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APPLICATION OF ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING IN THE MEDICAL AND HEALTHCARE SECTOR

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ABSTRACT

In this paper, we are going to discuss how the operations of Artificial Intelligence are boosting and involvement of machine learning is being increased from the last few years. Through this research we will also mention how different medical and healthcare organisation of different sizes, types and of various specialities are being more interested through its implementation. This context is also going to let us understand how such systems will become more advanced and thus, attain a huge potential and capability to carry out a wide range of tasks without the human control or input. Although, we will also come to understand that their applications can perform such tasks in a more improved manner apart from humans, but its execution at an extensive scale in similar sectors will also prevent huge number in computerization of healthcare skill full jobs for a hefty period. Such technologies will be helpful in rural and inaccessible areas where there is inadequacy of human resources. But, towards its complete adoption it is significantly substantial to train personnel's in AI and machine learning so that they are able to carefully supervise as well as manage sensitive healthcare information protect data against theft to consider its use effectively.

KEY WORDS: Artificial intelligence, Healthcare, Applications, Implementation, Information, Increase.

INTRODUCTION

AI (Artificial Intelligence) can be referred as the ability of machines to perform sensitive functions like thinking, observing, learning, problem solving as well as decision making (Bennett & Hauser, 2013). Such technologies from the previous few years are being increasingly prevalent and deployed in business, society and especially in healthcare and medical sector. Since the early 1950s, it has been introduced in medicine because some physicians considered some primary attempts to enhance their diagnoses using the computer-aided programs (Schläpfer & Wellens, 2017). These technologies have a huge potential to perform their tasks effectively and also towards the transformation in many aspects of

healthcare, administrative processes with regard to provider, payer and also pharmaceutical organisations. Machine Learning can be termed as a branch of AI that operates the data and algorithms to mimic how humans learn (Alanazi, et.al, 2017). Machine learning algorithms have a numerous variety of features like assisting to filter out electronic mail, perceive objects in photos and also analyse a large volumes of increasingly complex sets of data. With the use of Artificial Intelligence and Machine learning to create intelligent processes as well as applications will ensure to create medical facilities cheaper, more effective and personalised (Sundaravadivel, et.al, 2017). Healthcare sector of an economy is moving towards a drastic evolution. Latest technologies and new applications of treatment are being developed all over the world which is making difficult for healthcare professionals to keep up. In the below text, we will also review on how such technologies are gaining extensive adoption thus, it will help healthcare providers in order to have a possibility to take a greater predictive approach that tend to create a greater unified device with advanced care delivery regarding patient based processes. Hospitals, pharmaceutical industry and several healthcare companies have begun to recognise its ability to improve their decision making and reduce-risks in this field. These applications can deal with a massive quantity of records produced in healthcare and medicinal sector and locate new sources of related facts that would contrarily continue to be hidden in the mass of medical huge records. On the other hand, they can also ingest, examine and report large volumes of informational data's throughout the distinctive modalities to detect disorder and guide medical selections. This paper will also concentrate on several AI strategies for medical industry from the accounting, business and with regard to administrative prospects. The era of artificial in medical will potentially lessen care expenses and their repetitive operations via focusing the medical career on essential questioning and clinical creativity (Castaneda, et.al, 2015). In this field, the most common place where ML and AI are used can be referred as precision medicine. There are a number of applications of AI in medicine which are being used in a variety of medicinal fields those ones are as clinical, diagnostic, rehabilitative, surgical and predictive practices. With the help of its tools and applications medical firms have been able to acquire insights that were needed to treat patients efficaciously and effectively. Figure 1 shows the various applications of in healthcare sector.

Figure 1 Applications of Machine Learning in Healthcare

Source: www.rahulpaith.com (modified)

LITERATURE OF REVIEW

Before going further, let us first know what exactly Artificial Intelligence is. AI or termed as Artificial Intelligence is a well set of technologies that facilitate or provide the computers to perform various level of exceptional functions, including the ability to see, understand as well as analyse data, make certain recommendations on the basis of analysis and many more (Dilsizian & Siegel, 2014). It is considered to be a broad field because it encompasses several disciplines, including the computer science, data analytics and statistics and many more. It would be the capability for a system to "experience, think, and mimic" similar to human beings. For example machine learning which is considered, as one of the technology that are widely use in healthcare sector. The above mentioned advanced technology possesses their own set of determined responsibilities while catering machines (Mullainathan & Spiess, 2017). In fact, AI is also a main reason towards the formation of a variety of contemporary job openings that did not surprisingly prevailed from the past few years. Applications of AI are being authorised to install proficient and specific inventions that will assist to look after of patients suffering from these illnesses and optimistically discover a remedy for them (Khan, 2016). Their algorithm makes the system more accurate as they get the right set of

circumstances to interpret training data, which further benefits humans as they gets unprecedented insights into treatment variability, care processes, diagnostics and patient results. Report from CB Insights , acknowledged that around 86% of medical organisations, pharmaceutical manufacture companies, technology vendors are using such technologies and by the year 2020 such healthcare institutions will most commonly spend an average of around US$54 million on projects related to Artificial Intelligence. Through the use of Artificial intelligence machines can perform and execute numerous kinds of complex and simple tasks with greater efficiency and faster speed than humans would do. There are many potential applications of AI and ML in this sector and are broad and far-reaching from predicting several outcomes of electronic health records, management of clinical records as well as automation of redundant healthcare tasks (Devaraj, et.al, 2013). It is also going to play a major role with respect to redefining the way we process healthcare data, diagnose diseases, develop treatments and provide assurance to even prevent them altogether. The major applications of these technologies in healthcare and medical are as follows:

MANAGEMENT OF MEDICAL RECORDS: Machine learning algorithms can quickly and in a fast pace process vast amounts of clinical documentation that ensures greater accuracy with medical outcomes than ever before from traditional methods and identify their patterns. Eventually the processed facts can be used to tailor particular remedies to a patient, even to the extent of what healthcare practitioner can be best suited to cater to their needs and consequences which matters the most to them. Robots are trained to collect, store, re-format, and trace data with the use of such applications to provide the healthcare organisations with faster and more consistent access

DIGITAL CONSULTATION: In a rapidly transforming healthcare landscape, such technologies are also considered as a leading factor towards digital consultation with enhanced capabilities like more responsive AI assistants, intelligent healthcare providers and many more that embraces such technology. These applications are very helpful in rural and remote areas were people find it difficult to get consultants because of lack of healthcare facilities. Doctors and healthcare are able to access large volumes of patient's data very easily and in a quick way. This is among the most useful application as it offers the patient with a personalised experience which reduces the frequency of visits to the hospitals.

HEALTH MONITORING: Wearable's like smart healthcare trackers like those from Apple, Boat, Garmin Fit Bit and many more which helps to monitor heart rate and several

activity levels. These features helps the user to receive alerts to get more exercise which will at end share this informational data to their respective doctors on habits of their patients. Such data help the doctors to analyse and check their patient's conditions remotely and consult them or the hospital before any kinds of health issues arise.

HEALTHCARE SYSTEM ANALYSIS: Applications of AI and ML are continuously increasing in healthcare systems and such technologies are growing at a very faster pace than people may even realise. Changes in lifestyles among patients, increase towards life expectancy as well as the rising prevalence of diseases have contributed to its rising demand to detect and highlight mistakes done through traditional treatments which helps unnecessary hospitalisation of patients..

REDUCTION IN DOSAGE ERRORS: With the help of AI, the healthcare industry will be able to figure out and reduce the margin of probable errors while taking medications because, a single extra dosage of medicine prescribed by the doctor can have drastic consequences on the patient's body that is the patient must only consume the correct amount of medicine prescribed by medical consultants.

TREATMENT PATH: Technologies like AI and ML already have an overarching impact all across the healthcare and medical sector but despite such experiences it is able to go through massive amounts of patient's data to provide them with what kind of proper treatment path they should follow to obtain better care services and medications. They are able to predict what kinds of treatment procedures are specifically required through the analysis of data. Machine learning algorithms are very helpful while processing such vast amounts of clinical documentation to consider greater accuracy than ever before. With the utilisation of technologies such as Deep Learning and Artificial Intelligence healthcare organisations became capable to provide required treatment to their patients in a correct period of time which resulted to achieve better target selection of patients (Mesko, 2017).

ADMINISTRATIVE APPLICATIONS: Involvement of AI in medical organisations is also bringing changes in many of the administrative tasks which are as data entry, scheduling of appointments as well as claims processing. The healthcare or medical staffs are regularly overloaded with huge quantity of paper work in their care procedure so this workload has prompted the medical industry towards electronic systems with the help of AI based technologies (Hysong, et.al, 2011). Usage of chat bots in such administrative tasks are

identified as a potentially effective tool for quick engagement and conversation with patients and family members in hospitals.

DEVELOPMENT OF NEW MEDICATIONS: The distinctive benefit of Artificial Intelligence is that it permits the medical professionals to examine the preceding medicines and help them to use and revamp medications in order to allow them to fight in contrast to specified diseases. Machine learning models will be able to propose new molecules that will consist of certain properties that could fight against certain diseases, doing in minutes which might take humans several months to achieve manually (Kayala & Baldi, 2012).

ROBOT ASSISTED SURGERY: Many medical and healthcare organisations are willing to implement robotics that will allow medical professionals to complete their tasks appropriately which requires enormous amount of clarity, dominance and flexibility. The AI-based robots offers the doctors with a magnified, 3 dimensional visibility of the required surgical site that is unmanageable for doctors to look with their eyes.

AUTOMATION OF REDUNDANT HEALTHCARE TASKS: It is also one of the significant roles of AI based tools and applications in medicinal sector because they computerize unessential or unwanted time consuming tasks from healthcare organisations (Wallach, 2011). AI based systems are capable to perform necessary tasks in a routine manner and much better and faster than human employee those tasks are- accounting, managing the maintenance systems and information inquiry.

EARLY DIAGONOSIS OF FATAL DISEASES: Applications of AI certifies to be of substantial help as it helps to diagnose fatal blood related diseases at a very early stage. Doctors or physicians are able to scan harmful substances and bacteria in the samples of patient's blood at a much faster rate compared to speed while considering manual scanning. During the diagnosis accuracy needs to be maintained so that most of them could be cured at a certain stage where it does not turns fatal which will help to save numerous human lives.

FRAUD DETECTION: There are many patients who in search of effective healthcare consultant services that saves cost suffer huge damage from various fraudulent medical organisations but with the help of AI based tools and techniques such attempts have been detected and massively reduced. Before the introduction of AI and ML many fraudulent cases were registered regarding the treatment and now such tools help to detect these frauds.

Figure 2 presents the benefits of AI in Healthcare sector.

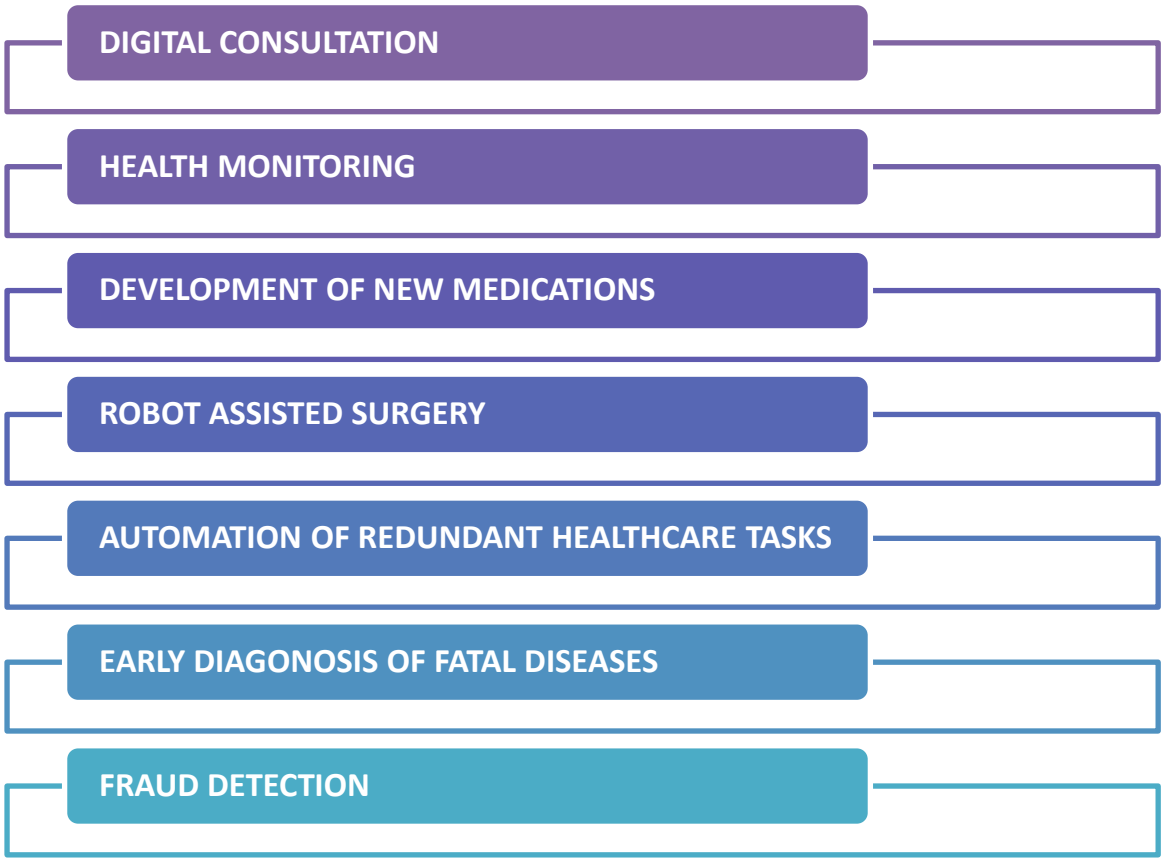

Figure 2 Applications of AI in Healthcare

Artificial Intelligence has helped the healthcare sector in many ways and therefore, it has led towards the development of many kinds of software's which will offer everyone with proper interactive and customised healthcare services (Hamet & Tremblay, 2017). The patients all across the world and in every corner of the society are facilitated with the improved access to healthcare services when required as the AI chat bots tends to help them further. Irrespective of such advantages most of the applications of Artificial Intelligence and machine learning are narrow, and still they are only able to carry out certain few tasks as well as solve some pre-defined problems. There are certain limitations in its functioning if AI is provided with inconsistent amount of digital data as well as poor quality of data then it can restrict the potential of AI. They will also be able to detect cyber-attacks and help to protect the computer systems of healthcare and medical organisations. While, AI applications have several positive potential that could be used for good in healthcare sector but such innovations can also be used for malicious purposes. So, to consider the best use of their applications many healthcare professionals and policy makers have raised an issue to deploy trained researchers with the relevant skills and knowledge in the relevant fields to evaluate and make the best use of Artificial intelligence and Machine learning. But at the end, AI

systems will need to make ethical decisions and be ethical. The applications need to be user-friendly so that it is easier for the healthcare workers to adopt these technologies.

CONCLUSION

We will conclude by saying that AI and their applications are on its way to become more useful at many levels in the healthcare sector that will enable them with better and faster patient outcomes. Some factors that need to be considered while introducing these applications to obtain better outcomes have also been mentioned. It has much potential that will help to ensure and address many healthcare challenges these are just some of the solutions that AI and ML is offering the medical industry. In the upcoming years, it becomes increasingly important that will help and ensure the patients with right care at the right time. Lack of AI trained professionals is also one of the major challenges in healthcare sector. Government should support the companies to invest in Artificial Intelligence and encourage training human workforce in such applications so that they are able to handle sensitive health information and data with care to protect sensitive information from patient's records against theft and use them in an effective manner (Latif, et.al, 2017). Through this discussion we have also come to know, that AI systems will not replace human clinicians on a large scale but majority of healthcare providers in medical organisations will tend to lose their jobs over time on its complete implementation.

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