

# Intellectual Property management in IOT and Big Data integration in healthcare for smart health monitoring

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## Abstract

From the early ages of human beings to the newest phase of aspiring humans the global vision increases our awareness between technology and life. Now a day's in the technological arena cloud computing plays a crucial role in today's healthcare domain because of its low cost and convenient service accessibility. IOT provides a wide variety of health care innovations to enhance the coordination and lifestyle of people in need. The authors in this chapter depict some of the recent trends of IOT and big data for smart health monitoring and also their applications are needed to be discussed thoroughly especially mobile health, Big data, etc. This would help the readers to understand the current emerging of technology in smart health. In addition to it, the authors will contemplate the pros and cons of the current emerging technology which has significant inception. Secondly, the most important factor has to be determined with the recent trends of innovation i.e. Intellectual Property Rights Management for collateral assets. This shall enable the readers to grasp the connection between the two fields, gradually. Finally, the objective of this paper is to gain knowledge on medical technologies and IPR management protection.

**Keywords:** Big Data, Artificial Intelligence, IP Assets, smart health, Internet of Things (IOT).

## I. INTRODUCTION

### Background

When we talk about the term "health care" the first thing that comes into the mind of the reader is the USSR declaration for healthcare. The term "healthcare" is defined as the efforts given by the medical practitioners to maintain physical/ emotional & mental growth of a well being. Earlier the techniques are not well equipped for the treatment whereas in the 21st-century medical technologies and treatment procedures are well advanced. Thus the concept of smart healthcare comes into the picture. According to Blue stream, Smart healthcare

means services rendered to the patient through some wearable devices and with the help of advanced medical techniques or diagnostic tools. The healthcare sector typically benefits greatly from the use of information technology, specifically IOT & Big Data. As of now, the authors throw a light regarding the advancement of the latest techniques so it is of utmost necessary to look into the legal protection of those technologies and that asset can be managed.

### Objective

The main aim to perform this analytical research is to identify the gaps about identifies the newest

form of technology that is being prominently used by doctors and physicians worldwide. This would help the readers to understand the current emerging of technology in smart health. In addition to it, the authors will contemplate the pros and cons of the current emerging technology which has significant inception. Secondly, the chapter will deal with the recent IPR protection and management of assets which provide legal protection

### Contribution

As of now, due to the rapid increase of population, Traditional health care is unable to accommodate everyone's needs, therefore in this chapter, the authors contributed and analyzed the depth of knowledge of various Smart healthcare mechanisms and how smart healthcare has been evolved. Secondly, the author contributed regarding the significant legal protection of various scientific innovations in smart healthcare industries through Intellectual Property Rights. As Intellectual Property has various facets therefore all the pros and cons and also the challenges faced by the people in the latest developments of medical science will be addressed by Intellectual Property Rights.

### Structure

The chapter has been structured into three parts by authors, the first part of the chapter will provide the healthcare mechanisms & evolution of smart healthcare which provide clear inception about the various healthcare mechanisms which are available currently for the betterment of the people at large. Secondly, the chapter has stated about Intellectual Property Protection and the evaluation of assets. Thirdly the challenges faced by big data have been analyzed by the Intellectual Property thus a legal remedy has been given to the people if any issue occurs concerning violation of privacy rights.

## 2. Evolution of Smart Health Care

As we've already introduced the concept of "Healthcare" [1] and "Smart Healthcare" therefore it is of utmost necessary to discuss the evolution of the origin of smart health care in detail. The concept of "Telemedicine" has been considered as a natural evolution of smart health care. The term Telemedicine was coined in the

1970s. The Greek word "tele" means "distance," and "mederi" means "heal." [2] Medical science is getting advanced day-by-day with the latest technique that utilizes sensors for information perception Transmit IOT information and store information through cloud storage. [3]. Now when we say some presentation or any form of technology is a 'smart' way of presentation it reflects how the whole system has been properly summarized adequately so here in the healthcare industries smart healthcare refers to proper management of hospital systems in one platform via virtual mode. Medical data are large so to handle all the matter efficiently cloud platform is required. As shown in figure 1.1, below the diagrammatic representation of smart health care. The cloud helps in storing the data and sending the data to the concerned departments for further analysis. When the patient gets registered they can pay the bills of the reports online. Moreover, technology changes society along with fueling the network connecting industries which creates enormous changes with the new generation of technology.

Now we'd like to discuss the emerging technologies that are certified by the medical board to be efficient for the treatment of patients.

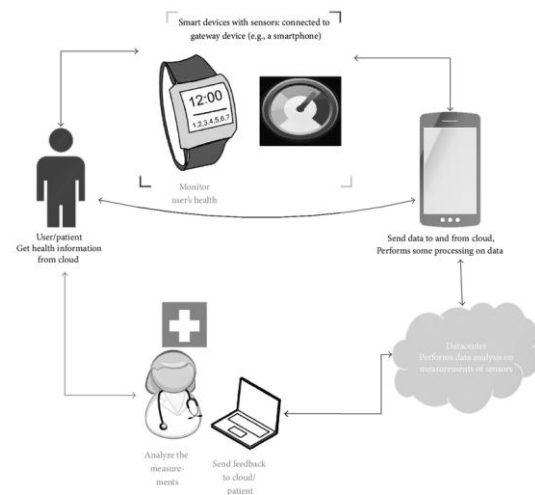


Figure Legends1.1: *diagrammatic representation of smart health care*

### 2.1. Artificial intelligence & Machine learning

Artificial Intelligence [4] has great importance in health care sectors, with the rapid advancement of effective techniques used in smart health care. Studies show that AI has great importance in smart health care as a software program has been provided by AI to elucidate data compilation which includes images,

sounds, text for a proper explanation as a result it becomes a boon to get success. Nowadays with the latest innovative techniques of computer application both artificial intelligence & machine learning moving forwards pertain to the improvement in health care. The essential requisite of artificial intelligence (AI) and machine learning (ML) in healthcare is to re-frame the health care industries and making the software for getting the correct answers and also helps to get precise answers with proper analysis of the complicated data sets.

Firstly in healthcare Logistic regression is used widely in solving problems in classification and the calculation of the risk of a certain event, making it an important method for assessing and further assessing disease risk. As shown in figure 1.2, below the diagrammatic representation of

Planning from generation of medical data through machine learning and figure 1.3 shows diagrammatic representation calculation of algorithms for dichotomous outcomes.

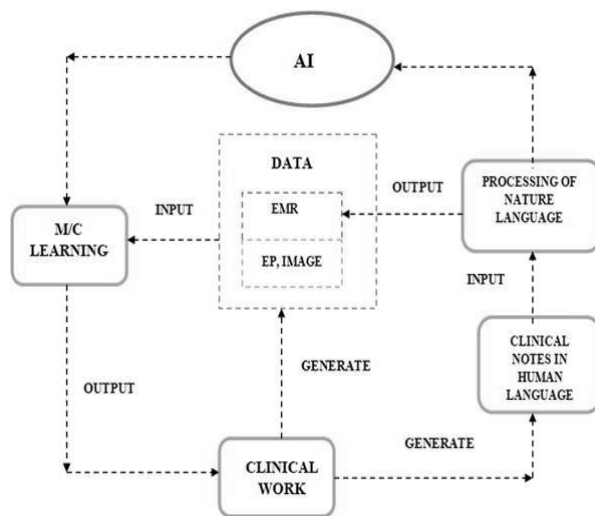


Figure Legends 1.2: the diagrammatic representation of Planning from generation of medical data through machine learning

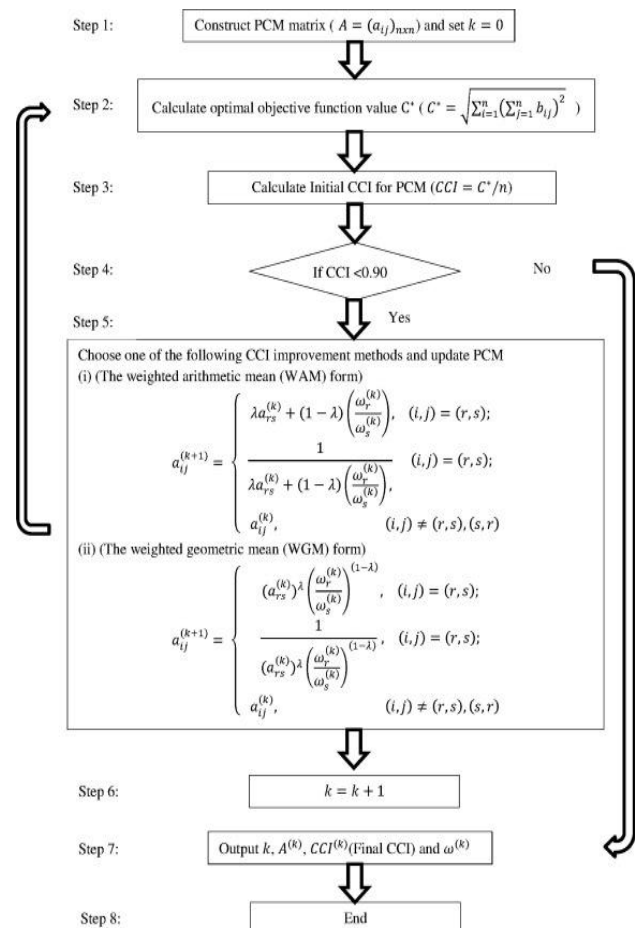


Figure Legends 1.3: diagrammatic representation calculation of algorithms for dichotomous outcomes

Secondly, the Support Vector Machine (SVM) is used in clinical researches, for instance, the identification of imaging biomarkers, cancer or neurological disorders diagnosis, and, in general, the classification of imbalanced or insufficient value data set information. As shown in figure 1.4, below the diagrammatic representation of calculation of algorithms for Support Vector Machine

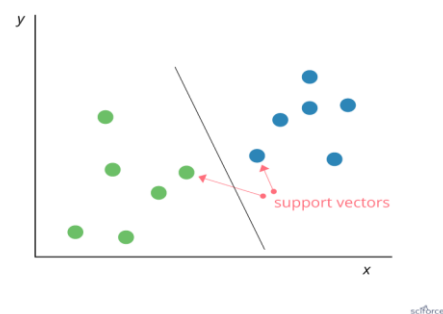


Figure Legends 1.4: diagrammatic representation of calculation of algorithms for Support Vector Machine

AI has various benefits in the health care sector like in technological advancement AI helps in diagnosing the patients remotely and also helps in providing the best treatment AI helps in accessing the previous & present health issues through the data provided and thus it saves the costs of the patient also. AI assures robotic surgeries without any hassle. But every technique has both pros and cons. The main cons of this technique are privacy issues, errors that have a great impact upon patients like for instance if any patient consumes any drug which is wrongly recommended by AI then it will lead to serious health issues. Machine learning also functions simultaneously with AI in identifying the disease, provides the best possible medicines for the treatment, and also keeps all the records updated which is the most essential requirement in smart health care.

## 2.2. Big Data

The word 'Big data' [5] means large amounts of data which can't be managed by ordinary software or virtual platform. It contains a vast volume of used storage, refining, and analytical power. The word 'Big' means a large volume of data Nowadays in all aspects starting from any research to academics Big Data is used to carry out for many purposes as I've already told that it which can't be managed by ordinary software or virtual platform, therefore, Artificial logarithms and the fusion of novel logarithms become mandatory to get a huge amount of data As shown in figure 1.4, below the whole workflow of Big Data Analytics and also in figure 1.5 below shows Analysis of such big data from medical and healthcare systems Machine Learning (ML) helps in getting quick automatic decision-making. figure 1.6 below shows the analysis of Big Data in Healthcare.

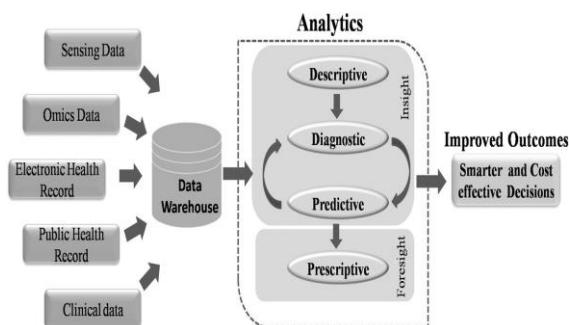


Figure Legends 1.5: below shows Analysis of such big data from medical and healthcare systems

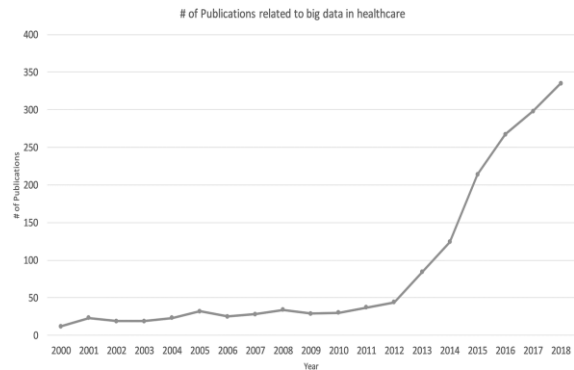


figure 1.6 below shows the analysis of Big Data in Healthcare.- Figure Legends

## Advantages of Big Data in health care

By Digitalization, integration, and effective use of big data healthcare organization from a single network of medical practitioners to a large group of the accountable network which has significant benefits. It has added benefits which have been stated below

### R & D in Pharma Industries

□ Analyze the health records of patients through clinical trials for identifying the indication of the discoveries before the product has been launched in the market.

### Public Health

□ Big Data helps in the analysis of deadly virus/ any element which is the cause of the outbreak of the disease and helps in getting proper medications.

□ It helps in managing the data with the help of the response based on detection of patient health status.

### Device Monitoring

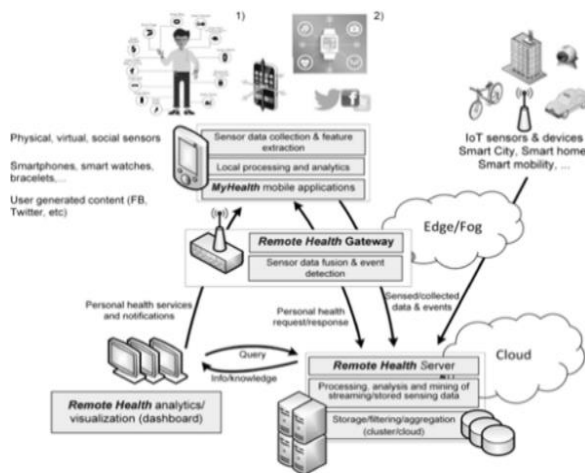
□ It helps in the analysis of large volumes of fast-transmission of Data for the safety of the patient with proper care and due attention on a real-time basis.

## 2.3. Internet of Things (IOT)

IOT [6] is a main essential component in healthcare industries as with the advanced development and improvement of applied mechanisms in health care IOT (internet of things) and statistical analysis, along with distinct smart ways of techniques which are conjoined with health service to make it healthier therefore the IOT allows for keeping

track of health care services through remote ways. The theory of smart health care enables collecting the data through information technology.

**Figure Legends** The general architecture of a large-scale distributed system based on medical IOT devices and Big Data processing and analytics for remote monitoring of peoples health and activities is given in figure 1.7



#### Advantages of IOT in healthcare

A medical practitioner will evaluate and regulate different parameters of his/her clients, for instance in the home or his/her office, on the cloud of IOT devices. As a result, patients will not have to be hospitalized or even visited by a doctor, which would significantly lower the costs of healthcare by early intervention and treatment. By connecting this information with other health records such as EMRs or PHRs, the status and progression for patients from the sub-clinical condition to the pathological state was expected. Indeed, IOT-generated big data was very useful to improve analysis and predictions in several fields.

#### 2.4. Mobile Health

In the era of Digitalization is one of the fastest-growing apps in respect of Healthcare [7]. Estimation states that around 3.4 billion people around the world are using mobile health apps. It collaborates with Healthcare organizations and provides the essential needs to the patients. To trail, the Patient's details about treatment for any further use like diagnostics or further treatment is done through the cloud computing services. This developing technology has helped in saving lots of money. It helps the patient in updating like going for a stroll or drinking water

etc. The repayment option is now available in Mobile health apps for patients who have used the healthcare services. 75% of the patients believe in the physicians for convenient experience for patients and cut the waiting times in the clinics. The total turnover is US\$28.320 billion in 2018. The challenges that need to be overcome for mHealth are confidentiality of information with is shared in this app on regular basis and it should be tracked off. Patient involvement should be increased as very few patients are relying on these apps.

#### 2.5. 3D printing

The word 3D printing [8] was used to describe a process when ink-jet printer heads layer by layer on a powder bed and deposit a binder material. The main solution for the industrial prototype method was a faster and less costly solution. The industry's favourite prototyping method is rapid prototyping (RP).[9] It was first filed for a patent application in the year 1980 by Dr. Kodama whereas he was not able to submit the complete specification so it was given as a patented product to Chuck Hull in 1986 for stereo lithography apparatus.

So it's crystal clear that it prints three-dimensional figures layer upon layer. In India, Hospitals are receiving various Applications for this technology and these technologies have helped in treating complex heart disease. In India hardly 3% of the Organization has adopted the 3D Technology 3D Printing has a lot of benefits in health care sectors with the current pandemic it has gained huge importance in providing and preparing personalized medicines and also it provides quick assistance for nurses and doctors in providing dosage thus it is customized as personal medicine for patients and it is also cost-effective. But it is not eco-friendly in nature because recycling doesn't take place.

#### 2.6. Digital Twins

Digital Twin [10] is defined as a digital representation of a real-world entity and it is an advanced form in healthcare. Before starting about the digital twin technology I'd like to say how artificial intelligence helps in health care with the effect of this new technology. Digital twin represents through mirror representation for bridging the physical & virtual realm through data transmission. With the advent of artificial intelligence digital twins helps in reproducing

real-world situations & improve operations with major alterations. With the help of biotechnologist and engineers, patients are watched carefully through online medium mode with the help of the mathematical models of real-world objects for accurate results. Moreover, through remote ways, doctors can monitor the patients. Since digital twin is defined as an essence of a computer program with a real-world data reproduction therefore it is a boon for health care now in Covid 19 pandemic also as it saves the cost of the people as it creates specific treatment plan with the help of computation of data analysis. It also helps them to make the right decisions through personalized recommendations. M-health is also emerging as a result of digital twins in the telemedicine & smart health care sectors. Thus IOT & big data enable the reproduction of data through online mode. The digital twin also determines the right therapy for the treatment for a specific purpose like for instance a person suffering from prostate cancer various range of treatment options are available starting from radiation to chemotherapy but the digital twin will check the records of the patients with a model of the prostate cancer then suggest the best therapy for the outcome of the patient by ensuring optimal decision making. Digital twin helps in the management of high-value care with the help of expanding the precise form of medicines and empowers the patient to manage their health proactively. It also helps them to get personalized information for health care from the physicians without any cognitive load.

## 2.7. Telemedicine

It is a mixture of communication technologies and information for medical Science [11]. The Government of India introduced this policy in response to a flare-up of Novel Corona-virus Disease (COVID-19) when the deadly Novel Corona-virus brought the whole country to a halt. Many countries, including India, have implemented physical distance as a precautionary measure to prevent the transmission of the disease to a large number of people. The lockdown has aided in delaying the spread of the virus and preparing outpatient healthcare services to deal with an emergency crisis. Yet due to the rise in Covid cases Telemedicine serves as an important tool in providing better clinical care to the patients from home itself.

## 2.8. Smart hospitals

Smart medical treatment[12] is composed of three main components: location, hospital and family. Intelligent hospitals rely on ICT environments, in particular those based upon techniques of IOT optimization and automated processes. The newly implemented features [13] help to improve the treatment techniques of the patients. There are three main types of smart hospital facilities necessary: hospital staff, patient services, and administrator services. This technology can also be used to identify and track patients in the hospital. Smart health care has great importance in drug control and management. It also helps in the reduction of costs and utilization of resources.

## 2.9. Interpretation of Cloud Computing in Smart Health Care

In the real world there is a lack of healthcare and support system which's the biggest issue, therefore to overcome the challenges the healthcare sector adopted (SAAS) software as a service for the collection of audio signals of the users. There are four layers in cloud computing that provide scalability, mobility, and security benefits to the users.

□ Cloud computing [14] is gradually becoming the pillar of Internet of Things (IOT) healthcare services the ability to share information more effectively and evenly between healthcare practitioners, caregivers and patients is another major advantage of cloud computing, reducing the risk that medical data will be lost. As a result, advances in technology like IOT and Cloud Computing supported health services. As the background for the platform is the Cloud Storage and Access Control Layer for Multiple Holders, which receives health information from sensors like BG or sphygmometers in daily operations. Through using the cloud platform, the authors were able to reduce the expense of storing and maintaining data. Furthermore, multiple In order to improve the protection and privacy of patient registers, tenant access management interfaces are installed between the tenant database and the shared database.

□ The Annotation Layer of Healthcare Data addresses the question of data heterogeneity that is common in data treatment. Given the differences in hospital equipment, the data generated is often heterogeneous, making

automatic data sharing and understanding between medical agencies more complicated. The authors proposed an open package of Linked Life Data (LLD) for the cloud framework to record personal healthcare and incorporate dispersed information within a patient-centered pattern.

□ The Healthcare Data Analysis Layer analyses cloud-collected healthcare data to help in therapeutic decision making, and equivalent historical data is helpful when designing a recovery strategy. for a similar disease situation.

Each level has been designed for a particular purpose and can be used by using cloud infrastructure and service-oriented architecture to meet a variety of healthcare requirements. The platform helped doctors track and analyse health conditions by uploading raw sensor data from the end user to the cloud server to be analyzed and then presenting results to doctors.

Now the next chapter will mainly be focused on Intellectual Property Asset management in smart healthcare industries followed by Big Data regarding the challenges for data privacy will be addressed by IPR

### **3. IP Asset Management & Smart Healthcare**

The current health sector[15] faces major developments at the end of the decade. Many of these focus on recent technological developments and show the strong trend towards new treatments. The major pillars of the next decade of healthcare progress are genetic engineering, big data and healthcare related technologies and all of them rely heavily on new or novel innovations. In view of the large quantity of research which is particularly relevant to the healthcare sector, the IP legislation has become a major player. BIOTech and medical research is concerned with patenting, as it increases perspectives for creativity and innovation, but in the business models of most healthcare-related industries other IP sectors are also important. We will examine, throughout this section, how healthcare is linked to healthcare and how that relationship will change in the years ahead. Consequently, this is the definition of IP law as legal rights governing creativity and innovation implementation. Intellectual property demands

that the rules for theft and ownership be alternated and more perplexed because these are more often indistinguishable and more difficult than actual property.

Therefore current medical emerging trends need utmost protection from being getting infringed. Now we'll talk about IP Assets and why it needs to manage?

IP Asset [16] is the collective of all forms of Intellectual property creations which include Trademarks, Patents, Copyright, trade secrets which are chosen by the entrepreneurs as per their business requirements. Like for an instance, a publishing company will require to manage copyright & trademark for gaining economic value because it enhances the financial values in the market. Business managers and policymakers perceive by using the terminology "assets" that IP is not only a legal right but is an economic advantage for all owners. IP is part of a larger economic context in which human capital is a productive and qualified workforce or a generation of scholars and scientists.

Human capital is of limited economic value without the addition of intellectual property because, in its nature, it is non-owned – human creativity can't be possessed – and has no status in law. Intellectual property is not created and cannot be protected and developed without human capital. The most important driver for economic development has been intellectual property. In today's knowledge economy, the combination of intellectual property and human capital is a powerful economic force.

#### **3.1 Why IP Assets are required to manage?**

Trademarks, international patents, copyright allocation and utilization, trade secrets, geographical indicators, domain names, registered designs, plant breeder rights, and technology are all examples of IP assets that must be managed in order to create value, special rights, profits, and consumer goodwill and loyalty. An IP asset helps in generating revenues from licensing or franchising the products. It also helps in promoting funds for research and development therefore for getting enhances the result. Valuation of the product also increases which helps in transfer pricing negotiations.

Therefore it has been clear to all the readers that why IP Assets are required to manage therefore now the authors would like to conclude that how IP Assets are managed in healthcare industries.

Intellectual property assets ("IP"), including business transactions in healthcare, are important to a wide range of business types. This article offers a summary of how IP rights under a transaction can best be protected, transferred, and preserved. The very next question comes to the mind of the authors that who is entitled to have IPR in healthcare? Health care IP is indeed a wide-ranging field. It also includes the IP of large institutes, including health centers conducting clinical trials at universities and medical research companies, and biotechnology and pharmaceutical companies. Now the authors would like to state the concept of IPR in healthcare industries, Health care Patents, trademarks, copyright, and even trade secrets have emerged as forms of IPR. A medical research board holds a novel technique by a process or system patent, while a pharmaceutical corporation develops a medicine or a new drug patent. Health services and organizations can also provide trademark rights for their books, guidelines, regulations, and process.

### 3.2 Artificial Intelligence and IP Assets Management

When we talk about Artificial Intelligence in healthcare the first thing that comes to our mind robotic images & design labs.[17] With the advancement of information science Artificial intelligence has gone far beyond our imagination and has been marked in different forms in various sectors. Artificial intelligence is the science of developing machinery and systems which can carry out tasks that are generally human intelligence. It is used in different sectors to help people easily accomplish difficult tasks, keep track of any data, client services, and simulate models and predictions that took years to complete. AI helps in diagnosing the patients remotely and also helps in providing the best treatment AI helps in accessing the previous & present health issues through the data provided and thus it saves the costs of the patient also. AI assures robotic surgeries without any hassle. But every technique has both pros and cons. The main cons of this technique are privacy issues, errors that have a great impact upon patients like for instance if any patient consumes any drug which

is wrongly recommended by AI then it will lead to serious health issues. Now IPR plays a great role in artificial intelligence which furthermore, needed to protect years of Research and technologies which has been developed in the medical era. IPR Law offers protection for inventions, creative activities, and ideas that are usually a large bag of intangible markets. To ensure they reach the right people and are put to proper use in saving lives it is necessary to make patent innovation and invention in the health sector. Therefore it is clear that in artificial intelligence & machine learning copyright and patents are needed to be managed as an IP asset. Copyright helps in protecting database records of every patient and patents help in protecting the process of using the machines and also the aesthetic aspect of the product. Since it is based on computer software therefore R&D of healthcare industries in valuation & economic benefit as valuation is an art that helps in assessing the value of the product through due diligence report. Due diligence is one of the important aspects which is needed to be done by the team as it is useful for the mathematical valuation of Intellectual Property.

Firstly we need to focus on the market-based value which focused on the valuation technique of the marketed product secondly cost-based value which focused on the purchase price determined by the cost to create or the cost to replace and thirdly value Based on Estimates of Future Economic Benefits is one of the best economic benefits which works on economic benefits for the future aspects. That helps in future earnings. So in healthcare industries, it is one of the main aspects which talks about ever-greening of product patent for future benefits.

### 3.3. IP Assets Management in 3d Printing

3D Printing can destabilize traditional production processes. It will allow users to bypass the manufacturer and 3D print a physical aspect created on a computer, or 3D scanned. [18] 3D Printing can allow users even to print patented and copyright designs in almost everything. By making 3D printing more accessible, a large number of various production processes might be created. In this way, intellectual property can be threatened and if not thieves, at least a loss of control of that property by the conventional manufacturer. The main important IP assets involved in Trademark, Copyright, and lastly Patents because the



probability of trademark infringement could increase 3D printing, as in the case of patents. However, it shall not take into consideration that the use of a Trademark for personal use or non-commercial purposes is a "use in commerce" and thus no trademark infringement. With 3D printing, the trademark aspect of 'use in commerce' will probably reappear. It would also be interesting to see whether a person could still prevent the use of trademarks in a non-commercial manner under the head of trademark dilution. Now copyright has great importance in 3D printing which has a real-world object or the creation, in a software package, of a digital representation through CAD. CAD computer program is then used to deconstruct a CAD file, transmitting it to the printer through the use of the computer code, in coordinates and dimensions. The software of the printer reads the file current sensing on formatting. Then each material layer, formed above the preceding one, is deposited in different sequences until a 3D item is created. The 3D Printing device and CAD files, therefore, constitute important components. The copyright of CAD and CAD software can be used even to prevent the 3D reproduction of file images.

The authors already told about the different aspects of IP Asset management in healthcare now the authors would like to elucidate the offenses & penalties.

1. Severe infringements of patient records will be punishable by up to 5 years imprisonment and a fine of up to 5 lakhs.

2. If a person deliberately, dishonestly, fraudulently, or negligently infringes the digital health data, shares information that is not anonymous or de-recognized, and a person failed to retain the information by legislative changes, standards, or rules, the data will be considered to constitute a serious violation of digital health data.

### 3.4. Big data & IP asset management

The word 'Big data' means large amounts of data which can't be managed by ordinary software or virtual platform. It comprises of used amount of storage, processing, and analytical power in a large quantity. The word 'Big' means a large volume of data nowadays in all aspects starting from any research to academics. [19]

IPR assets involved in Big Data are copyright, Trade secrets & Patent. However, data cannot create a digital transformation in its raw shape. It must be properly processed and it must be conducted to effect. When it is collected, it has to be carefully evaluated and proper results taken and meaningfully communicated. [20]

The process plays a vital role in intellectual property – from patented hardware for the processing and storage of data in copyrighted software applications for its organization and study. When an organization decides to conduct analytics, the final result is covered as a trade secret under IPR legislation. Any publications released using the findings of this review are therefore also safeguarded by IP legalization.

IP Due Diligence [21] has great importance in healthcare industries because Due diligence team has to value the IP Assets involved in Big Data. In general, Patent has great importance in Big Data for smart healthcare because to get economic benefit arises out of the patented product. Next is copyright as we all know the computer data are protected as literary works by copyright therefore The presentation and interpretation of the data is a result of increasing standard of innovation and the preparation of the database is original henceforth it is protective in nature. In the doctrine of 'Sweat of the Brow,' copyright protection will be used. Copyright protection of clinical guidelines and data may, therefore, be granted in Digital Health without originality of the content, provided that it is independently carried out by the creator or the author of such database. In such instances, the author of the work is entitled to safeguard and economically benefit from his efforts. Lastly Trade secret protects the exclusivity of data as a secret keeper for the company along with the confidential details. One of the smartest strategies would be to enter into a deal with the employees to reveal confidential information and trade secrets if they were to have remedies available. The non-compete clause is another way to safeguard the publication of unjustified commercial knowledge. In the absence of the exclusive law on trade secrets in India, an additional layer shall be attached to the combination of the non-disclosure agreement and the non-competitive clause to safeguard the proprietary knowledge and confidential information of the organization.

Finally, the authors would like to conclude the end of the chapter by challenges of big data for data privacy will be addressed by IPR.

#### 4. Various issues and challenges of big data in healthcare [22]

□ Data capture issues: Data capture for healthcare providers is one of the biggest problems because they do not have good data processing practices. For data to be more effective, it needs to be safe, precise, and correctly formatted to be used on different medical platforms. Data cleaning is also equally critical and this important factor, resulting in less reliable, incoherent, and meaningless data for most healthcare organizations, is overlooked. Another issue is the handling of high-cost data storage, as well as reliability and efficiency challenges that IT departments must solve.

□ Security Issues: For most health care providers with multiple intrusion and security breaches that have to be constantly handled, data security is one of the main problems. Data theft-healthcare data is vulnerable in a variety of areas, right from ransomware, phishing attacks, which pose more risks for healthcare organizations when they need efficient processes to protect sensitive data.

□ Privacy Issues: Whilst working with highly confidential details or important medical records, the health sector should be extremely vigilant. Information leakage can prove expensive for the healthcare organization as well, but without prior approval, it is often illegal to share them. HIPAA was introduced in 1996 to protect the privacy of patients and to protect classified information. HIPAA compliance in technology with data encryption, data masking, and other stringent data protection methods which enable restricted data access to others is thus the challenge for healthcare providers.

##### 4.1. Role of IPR in safeguarding the challenges of Big Data in healthcare [23]

The parity entre 'data security and 'intellectual property regulation' needs to be analyzed as the best approach to the work of computer-related databases. Section 63B of the Indian Copyright Act imposes a risk of violation on a computer for

any user who learns of an offensive copy of the software. The individual's right to intellectual property is based on the "practice, authority, and decision" aspects. The protection of the owner's right to certain works is essential in the case of law involving such works of literature, fiction, poetry, art, and movies. Data protection and data security are hard to differentiate under the Copyright Act. The object of data protection is to protect the privacy of people, While the protection of databases is aimed at protecting the creativity and expense of collecting, verifying and displaying databases in an unprecedented way. All partnerships adhere to the fundamental legal standards of entry, anonymity, possession, and evidence.

#### 4.2. CONCLUSION

Finally the authors have contributed the chapter about the role of internet of things in smart healthcare with various advancements in smart healthcare management. Apart from Internet of things cloud computing also meets the continuous requirements of pharmaceutical industries and also the medical practitioners to upgrade the skills for better treatment of patients therefore in the light of the pandemic epidemic, the pharmaceutical industry is well positioned to meet the primary needs of the medical community. Now IPR has an significant effect which the authors have discussed in the chapter especially Patent is a significant aspect of biotech and medical research as it increases prospects for creativity and innovation. Since there's a lot of advancement takes place in healthcare industries pertaining to Internet of things, cloud computing and Big Data therefore various collateral data sets are available which is termed as assets so under IPR it is known as IP Assets. The best ways to manage the IP Assets are stated in the chapter which has a significant inception.

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