificial intelligence into its recruitment and scouting arsenal, sports teams are tightening the rules and intensifying the competition. To make the best choice, every action on the pitch is monitored, including a player's motions and body alignment. This improves not just the recruitment options but also gives nations a strong and healthy squad to accomplish the unattainable.

4. Issuing tickets

On major sporting events, the audience frequently has trouble entering stadiums in time for the game. Up to this point, nothing could fix the crowd problem before the AI intervened.

The AI-based face recognition technology was recently modified by Columbus Crew to let spectators enter the stadium without having to show their tickets. This avoided bottlenecks and improved the effectiveness of the stadium entrance.

In addition, predictive and cognitive analytics are employed to forecast both the time schedule and the expected attendance at the stadium. This enables the officials to meet demand without exerting too much effort. Additionally, the arrangements for goods and food arrive on time.

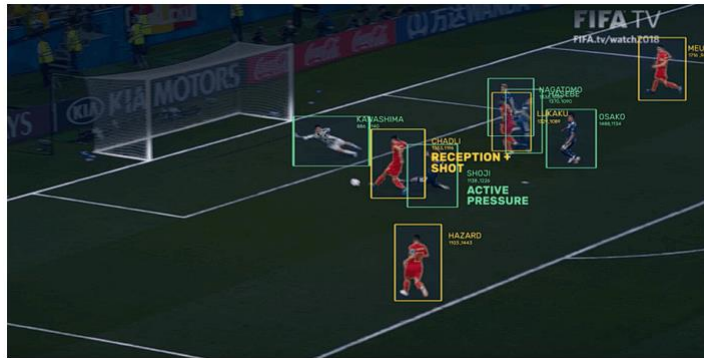
5. Sports forecasts

It's no secret that for years, officials have been attempting to process a mountain of data in an effort to forecast events and make money. If you are only utilising your probabilistic experience, looking at the first half of the game or the number of aces and scores is a pseudo prediction.

Based on the following parameters, AI can now accurately forecast match results in more than 40% of the sports categories:

- 1.A Team's composition

- 2.Total goals scored
- 3.Key passes for a chance to score.
4. How many passes there were between teammates, etc.



6. Advertising

It is a brief and underappreciated advantage of AI in sports. The usage of artificial intelligence can be utilised to spot opportunities and show more demographically appropriate adverts. In this method, brands receive better advertising based on the AI-identified game's greatest moments.

The icing on the cake are the automated learning algorithms used in sports by artificial intelligence (AI) and machine learning that monitor players' behaviours and spectators' emotions throughout contests.

Isn't it amazing how artificial intelligence in sports has completely changed how we think about playing and watching games? The future of AI in the sports industry is, in our opinion, bright and sparkling. We might as well invest in the AI sports market as AI is pervasive and there is currently no turning back from drones and large sports monitors.

AI IN SPORTS BROADCASTING AND FAN ENGAGEMENT

Its significance is reiterated by the broadcasters' and organisers' growing dependence on AI to deliver a better viewing experience. As a result, fan connection management is fast adopting artificial intelligence. The fan experience is being revolutionised by AI in every aspect, including venues, events, and ticketing. For instance, AI-powered smart ticketing technology provides flexible seating alternatives with co-workers, friends, or family during a game. Making automatic highlights that are customised to the lengths and formats that viewers desire is another significant use of AI in sports media. In a similar vein, venues are crucial to the fan experience. For both spectators and competitors, AI-powered logistics are required, including better parking facilities, high-quality food, and retail. Because of AI, merchandise won't be limited to a single trend anymore; instead, it will take into account fans' reactions, feelings, and preferences.

Artificial Intelligence in Sports Journalism

Many media organisations now use artificial intelligence to generate automatic fresh material and content. AI is used in sports broadcasting to compile important game highlights. Future advancements in machine learning will contribute to the creation of comprehensive reports as well. Many artificial intelligence (AI) and data science firms, like Yseop, United Robots, Narrative Science, and Automated Insights, provide algorithms to major media corporations today. Leading news organisations have embraced this technology, including the Los Angeles Times, ProPublica, Forbes, and Associated Press.

The lengthy process of manually assembling these highlights and creating tales and brief summaries can be sped up with AI in media. Furthermore, Twitter and Facebook will continue to use AI more and more in their fight against fake news. Fan Relationship Management with AI Sports are a very profitable

industry, and as a result, significant sums of money are invested through sponsorships and media exposure. technologies like speech technologies and chatbots are being used to reward fan loyalty to their teams. Apps and websites are being used by media businesses to notify fans about important sporting events. Additionally, media behemoths provide loyalty programmes to increase fan involvement.

AI in Entertainment and Media

Artificial intelligence is now widely used in media, going far beyond television to include social media. By producing and disseminating carefully curated material for Instagram, Facebook, Twitter, and Reddit, sports clubs are enhancing their online visibility. The greatest way to stay in touch with your audience is proving to be social networking. After the game, the aforementioned platforms even broadcast streaming highlights to let viewers catch up on the crucial moments. After the game, social media is a terrific area to host AMAs and polls, which is a great opportunity to interact with the fans. Even TV viewers can't access some of the sports content that is posted on social media. Artificial intelligence and virtual reality will further advance sports media technologies.

AI in Sports Equipment and Wearables

AI and sensor technology together can assist players in becoming more proficient. AI is being utilized in sports training to design tailored training regimens for players and deliver real-time feedback, increasing the effectiveness of each activity for each individual.

Wearables like watches and heart rate monitors contain artificial intelligence. These tools monitor players' whereabouts off the field to ensure safety and track player movements for the best

workout sessions. AI can even keep drivers safe in competitive sports like NASCAR by spotting problems before they become dangerous.

Wearable software can tell users about the wear and tear placed on athletes, helping to keep them healthy. During games, AI can spot trends in tactics, methods, and flaws. Athletes can prevent major injuries thanks to the development of wearables that collect data on degrees of strain and wear.

AI in Sports Training and Performance Analysis

Artificial Intelligence in Sport Performance Analysis provides an all-encompassing perspective in an innovative approach that signals practical applications for both academics and practitioners in the fields of coaching, sports analysis, and sport science, as well as related subjects such as engineering, computer and data science, and statistics.

Artificial intelligence in sports is the application of certain AI techniques in the sports field. As such, there is a wide range of tools that facilitate making predictions about sport performance, athletes and their rivals.

Because of AI we see the multiple screens in matches, when the batsmen hit the six and how far the ball goes, what's the speed of the ball when the bowler throws the ball, everything is calculated by AI. It helps the players to analyse their performance, and to check if they are doing any mistakes. Because of AI we can easily detect the problems/errors. In cricket, there is a huge rule of AI, we can see in LBW, ultra edge, AI plays a vital role in analysis.

AI systems help professionals calculate the parameters that have an impact on athlete performance. By using this data, medical services are able to develop systems and provide

recommendations to prevent injuries or avoid accumulated fatigue.

- **Improvements in performance-** The application of artificial intelligence in sport performance analysis means that, as we've mentioned above, great improvements can be achieved. For example, data-collecting devices can monitor the athletes' health and other parameters, which are then interpreted by artificial intelligence systems to provide valuable insights for improving sports performance.

- **AI workouts-** AI systems facilitate the control of various aspects of sports during training. For example, a combination of cameras and sensors in tennis games helps measuring speed, spin and placement on a serve. This can then have a direct impact on the strategic decisions taken by coaches and training staff.

- **Player analysis and choices-** Perhaps one of the most relevant applications of AI today. It's in fact particularly valuable for sports like football, where multiple players are involved and huge investments are made. In this context, AI provides help in selecting players from a much more objective, data-based approach that is based on predictions of potential, overpassing what a human scout could do.

Ethical and Social Implications of AI in Sports

Irrespective of the benefits that AI have in the field of the sports industry, one cannot ignore the legal and ethical issues that AI's application poses in the sporting world. With unobstructed access and growth that AI has to the confidential resources a number of important legal and ethical issues arise which remain unanswered. As in cricket, the process of using third umpiring technology has several ethical issues in modern day cricket though these

upgraded technologies have been implemented for the fairer execution and better experiences of the game.

Fairness is a key ethical concern with artificial intelligence in sports. For instance, AI technologies may unfairly favour some sportsmen over others by helping them to identify the flaws of their rivals and devise winning strategies. Athletes can be arbitrarily eliminated from contests if AI is used to decide who is eligible to compete.

The Future of AI in Sport

There is no doubt that AI will continue to change sports, and these changes will include novel and unexpected methods for us to play, watch, and analyse sports. In reality, machine learning has fundamentally altered how we think about player performance metrics, match plans, as well as how we track, categorize, and study sport consumers. When machines enter the historically human-centred and naturally skilled athlete base of sport, a Pandora's box of ethical issues will emerge and will need to be taken into consideration more frequently. Although it is unlikely that AI will totally replace coaches and human specialists, there is little doubt that using AI effectively will provide coaches and players a significant advantage over those who just rely on human expertise.

Additionally, it will give sport business executives richer, real-time insights into the preferences, requirements, and behaviours of sport consumers. As a result, AI will play a major role in the creation of sport content that is tailored and personalised for specific consumers. However, it appears that, at least in the near future, human guidance and involvement will continue to be crucial for achieving top athletic performance and making strategic decisions in the sport industry. The sporting event itself

is frequently produced as an entertainment spectacle, with the sporting background serving as the foundation for the sport's economic growth. Because automated AI is more precise and effective, it is certainly viable to replace referees in a variety of sports, but is this what spectators want?

The fact that information about players and teams, as well as business information like ticket sales and attendance figures, is kept confidential and not made public in order to prevent other parties from obtaining competitive information, makes it difficult to conduct such a thorough analysis. Furthermore, privacy is a key factor as well. The usage and sharing of sports (performance and consumption) data must be governed by laws on data privacy and the disclosure of personal identifiable information. The need for thorough and stringent law and regulation will be driven by concerns about data ownership, protection, security, privacy, and access, all of which will have a significant impact on how quickly and thoroughly AI is adopted in sport. Therefore, it is important to examine privacy and confidentiality considerations separately when comparing the adoption of AI by leagues to that of individual clubs, and eventually, to that of individual players. A sports league's eventual success in implementing AI will probably depend on how willing its teams and athletes are to share confidential information with one another. Particularly player performance data is becoming a hotly contested subject. The bargaining strength of players and their representatives in relation to the value of their contracts may very well be determined by AI.

As a continuation of this, AI will also be the source of the data used to assess whether players are meeting the performance goals established by coaches and stipulated in contracts. In other words, ownership and confidentiality of league, team, and player-level data will become more and more contentious legal issues, which will be reflected in the complexity of contractual agreements and

potential conflicts in locker rooms and on the playing field. It's important to maintain control over the use of your data, both now and in the future.

CODE

```
Round 3: Team B scores! Team A: 1, Team B: 2
Team A gets the balls
Round 4: Team A scores! Team A: 2, Team B: 2
Team B gets the balls
Round 5: Team B misses! Team A: 2, Team B: 2

It's a tie! Final score: Team A: 2, Team B: 2
Team B gets the balls

Round 1: Team B misses! Team A: 0, Team B: 0
Team B gets the balls
Round 2: Team B scores! Team A: 0, Team B: 1
Team B gets the balls
Round 3: Team B misses! Team A: 0, Team B: 1
Team B gets the balls
Round 4: Team B scores! Team A: 0, Team B: 2
Team A gets the balls
Round 5: Team A misses! Team A: 0, Team B: 2

Round 5: Team B misses! Team A: 3, Team B: 0

Team A wins! Final score: Team A: 3, Team B: 0

winning percentage of team A: 0.2
winning percentage of team B: 0.6
Total No of draws: 2
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This program simulates a series of matches between two teams, Team A and Team B, based on their offensive and defensive skills. The program allows the user to input the offensive and defensive skills of both teams, and then simulates a specified number of matches with a specified number of rounds in each match. During each round of a match, the program randomly determines which team has possession of the ball, and then calculates the probability of that team scoring a goal based on their offensive and the other team's defensive skills. The program then updates the score and moves on to the next round. At the end of each match, the program determines the winner and records the result. Finally, the program calculates the winning percentage of each team and the number of draws in the entire series.

Conclusion

Artificial Intelligence is influencing almost virtually every professional sport and is now also filtering through to grassroots participants. A really strong vision is needed for AI in sports. A fruitful result is only possible when there can be enormous technological advancements happening in the field of AI. With proper handling and usage of AI and its applications, AI could provide precise data analysis and scientific plans which will improve the training efficiency of athletes. AI technologies are advancing rapidly and growing increasingly critical for a sporting organisation's ability to win games; manage various operations and grow, serve, and hold on to their admirers and followers. The peremptory exists for sporting teams not to just acquire a singular AI technology but preferably to have perspective to have an arsenal of AI technologies that will improve their ability to generate an arsenal of AI technologies that will improve their ability to give rise and act on critical intuitions whether it's supporters engagement, talent identification, pre – game preparation or in-game real-time facilitation. However, unless sporting organisations scheme, deploy, and govern it accurately

and precisely, new AI technology will provide meagre benefits at best or, at worst, result in unexpected and undesired results.

The imperative exists for sports teams to not just purchase a single AI technology but rather to have the perspective to have an arsenal of AI technologies that will improve their capacity to generate and act on critical intuitions, whether it be fan engagement, talent identification, pre-game planning, or in-game real-time facilitation. However, new AI technology will offer minimal benefits at best or, at worst, produce unanticipated and undesirable outcomes unless sporting organisations plan, implement, and regulate it carefully.

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