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Paper on Intellectual Property and Sports: Artificial Intelligence and Sports

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ABSTRACT:

The world is being morphed into a digital data world gradually and the tool for such changes is the new age disruption in technological development of abstracting ,assimilating and analyzing such data into smart computer systems and such machines which has wide implications in different sectors of economy. With changing technology there is associated challenges out of intellectual rights and the innovations as an outcome of the new technological changes. Thus in the context of our paper, we will try to understand how artificial intelligence as a modern technology has its applications in sports and the inter relation of artificial intelligence and patents related rights.

COVER NOTE: INTRODUCTION

The design and implementation of innovative systems on the basis of state of the art information and communication technologies in combination to sophisticated processing methods are getting increasingly important for the collection, transfer, storage as well as analysis of sensor data in sports. Moreover integration of machine aided intelligence into development of modern sports information systems enables a prompt and active evaluation of sports specific parameters value, thereby allowing the establishment of computer based feedback and intervention routines. [1]

In simple terms, artificial intelligence is imbibing human actions like thinking and learning by machines and designing of such systems that can acquire and simulate knowledge, have analytical capabilities, and professional skills for the overall purposes of problem solving .

Taking a few instances of sports and artificial intelligence of computers when we were tricked to think them as humans like in 1996 , deep blue (IBM'S computer) beat reigning grandmaster Gary Kasparov in one game, IBM WATSON supercomputers beats two of the champions in a US –gameshow called JEOPARDY. GOOGLE's AI beats reigning champion of the game called GO which is a 2500 years old game and is considered more complex than chess.

IN context of this paper we will be asses the impacts artificial intelligence can make in sports and associated intellectual property rights complexities associated with sports in the time of artificial intelligence era.

ARTIFICIAL INTELLIGENCE

Artificial intelligence is a branch of computer science that aims to create intelligent machines. It has become an important part of technology industry. Machines can often act like humans only if they have abundant information about the living world. Thus, knowledge engineering is an essential part of artificial intelligence. A.I must have access to objects, categories, properties and relations between all of them to implement knowledge engineering.

Machine learning is also a core part of A.I. Learning without any kind of supervision requires ability to identify patterns in streams of inputs. Machine perceptions deals with capability to use sensory inputs to deduce the different aspects of the world, while computer vision is the power to analyse visual inputs with a few sub problems such as facial object and gesture recognition. Robotics is also a major field related to A.I robots needs intelligence to handle tasks such as object manipulation and navigation along with sub problems of localization motion planning and mapping .

Artificial intelligence in sports historical

- In 1995, Lapham and Bartlett published a review of the use of AI in sports biomechanics (the study of the mechanical laws relating to the movement or structure of living organisms).

[1] Baca et al 2009, 2012

. They predicted a very bright future of experts systems and artificial neural networks (ANNs) in sports biomechanics. Experts systems are basically a database combined with a knowledge base, reasoning and user interface. Artificial neural networks (ANNs) allow computers to learn from experiences and analogy. They are computer models that try to create mathematical models of neurons in brains.[2] Thus ANNs are used in pattern recognitions that can be tactical ones from games or performance pattern in trainings or the movement patterns of sports performers.

Down the years, we have moved to a world being gradually turning into a data world and assimilation of new disruptive changes in different sectors including sports brought by the rise of artificial intelligence. Deep Machine learning, knowledge engineering, robotics and data analytics as discussed above, are the core areas of artificial intelligence which is having far reaching impacts in the modern times to almost all the socio economic aspects of human lives.

CURRENT APPLICATIONS OF A.I IN SPORTS

A.I has multiple implications in present day professional sports. It has been transforming the conventional sports into altogether new sporting experiences. We will further look into the major applications of A.I in sports categorically.

- **COMPUTER VISION**

Humans use their eyes and brains to see the world around them. Computer vision aims similar vision to machines or computers. Computer vision is based on automatic extraction, analysis and understanding of useful information from single images and sequence of images.

COMPUTER VISION in sports is used for several kinds of benefits which includes[3]

- Improving broadcast and viewer experiences
- Improving referees ,umpires decisions
- Improving training process of professional athletes
- Automatic sports analysis and interpretation
- Commercial benefit

LET US take some visuals* to understand the applications of computer vision in sports..

- Improving referees umpires decision

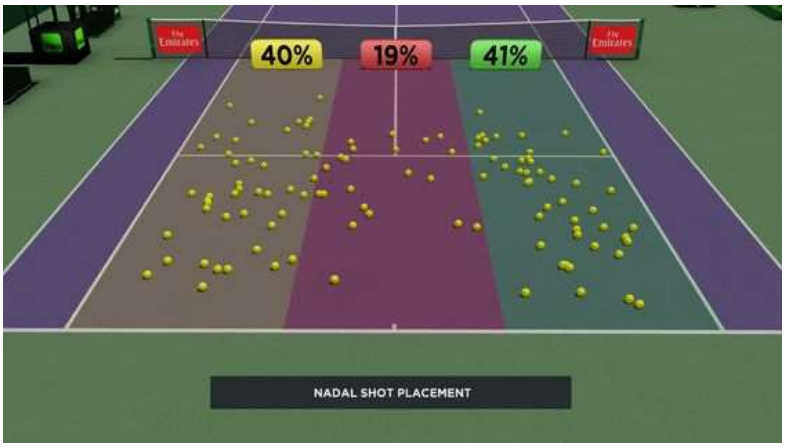
(HAWK EYE IN TENNIS)

[2] https://www.researchgate.net/publication/258035704_Artificial_Intelligence_in_Sports_on_the_Example_of_Weight_Training

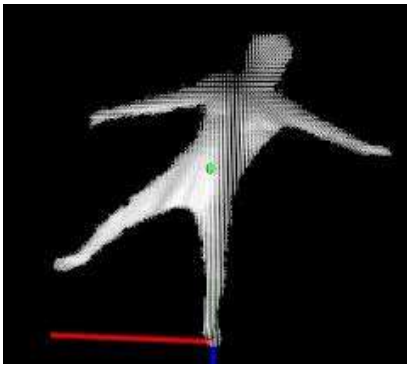
[3] https://morph.ai/sports

*photos taken from http://www3.weforum.org/docs/WEF_48540_WP_End_of_Innovation_Protecting_Patent_Law.pdf

(DECISION REVIEW SYSTEM IN CRICKET)



- Improving the training process of proessional athletes.



There are certain challenges which also needs to be acknowledged.

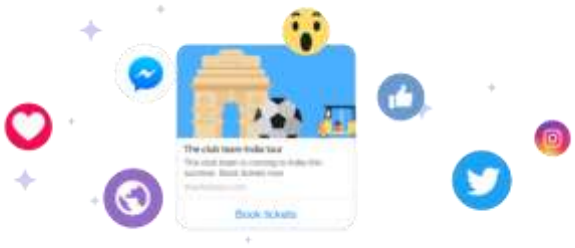
One such challenge is to provide innovation and value for money. Another challenge is to remain robust and maintain higher degrees of accuracy and to convince the conservative regulators and critics is another main challenge for the COMPUTER VISION to prove its higher utility in sports.

- **CHATBOTS APPLICATION IN SPORTS**

A chat bot is an artificial intelligence system that can simulate the conversations with users in natural language through messaging applications, websites, mobile apps, or through the telephones. Formulating responses to questions in natural languages is one of the most typical examples of natural languages processing applied in various enterprises end use applications.[4]

IN SPORTS, various sports clubs are using chatbots to engage and increase fans globally. Chatbots gives personalized feeds to the fans such as Personal reachout to fans- Sports teams and clubs can remain connected to fans via a bot that remains functional 24 *7.

[4] https://morph.ai/sports



Broadcast live updates- chatbots sends automatic live updates to fans instantly.

Engage with rich content – chatbots lets sports clubs to engage with fans and collaborate with powerful conversational surveys.

Increase fans and views - personalised subscription for fans to watch latest videos & power to share content in a click.

- Publish content - publish rich, actionable and sponsored content to selected or segmented group of friends based on location, language and many more.
- Sell tickets merchandise and more - From chatbots, fans can buy tickets directly .

Real time analytics - powerful analytics to gain insights like never before, helps to take data driven decisions.

- **Application of automated journalism in sports**

Automated journalism is also known as robot journalism, in which, news articles are generated by computer programmes . A.I software's automatically creates stories rather than human reports . These programmes interpret, organize and present data in human readable ways.[5]

Since automation is based on algorithms and formulas, automated journalism is used for stories based on statistics and numerical figures. One such application area is sports recaps.

Let us see the application of automated journalism in sports citing few practical examples

- **MINOR LEAGUE BASKETBALL (MiLB)**

Use of automated journalism is uniquely applied into sports which no body has thought that data and technological integrations led generations of sports articles.

This new intervention of journalism started with basketball. The ASSOSIATED PRESS worked with AUTOMATED INSIGHTS which is a startup based in U.S to expand the media outlet coverage of the games in minor leagues basketball. 'WORDMITH' developed by automated insights is A.I driven platform that transforms hard data from MiLB into narratives, using natural language. As a result A.P has increased its reporting capabilities to many more leagues and affiiated teams. .Also this has boosted the revenues of the Automated insights to far extent.[6]

Automated press is one of the 200 clients using wordsmith platform which generates a reported 1.5 BILLION of contents annually.

As said earlier, sports works well with automated journalism since sports stats are number based. Theses datas can be structured in a way that makes automated articles easy to write.

- The Washington Post experiments with automated storytelling in RIO OLYMPICS 2016

One of the most ambitious use of automated storytelling was done by The Washington Post.

To provide more personalised and customized news experience related to the Olympics, post used a software called 'HELIOGRAPH' which generated short multi sentence updates for readers. These updates were available for posts live blogs and on twitter and were available for posts Olympics skills for alexa-enabled devices and the post's both for messenger.[7]

While the launching of Heliograph was the natural next step of use of machine learning, there are challenges such as broadening of subjects covered and deepening the kind of analysis possible.

The future of sports is closely related to the new technologies. As we saw above in two cases, sports can be a springboard for new and advanced experiments that can be tried later in different fields, from big corporations to public administration.

- **Wearable A.I TECH and its application in sports.**

Wearable's represent one of the latest trends in digital technology .Countless gizmos and gadgets gets invented everyday and a lot of them have potential to help us live healthier and better lives. Wearable technology has taken the world by storm and thus it is of no surprise that companies such as Apple, Huawei, Fitbit are investing a lot in this technology to develop new smart solutions and stay ahead in the area.

The introduction of A.I further enhanced the capabilities of these devices whose application now range from tracking every functions of our bodies to improve our level of fitness.

A.I ASSISTANTS IN WELLNESS AND SPORTS.

Wearable technology is changing the way athletes are training around the world. Wearabable devices companies that are tracking the performances of athletes across variety of sports including american soccer, rugby, basketball, baseball and racing.

Lets understand the application of such devices in sport with new devices built for the purpose by some of the companies.

[5] https://www.researchgate.net/publication/323826816_Artificial_intelligence_and_sports_journalism_Is_it_a_sweeping_change

[6] https://emerj.com/ai-sector-overviews/artificial-intelligence-in-sports

[7] https://www.forbes.com/sites/cognitiveworld/2019/03/15/heres-how-ai-will-change-the-world-of-sports/#e78aba8556be

- Zephyr's wearable platform[8] consists of a compression shirt (or sports bra) that can hoist a **GPS** and BIOMODULE. Zephyr biomodule can directly measure six key inputs like heart beat, breathing, heart rate variability, posture and impact. This is then used to deduce more than 20 secondary parameters such as jump, height and fight time , explosiveness, peak force, heart rate confidence, estimated core body temperature , heart rate recovery, physiological load, physiological intensity etc. The results can be visualized in zephyrs OMNISENSE PC and online cloud –based software application that can track upto 100 individuals in near real time. O Mnisense can be customized to send safety alert when an individual crosses the safety threshold.
- CATAPULT SPORT's[9] multiple GPS module like clearskyT6, GPsportrsEvo which can be viewed using CATAPULT AMS SOFTWARE. These are developed to improve athlete's performances by minimizing the risks.
- Firstsbeat's textile heart rate belt[10], plastic heart rate belt and team receiver uses a chest strap based system to track user's heart rate and heart rate variability. Firstbeat's platform is being used by 22000 athletes representing around 1000 teams around the world such as famous soccer league teams like Arsenal, Manchester United etc

Thus we can see that there are few companies at present, that have built the first generation of wearable performances monitoring platforms that can give professional athletes some exciting insights from their GPS based location tracking and ECG based biometrics monitoring . . Thus new age interventions are pushing the sports and sportspersons to next level of sportings.

- **VIRTUAL REALITY APPLICATION IN SPORTS**

The virtual reality basically means near reality. This could of course mean anything but it usually refers to a specific type of reality emulation.

Everything that we know about our reality comes by way of our senses. In other words, .Our entire experience of reality is a combination of sensory information and brain sense making mechanisms to that information.

In simple technical terms, Virtual reality is the term used to describe three dimensional computer generated environment which can be explored and interacted by a person. That person becomes part of this virtual world and is able to manipulate objects or perform a series of actions.

- VR IN SPORTS

VR is used as training aids in many sports such as golf, cycling, skiing; etc .It is used as an aid to measure athletic performance and analysing technique and is designed to help both of these.

VR has wide array of applications. Lets understand the Impacts of VR in details.

- DRIVING EQUIPMENT DESIGN AND INNOVATION - VR is used to manufacture sports clothes/equipment such as running shoes design. Being innovative is the key factor to excel in this industry.
- VIRTUAL REALITY PERFORMANCE - To brush on certain aspects of their performances for instance a golfer looking to improve their swing or a track cyclist wanting to go faster in the individual pursuit. 3 dimensional systems can pinpoint aspects of an athletes performance which requires any change for example of technique or biomechanics.
- BRINGING THE SPORTING EVENT CLOSER TO AUDIENCE – Some VR systems allows audience to walk through stadiums.

American national basketball association (NBA) is one of the pioneers of adopting VRs. Broadcasting start up NEXT VR helped the association produce one game a week in 2017 making NBA first professional sports league to do that.[11]

While VR has promising applications in improving sports experiences, also there is interests of industries so that they may remain ahead in time of systemic technological changes being unfolding in present time. Investment In VR for example to gain monetary benefits for instance by the sell of virtual tickets is also a growing trend.

Challenges associated such as VR's acceptance by number of people to make it sustainable in the coming time, also there is challenge to provide cost effective technologies as most of the VR equipments are expensive.

MAPPING THE FUTURE OF SPORTS WITH ARTIFICIAL INTELLIGENCE

Sport is one of the biggest fascinations of the world. Whether it is Grand slams, UEFA leagues or any other bigger or smaller league, to meet the ecstasy and fervor of the game, there's lot of backstage works done which among others includes technological interventions for the betterment of sports. We have seen in above sections that how A.I has brought positive disruption in sporting arenas around the world using strong computer algorithm and processes.

[8] https://www.forbes.com/sites/cognitiveworld/2019/03/15/heres-how-ai-will-change-the-world-of-sports/#e78aba8556be
[9] https://www.forbes.com/sites/shourjyasanyal/2018/11/30/how-are-wearables-changing-athlete-performance-monitoring/#736671ccae09
[10] https://www.forbes.com/sites/shourjyasanyal/2018/11/30/how-are-wearables-changing-athlete-performance-monitoring/#736671ccae09
[11] https://www.vrs.org.uk/virtual-reality-applications/sport.html

Now we will see the such applications which will have promising impact on sports in future.

- A SMART ASSISTANT COACH - Oxford University and deloitte predicts a bright future of robots in various professions. A.I may become professional assistant coach as by relying on data analytics, managers and coaches can enhance the winning chances of their team . They can possibly track the performance of players both on field and off the fled and can then prepare a database containing all players intelligence data stored in it. This kind of analyis helps to improve decision making in teams. Thus A.I in IPL to improve game strategies is not too distant dream.[12]
- SMART TICKETING - This will help to build and increase the fan base .It is a technology to allow ticket buyers to change seats game to game based on their backgrounds and interests.
- AUTOMATED VIDEO HIGHLIGHTS – IBM through it's A.I platform WATSON aims to create a A.I automated video highlights of the game, which supposedly will help team of scientists and consultants to curate the game highlights based on game specific data such as analysis of crowd noise, players movement and match data . Thus IBM is trying to accelerate the process of organizing and procesing the video highlights that normally takes much more time .[13]
- COMPUTER VISION REFREE - Let us understand this with an example. A pocket sized device called TENNISIN / OUT is an A.I device which uses computer vision to detect the speed and placement of a tennis shot which also includes whether ball was out of bounds or not . While the application of the device still seems quite novel, but it shows potential uses of A.I software and camera hardware .Thus combination of internet of things and A.I are becoming more popular day by day and sports field holds far wider chances of such innovation in time .

TECHNOLOGICAL INNOVATIONS AND INTELLECTUAL PROPERTY RIGHTS IN SPORTS.

Sports shows intellectual property in action ,patents encourages technological advances that results in better sporting equipments, Trademarks, brands and designs contribute to the distinct identity of events , teams and their gears. Copy right related rights generates the revenues needed for broadcasters to invest in the costly undertakings of broadcastings sports events to fans al over the world . IP rights are the basis of licensing and merchandising agreements that earns revenues to support development of the sports industry. (WIPO)

Innovation is the key driver for development of sports . Being creative and innovative has become sine - qua – non for success in sports . In the present time, as we can see, the state of the art technology in sports has broadened the limits of any sports. While such changes are appreciable yet we should understand the relations between technological developments (with particular emphasis being on artificial intelligence) and associated complexities of intellectual property rights such as laws of patents, trademarks etc. Thus we will categorically try to understand the importance of IP for sports industry as well as the friction between artificial intelligence and patents law.

- **THE ROLE OF INTELLECTUAL PROPERTY RIGHTS IN SPORTS.**

The growing economic importance of the sports industry makes role of IP in sports of vital importance. The sports industry has a growing impact on the world economy, creating jobs, investing in public infrastructure and mobilizing the resources and an important component of this is generated through IP related activities . The global revenue of the sports industry comprising sponsorships, gate revenues, media rights fees and merchandising is predicted to reach $133 bn in 2013 from $114bn in 2009 . The annual global turnover of sporting goods is put at around $300bn (equipment ,apparel and footwear) (~ WIPO) .

The organization of sports competition has positive effects over other economic sectors (employment, infrastructure, tourism etc) .

While organizing sporting events as Olympics or football requires heavy investments yet the economic impacts are beneficial. Economic benefits may follow from

- Investments and Sponsorships
- Tourisms
- Telecommunications etc..

The reason for this is the fame of such mega events as it involves foreign investors, tourists, mass media and communication organization. Hosting such requires lots of finances for example hosting a FIFA world cup requires making of 8 new football stadiums. Since with infrastructure development it is also an opportunity for technological progress and better productivity of the host country. Also promoting the host nation as a tourist destination will bring additional benefits along with positive impacts over other sectors of the economy.

Thus in order to attract sufficient investments the legal framework must ensure an adequate protection of IP rights related to sports industry .

- SPORTS TECH –INDUSTRIAL DESIGNS AND PATENTS

[12] https://emerj.com/ai-sector-overviews/artificial-intelligence-in-sports

[13] https://www.iotforall.com/benefits-ai-in-wearables

In most countries industrial design must be registered in order to be protected under industrial design law. However protection is given in the country where the design is registered . WORLD INTELLECTUAL PROPERTY RIGHTS provides an easy and cost effective way to obtain protection under the HAGUE SYSTEM OF WIPO'S. WIPO'S PATENT CO-OPERATION TREATMENT (PCT) system provides an easy and cost effective way to provide protection for an invention in upto 148 countries . For example, during halftime or during innings break, players stretch an heads down towards their multicoloured shoes .this multi colored shoes contains many things that can be protected by IP rights such as PATENTS that can be protected using above said system of WIPO for the technology used to make the shoes. REGISTERED DESIGNS protects the look of the shoe ,while TRADEMARK distinguish the shoe from similar products and protects the reputation of the shoe while copyrights may protect the artwork and audio visual creations used to publicize the shoe.[14]

- PERSONAL PRODUCTS PLAYERS AND TRADEMARKS

Some of the players may use IP rights to control the use of certain images with which they are associated for example jamaican sprinter USAIN BOLTS lightning pose and "to di world" slogan , US basketball star Miachel Jordan's jumpman's pose and his air jordan brand shoes. Without bestowing absolute rights over those poses and words , trademarks prevents unauthorized commercial use of product without the endorsements of the celebrities .WIPO'S international trade registration system , known as the MADRID SYSTEM enables trademarks holders to file a single application for registration in up to 85 countries and to maintain and renew those marks through a single procedure .[15]

- COPYRIGHTS

Copyrights and related rights provides protection against unauthorized retransmission of broadcasts and underpin the relationship between sports and television and other media . Television and media organizations pays huge sums of money for the exclusive rights to broadcast the sporting events. For example 2010 FIFA world cup's two third revenue was generated through sales of broadcasting rights .

Thus in the light of above importance of IP in sports industry , it is of prime importance to build a national strategy that comprises the government and the private sector to facilitate the creation of an effective legal framework and that legal framework must ensure an adequate protection of IP rights in order to attract investments in sorts industry .

ARTIFICIAL INTELLIGENCE COLLIDES WITH PATENTS LAW

In the face of A.Is rapid changes in technological and societal aspects, it is of vital importance to discuss on A.I's patents law to achieve patents main objective and to avoid negative social, economic and ethical effects.

- THE PATENTS SUBJECT MATTER ELIGIBILITY FOR A.I

The topic here needs to account for A.I specific factors as opposed to broader software specific considerations when assessing whether incentivizing A.I through patents rights may have different or greater social, economic and ethical impact than incentivizing other general software[16]. For example many have concerned that A.I could make much of human employment redundant having more negative impacts than prior technological changes ,while others believe that A.I's overall economic impacts will not be very different from those of previous technological advances . How to implement legal challenges to maximize social and ethical benefits from A.I should be explored.

OTHER ASPECTS OF PATENTS LAW IMPACTED BY THE A.I

- Patentability and Inventorship issues for A.I invented interventions.
- It includes legal considerations for patentability and Inventoship for A.I ,
- Discussion points on patentability.
- Discussion points on inventorships.
- LIABILITY ISSUES FOR PATENT INFRINGEMENT BY A.I
- It includes legal framework for patents infringements liability
- Discussion points on patents infringements liability

The patents law governance and treatment of A.I can have deep impacts on innovation the economy and society. Given how quickly A.I is advancing it is paramount that the relevant stakeholders that includes patents and non patents professionals alike proactively engage in further research and discussions with one another to find ways for the patent system to promote innovation while minimizing any negative social and ethical implications

[14] https://www.wipo.int/pressroom/en/briefs/ip_sports.html
[15] https://www.wipo.int/pressroom/en/briefs/ip_sports.html
[16] http://www3.weforum.org/docs/WEF_48540_WP_End_of_Innovation_Protecting_Patent_Law.pdf

CONCLUSION

In this present era of data driven economy, we have seen the paramount importance of data and related new disruptive technological changes which is transcending all the sectors of world economy and society. We tried to understand the implications that these new technologies in form of artificial intelligence have on sports via core sectors of artificial intelligence such as machine learning, knowledge engineering and automated neural networks.

In the later sections, we tried to understand the interrelations of growing importance of intellectual properties rights in sports industry and the artificial intelligence's friction with the existing patents law.

Thus we can conclude that from fictional movie "moneyball" to recent A.I system predicting the winner of the game of thrones, from English premier leagues VR match viewing seemingly looking possible to future use of interesting IOT and A.I TECHNOLOGIS, world is being transformed both socially and systemically and the force is new eras development of technologies such as ARTIFICIAL INTELLIGENCE.