Artificial Intelligence in Healthcare Sector: Policy and Practice

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Abstract
Artificial Intelligence and Internet of Things are definitely running parallel to humankind and the edge of being faster from humans in work is coming with its own complexities. The researchers in the paper will explore and lift the veil of the usage and implication of AI and IoT in the healthcare sector. The need of maximizing the benefits and sown the seeds of AI, while ensuring minimum risks and potential costs shows the path to need of an AI policy. Healthcare can exponentially improve the productivity and efficiency of the industry and lives of people. Humankind invented and introduced new machines into the lives of people to ensure a smooth living. The covid’19 response to the use of AI and better patient care has been a practice recently initiated and they assist in detection and diagnostics. A lot of data is analyzed to predict patients’ outcomes through their electronic health records which also posses a threat to the privacy of an individual. The paper shows the tussle between policies and practice of usage of AI and legal stand.

Keywords: Artificial Intelligence, Internet of Things, Diagnostic, Therapeutic, Operations, Medical technologies, Case study

Introduction
AI has also become a big part in resolving clinical decisions over the old methods of analysis. The process of algorithms is more accurate and precise as it interacts with the data training by letting the human’s access unprecedented information about new diagnostics, nourishment techniques, various treatments and the outcomes. Now-a-days algorithms are outperforming almost all the traditional
medical processes we can take examples of technologies used in DNA sequencing to combat social distancing situations in hospital by nourishing Corona virus patients with the help of Artificial Intelligence. It’s basically not a single technology, but rather a vast collection of different technologies.

Technology assisting humans and technology replacing humans though are two different concepts, but aim at vast possibilities that technology has to offer for humankind at large that one cannot even imagine. These trends can be seen emerging simultaneously across the globe for a range of sectors, including healthcare. Artificial Intelligence (AI) is one such technology with having the abilities of processing natural language and machine learning techniques into innovation that might soon replace humans. We have started being dependent on AI assistants, fitness bands, online software supports, text and chat bots and other applications for every mundane to complex day today activities. The authors have highlighted how AI has proven to be of great help in healthcare in field of medicine, therapies, and complex operations and has assisted clinicians in handling patients physically, mentally and managing their records. There might be some apprehension that while doing amazing and next to impossible tasks with AI in healthcare industry, like replacing doctors, no empathy or human touch while decision making, no emotional intelligence or thinking towards the human and this might be enough to outweigh the good things attached. The practice of usage of AI in healthcare have also led to unwanted issues such as, loss of data and patient privacy concerns, liability fixing, patenting, etc. The need of the hour makes it even more pertinent to focus on the healthcare sector at national and international level as we are in middle of Pandemic-Covid’19 which has proven to be a global crisis. Covid’19 is caused by SARS-CoV-2 virus and was declared to be a pandemic by the WHO. AI’s can use their data analytic tools to recognize, predict and explain or treat Covid’19 infections. It can help manage different socio-economic impacts. There has been an increase in the techno-legal perspective on the effect of AI in healthcare by highlighting different government initiatives, legislations and expected amendments to be brought in the existing legislation and new proposed policies. Intellectual Property rights can be closely related to AI technologies and softwares. Different principles of law are analysed to see if AIs could fit in the ambit of legal person or there will be need of a new policy.

The researcher, through this study, seek to discuss the same and its link with Intellectual Property Management, elaborately. The study begins with the researcher tracing the past trends of technology used in the health care industry to the present techniques which are being prominently used by doctors and physicians worldwide, while we are in a pandemic situation.
This would help the readers to understand the ‘revolution’ since its known significant inception. Additionally, the researcher also contemplates the causes that are believed to have triggered such an evolution and its subsequent entry into the medical field. As evidently noticed, COVID – 19 situations have acted as a catalyst for digital innovation in healthcare. On the other hand, the researcher also elaborates as to how management of IP assets created out of such digital revolution owing to accelerated and ramped up innovation comes into the picture, quite significantly. This shall enable the readers to grasp the connection between the two fields, gradually. Further, the study moves forward to throw light upon some of the most contemporary trends in this field. The study has attempted to elaborate on the basic notion of their functioning, which has enabled the medical arena to incorporate such a sophisticated technology in its latest procedures and how. In addition to the same, the researcher have also analysed the scope of IP management in case of AR and VR. The final two trends discussed by the Study are the significance and impact of Big Data in the health sector and a nascent technology called Digital Twin Technology, which is debated to be one of the tech-creations, leading the digital revolution in the health sector.

Understanding the Evolution: A Brief Literature Review

A successful research study is founded on prior knowledge. As a result, after stating the research problem, the researcher must review the available literature in the specific area of study. This aids in understanding the nature and design of the research investigation and demonstrates that the researcher is aware of what is already known about the research problem. Thus, a review of the literature assists the researcher in avoiding duplication of what has already been done.

The researcher can gain insight into the research problem by using information gathered from the literature, which will allow her to present the problem in the proper context. As a result, studying previous literature can often provide the researcher with useful hypotheses.

Woodrow Barfield and Ugo Pagallo in their book “Research Handbook on the Law of Artificial Intelligence” have discuss how, in the last two decades, the field of artificial intelligence (AI) has made vast changes, but as smart as AI is now it is getting smarter and more autonomous. This poses a host of challenges to existing legal doctrine, including whether AI/algorithms should count as ‘speech’, whether AI should be governed under the laws of antitrust and criminal law, and whether AI should be treated as an agent under agency law or held liable under tort law for injuries. This book contains chapters on the role of law in an era of increasingly intelligent AI from US and international law scholars, discussing these and other concerns that are crucial to the field's evolution.
Christopher Heath, Anselm Kamperman Sanders, Anke Moerland; in their book Intellectual Property Law and the Fourth Industrial Revolution approaches the fourth industrial revolution from the perspectives of technological history, culture and law, providing the first in-depth legal commentary and study of this highly topical issue. The definitive study of how the data-driven economy affects innovation and the transition of technology is unparalleled. Practicing attorneys in intellectual property rights and competition law, as well as scholars, think tanks and legislators, would be invited.

Craglia in his book has overviewed of the main legal challenges raised by widespread use of AI and found out that it has two ramifications for the legal sector: the modernization of working processes and procedures and the evaluation of the implications of new services in various sectors. AI provides jurists different resources that are useful for carrying out the work, allowing decisions in legal cases to be anticipated, and also allowing for a vast review of documents and pattern recognition. There are AI applications in the area of prevention of corruption to assist law enforcement and judges in their work. Chat bots are now allowing customers, without consulting costly legal experts, to solve their own problems.

María Jesús González-Espejo, Juan Pavón, in their book an Introductory Guide to Artificial Intelligence for Legal Professionals discuss How artificial intelligence is rapidly becoming a part of our daily lives, transforming the way we work, shop, travel, and communicate. However, we are still in the early stages of investigating the various ways in which AI can influence, society, and community, as well as challenge. There are numerous myths and concerns about the existence of AI and the threat it poses to humanity in particular. Given the widespread reservations and reservations, a factual basis for policy discussions on AI innovation is important. We aim to add evidence through this study and bring clarification to this critical field of debate.

WIPO in its report “Promoting Access to Medical Technologies and Innovation” aims to shed light on the trends in AI innovation since the field’s inception in the 1950s, using a thorough analysis of patents and other details. The research included a study of patent data related to AI inventions, as well as data on scientific publications, litigation filings, and acquisition activities. These data results are thoroughly discussed, and feedback from more than 20 of the world’s leading AI experts and industry perspectives is provided; more detailed datasets, patent search methodology, and expert contributions are freely available on the WIPO website. We hope that this study will be a valuable resource for companies, scientists, and policymakers in the field, as well as general readers looking for information.

In the WIPO Technology Trends 2019: Artificial Intelligence. Geneva: World
Intellectual Property Organization. It is in a way, the best of times at present. While many aspects of our present-day culture could certainly be described as the worst of times,’ technological advances have revolutionized our way of life and changed many things for the better. At the same time, it is the age of faith and unbelief, where we rejoice in computers that seem to be able to build and even invent artistic works. The interface between AI and intellectual property (IP) law is readily apparent and there are several possible topics in this article. This chapter gives a bird's-eye view of the current status of research on some of the related legal issues, mainly from the viewpoint of EU civil law.

Firth-Butterfield and Chae in the World Economic Forum’s (WEF) white paper Artificial Intelligence Collides with Patent Law A recent study states that since 2011, with an average annual growth rate of 43 percent and 83 patent applications, AI has become one of the fastest growing Fourth Industrial Revolution 19 (4IR) sectors. However there are a variety of legal uncertainties confronting the accelerated rate of patent applications. In this section, a sample of patent-protection problems for AI that consistently occur across jurisdictions and societies is given. One way to better align the promotion of creativity with addressing ethical issues may be to lower the subject-matter patentability requirement for AI innovations relating to fields considered more socially beneficial, such as healthcare, the environment, criminal justice and education.

**AI In Platform of Healthcare:**
There is no doubt that I will lead to automation of employment and it can also control the workforce but in the case of health care no such employment has displaced human force yet. Though it can be used in performing Digital ways but it is still too risky in direct contact with the patients. AI reads and interprets images while in the course of actions doctors do more than that , there is huge risk as AI cannot be 100% accurate all the times like radiologists and most importantly it requires a lot of labelled data to be attached for image recognition through algorithms . AI is one of the most powerful inventions of human which have both negative and positive impact. The technology is a huge success but it too comes with certain consequences, it can be dangerous and harmful if not used in good intentions to the mankind, especially in the health care sector. It requires a constant power of human for guidance and attention.

**The Involvement of AI In Healthcare in Future**
The AI in health care is believed to offer many aids in the future. In the case of machine learning it will do wonders in providing a precise medication. As of now AI has to develop a lot in diagnosis and treatment in early state of any health issue but it can be said that it will soon conquer that sphere too. By the help of remarkable image analysis by one day it
will replace radiologists and pathologists by its technical machine for examination purposes. It already reaching milestones in patient communication. It seems pretty clear that in upcoming decades AI will take over human help in healthcare sector.

**Internet of Things and It’s Applications in Healthcare**

The modern world is a huge contrast to the early and traditional life of people. As result types of equipment were very primitive and quite simple which was enough during that age. But as time passed, with a variety of demands from society, technology was required to evolve from the smallest of things to the big so that it could be effective and cope up with the newer change.

Technologies that connect and exchange data with other devices are called the Internet of Things. This was much needed for efficient time management and providing precise results. This has been especially helpful in the healthcare field, to prevent any delays in delivering any health care services. This chapter will specifically concentrate on the applications of the Internet of Things in the healthcare industry. Further, it will also go into the advantages and disadvantages of these technological instalments and lastly, a few ways of improving them.

With the recent trend of obtaining internet-based devices, new and high-tech types of equipment are introduced so applications would be many in general as a result only a few would be discussed.

**Implantable Glucose Monitoring Systems**- Embedded with sensors, devices could be placed just below a patient's skin which can send information to his or her mobile whenever the glucose levels get low for preventing any further risks.

**Activity Trackers**- This device could be useful in keeping track of the patient's movements, fatigue, his or her overall lifestyle, etc. The data collected of the whole treatment will alert the fitness instructor if any changes are required.

**Heart Monitors**- Patients can wear devices that could determine if they have high blood pressure or experiencing an erratic heartbeat then these devices could give a quick report if they are undergoing any strokes, heart attacks, and any impending danger. Ambulances can then be immediately available.

**Medical Alert Systems**- In an emergency, the individual could wear a medical alert bracelet which can inform the family members by notifying them on their smartphones, any help would be at his or her disposal.

**Ingestible Sensors**- Sensor pills that can be swallowed and after the ingestion, the information could be passed on to the patient's mobile that could help maintain a balanced routine. People who are under medications should go by a timetable.

**Medication Dispensers**- Implantable devices could be inserted into the body
dispensing steady doses during the day and refilled on a timely basis. This could also be convenient for the doctors as they would know whenever they might have missed doses in their routine visits.

Traceable Inhalers- These could report the causation of asthma attacks by transferring information to their gadgets. Physicians are also well informed with their health and also a constant reminder for the patients when to have their medications.

Connected Contact Lenses- These read the glucose levels of diabetic patients who could renew the focus of the eye and also enhancement of vision.

Location Services- Medical items should be tagged with a sensor so that they don’t get lost or stolen.

Remote Monitoring- Fitness trainers can make records about the patient's ongoing surgery treatment and could be alerted as soon as a patient experiences a critical stage. (IoT Applications in Healthcare)

These things open varieties of ways for obtaining valuable data and analyzed information in a quick and sophisticated technique. These devices help in healthcare by giving out practical and reliable data producing much better solutions and discovery of previously unknown issues and also develop existing technology. It tries to fill up the gaps between ways of delivering healthcare, creating a system and not just mere tools. It then brings forward shortcomings in this field and proposes different ways of improvement. It encourages the people of the medical department to expertise in their field of interests in an innovative way.

It helps to achieve better data and equipment that are precise and swift. The devices overall improve the health of individuals in the facilities as well as those in the professional practice. It enables patients to recover their health in environments where they are most comfortable. Individuals can manage independently by themselves and if needed help is always at their back of the call. (IoT Applications in Healthcare Field You Must Know)

They lack faithfulness to the privacy of individuals. There are confusions concerning data ownership and regulation. Thus, the data are prone to thefts and it is also vulnerable to cybercriminals compromising personal health information.

Data overload is one of the main concerns as it affects the whole system as well as covers most of the vital and important information. Devices could stop functioning properly if there is an overloading of data. Costs are huge as it requires a great amount for installments as well as an equal amount or more for maintenance. However, the costs are relevant if this equipment solves a genuine problem. At one end it requires a huge amount of money while the other reduces manpower and increases productivity. (Sheldon, 2019)
The devices with IoT can be secured by password protection by creating strong passwords like digital codes and with upper and lower cases which could be only known to the user. Another method to provide IoT security is to restrict the use of the internet on the connected devices by confining to only certain features of the software and it should be updated from time to time. The individual needs to do constant checks and immediate action should be taken to eliminate any bugs or loopholes found. Ignoring these could be devastating as it destroys the whole system and retrieval of all the important data is not easily possible.

The devices should be connected only to their private network preventing other public networks to have access to critical files. There should also be control in access of data for certain devices for the prevention of unauthorized access.

Hacking is the most common threat to this security. It becomes difficult for anyone who falls prey to this crime of advanced hacking attacks on their systems as it is very complicated and it could be done only by the experts. Precautionary measures should be taken to ensure that devices connected to the IoT cannot be spoofed having their own unique identity. (Joshi, 2020) As it is said prevention is better than cure so individuals should not wait for it to happen. It doesn’t hurt to be a little cautious ensuring one’s security.

Legality of use of Artificial intelligence in Healthcare

Artificial Intelligence (AI) is proving to be game changer in 21st century. In India, health sector is one of the dynamic and largest sectors in the country. This sector is expected to grow $6.6 billion by 2021. Using Artificial intelligence in this sector can give new life to the health sector. Currently, Government of India is working with NITI Ayog to promote artificial intelligence in health sector. Though Government is trying to promote and use artificial intelligence in health sector but there are no specific laws to regulate artificial intelligence in India. There are many fields under which artificial intelligence proposed to be used and is used in health industry. It consists of data storage, monitoring conditions, robotic surgery and data collection. In healthcare industry, hospital, medicine companies and diagnostic firms uses Artificial intelligence (AI). But Indian law will have to be amended and new laws have to be made so that artificial intelligence in health industry should come under the surveillance of legal system.

Liability of the AI’s: Consequence of No Express Legal Recognition

In current situation, if anything happens in the hospital during the treatment of the patient then doctor is held liable for its doing. It has been seen in many cases that doctors and other medical staffs were held liable under criminal and civil cases for their negligence. However, under the rules and regulations, doctors
and medical staffs are not held liable for the fault of the technology or not using the proper data. Therefore, there is no such liability on the company and the people developing or making the artificial intelligence soft and if a doctor and any medical professional does any wrong during the treatment of person while using artificial intelligence, it is also not clear that the person using the software or artificial intelligence during the treatment will be held accountable or not.

For example, data available in public domain suggest that many artificial intelligence solutions used for curing patients suffering from cancer has given very dangerous recommendations and solutions. Many reports have shown that where artificial intelligence was used to treat cancer patients, it recommended medicine and drug which could worsen the health of the patients. Under current situation, medical professional and doctors can be held liable for giving the drug recommended by the AI and they cannot the defense that the given drug was recommended by the Artificial intelligence solution.

**IOT and Data Privacy**

During the use of artificial intelligence method, there is continuous exchange of information of the patients between artificial service providers. Than this data are used for validations and generating algorithms. Though we have the data protection bill (DPC 2019) but the crucial information of the patient can be easily exploited for things beyond artificial intelligence.

After looking into this matter, health ministry has issued health security act. This law basically provides criminal and civil remedies for violation of data. It also proposes for the development of the national digital authority which will be primarily used for the protection of the healthcare database.

**Intellectual property rights (IPR) issues involving IOT**

The matters and authority related to the intellectual property does not accept algorithms patentability. It is the basis of which an artificial intelligence function. Under the provisions of the patents act, it doesn’t include algorithms under invention which is used for patent protection. Such rules may become hindrance in the development of the Artificial intelligence in India.

Artificial algorithms are generated with the help of the human work and collected data. Under the provisos of the Indian law, copyrights are granted to the creator of work with rights to regenerate that work again. It is not clear whether generating copies of this work for the development of the artificial intelligence could lead to the infringement of copyright by the developer. Currently, artificial intelligence is facing many challenges which can be solved by making effective law and policies on artificial intelligence. Artificial intelligence is playing and is going to play a major role not only in
the health sector in India and it is going to transform each sector of India. And as a result, we need an effective law to deal with the drawbacks of the artificial intelligence. Either parliament can pass it directly or it make laws on artificial intelligence by setting up a committee. In a long run, such steps will be helpful in the development of the artificial intelligence and the country as well.

**Conclusion**

The lacuna in present IP laws and Competition law has also shown the delay in technology transfer as the policies are not in place. The practice of use of AI for advancement of modern society and for smooth development of AI securing and encouraging innovation and creativity has to focused. The researcher also expects to find a policy structure for including AI in different Intellectual Property legislations, Competition law or propose amendments doing a thorough analytical study of the sui generis legislations.

**References**


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