Employment of Artificial Intelligence (AI) In Healthcare

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Abstract- The amount of data in the healthcare sector has increased greatly over the years. The availability of big data has necessitated the integration of artificial intelligence in healthcare to increase efficiency and healthcare quality. Various stakeholders in the sector such as healthcare providers and life sciences companies have already deployed the AI technology in healthcare. Some of the main uses entail diagnosis and providing treatment suggestion, administrative and management, patient engagement in care provision and adherence to the treatment plans. Employment of artificial intelligence in healthcare has greatly improved the quality of patient care, reduced medical costs, increased efficiency and has improved healthcare records management.

Keywords: artificial intelligence, healthcare, patient.

1. INTRODUCTION

Artificial intelligence and other related technologies have greatly been adopted in business enterprises and its application in healthcare is gaining momentum. AI technology has the capability to transform numerous patient care aspects, management processes by healthcare providers, financiers of health and pharmaceutical companies. Various research studies have suggested that artificial intelligence can work as well like humans or even far much superior than humans in performing some main healthcare roles like diagnoses of diseases (Sethi et al., 2020). For example algorithms are already performing better than radiologists at identifying malignant tumors, and providing guidelines to researchers on how to create cohorts for expensive medical trials. Nonetheless, it will take quite some time for AI to replace humans for advance medical domains and processes. This paper explores the potential of AI in healthcare sector and how it has been deployed in the sector.

2. ARTIFICIAL INTELLIGENCE RELEVANT TO HEALTHCARE

2.1 Rule-based expert systems

These systems are widely employed in healthcare for clinical decision support. Today, most of the electronic health record (EHR) providers provide a set of regulations with their structures. These structures call for human professionals and information engineers to create a set of regulations in a specific knowledge sphere. However, when the number of rules becomes huge and there exists conflicting rules, the system will break down. Moreover, change in knowledge domain makes it difficult to change the rules and times consuming. For these reasons, these AI systems in healthcare are being replaced by other approached based on data and machine learning algorithms.

2.2 Machine learning

Machine learning entails a statistical method used for fitting models to data and to "learn" through training models with data. The main usage of machine learning in healthcare involves precision medicine; foretelling what treatment protocol is likely to be successful on the patient. The prediction is based on several patient features as well as the treatment context. Deep learning, a sophisticated structure of machine learning, is applied in healthcare to identify the potential cancerous lesions in radiology imaging. Deep learning is also used in radiomics where their combination provides great diagnosis accuracy as compared with preceding generation of computerized image analyzing tools (Kalaiselvi & Deepika., 2020).

2.3 Robotic Process Automation (RPA)

This AI technology carries out specialized digital roles for managerial functions relating to information systems through following a script of guidelines. This technology is less expensive, transparent it its operations, and easy to program as compared with other forms of AI. RPA does not involve any robots; it involves computer programs and servers. In healthcare sector, RPA is used for cyclic tasks like billing and patient records update (Ratia et al., 2018). When used in collaboration with other existing technologies such as image recognition, they can be utilized to mine data from fax images.

2.4 physical robots

Physical robots are known to execute specialized roles like positioning, assembling objects and lifting in places like warehouses and factories, as well as delivering medical supplies to hospitals. Surgical robots was originally accepted in the united states in 2000 to grant 'superpowers' to surgeons, enhancing their sight capability, stitch wounds, and make precise and less invasive incisions (Kalaiselvi & Deepika., 2020). However, critical decisions are purely made by human surgeons and not the robots

4.5 Natural language processing (NLP)

Since 1950sunderstanding human language has been the aim of AI researchers. NLP entails applications such as text analysis, translation and speech recognition. Statistical NLP is anchored on deep learning neural networks and has led to increased accuracy of recognition. The major application of NLP in healthcare entails the production, understanding and organization of clinical records and available research (Trivedi, 2018). Natural language processing can examine patient's amorphous clinical notes, generate radiology examination reports, conduct conversational AI, and transcribe patient interactions.

3. DIAGNOSIS AND TREATMENT APPLICATION

Since 1970s, diseases diagnosis and treatment has been focusing on artificial; intelligence. The systems like MYCIN were promising to diagnose blood-borne bacterial infections and other diseases. However, the AI systems were not integrated then for medical practice since they were not superior than clinicians. Lately, IBM's Watson has attracted great interest for its breakthrough in precision medicine, more so for cancer detection and treatment. Watson utilizes machine learning and NLP capabilities combination (Trivedi, 2018). Nevertheless, Watson has faced some challenges as customers encountered some difficulties in teaching Watson how to tackle various cancer types and integration of Watson into care processes.

Implementation of AI technology in healthcare is facing numerous challenges. Despite rule-based systems being widely integrated in HER systems, they do not have precision of additional algorithmic systems that are based on machine learning. These systems are hard to maintain since they are overwhelmed by big data explosion as medical knowledge keeps changing. However, tech companies are working day and night to develop new AI technologies with equivalent or even better precision than human clinicians. For example, Google in collaboration with healthcare provision networks, they are building big data prediction models to caution clinicians on conditions with great risk such as heart related conditions. Jvion provides a 'clinical success machine' to recognize patients with high risks and those likely to respond to treatment protocols. These AI technologies are providing decision support to clinicians for effective disease detection and treatment (Krupinski, 2019).

Companies like Foundation Medicine and Flatiron Health are specifically focusing on various cancer types diagnosis and treatment suggestions based on their genetic expressions. Since most cancers are linked to genetics, it has become hard for human clinicians to understand all genetic cancer variants and their reaction to new drugs and protocols. Moreover, healthcare providers and payers are also utilizing 'population health' machine learning models to foretell populations at higher risk of specific ailments or to forecast hospital readmission.

4. PATIENT ENGAGEMENT AND ADHERENCE APPLICATIONS

For a long time, patient engagement and adherence has been considered one of the major barriers to achieving effective and good health results. When more patients are involved in active participation in their own well-being and care, the most desirable outcomes are achieved. Artificial intelligence and big data is addressing this issue currently. Hospitals and healthcare providers mostly use their clinical expertise to develop a care plan in an attempt to improve an acute or chronic patient's health (Sethi et al., 2020). However, it doesn't matter whether the patient does not comply with the treatment plan or fails to make behavioral adjustments required for the plan to be effective, non-compliance is often a major challenge.

Since it has been established that the deeper patient's involvement leads to better results, artificial intelligence technologies can be effective in personalizing patient's care. Messaging alerts and appropriate, customized content that stimulate certain actions at specific moments is an area of interest in artificial intelligence. In addition, there is a growing concern in healthcare to design effective 'choice architecture' to nudge patient behavior in a more predictable way depending on the real world evidence. Based on the data provides by provider EHR systems, watches, biosensors, and other gadgets, the software using AI technology can modify treatment recommendations by contrasting patient's information with other successful treatment plans for similar associates (Molnár-Gábor, 2019). Recommendations can be made available to patients, providers, call-center agents, as well as care givers coordinators.

5. ADMINISTRATIVE APPLICATIONS

Although the integration of artificial intelligence in healthcare administration may seem less revolutionary as compared to patient's care, AI technology in this sector can provide significant efficiencies. According to previous research, an average nurse in the United States spends 25 percent of working time on regulatory and executive roles. The AI technology that is relevant in this context is RPA which can be used for various activities like clinical documentation, medical records management, claims processing, and revenue cycle management (Kalaiselvi & Deepika., 2020). Some of the organizations in healthcare have deployed chabots for patient communication, telehealth , and mental health and wellness. These NLP-based applications have proved to be valuable for light transactions like making appointments and prescriptions refilling. However, some patients have expressed some concerns regarding confidentiality, poor usability, and inappropriate when discussing complex health issues. Moreover, machine learning can be deployed to claims and payment administration for probabilistic data matching across various databases.

6. FUTURE OF AI IN HEALTHCARE

Artificial intelligence plays a critical role in healthcare sector in the future. Although some efforts to detect diseases and provide treatment suggestions have demonstrated not to be easy, it is expected that AI technology will eventually master that field in the near future. Considering the rapid developments in AI for imaging analysis, there is a great likelihood that most pathology and radiology images will mages will be analyzed by machines. It is also expected that the usage of speech and text recognition for tasks such as patient communication will also increase (Peete, 2019). Moreover, it is crystal clear that artificial intelligence will not fully replace human clinicians in the healthcare sector but rather will enhance their efforts to offer patients' care. In the coming years, medical practitioners are likely to move towards tasks and job descriptions that rely solely on human traits like empathy.

7. FINDINGS

From this study, it has been found that artificial intelligent is playing a major role in the healthcare sector and has a great potential to facilitate healthcare delivery. Through AI, patients' engagement and adherence can be enhanced to offer personalized care. In addition, it has been established that artificial intelligence is never short of challenges. Some of the stakeholders in the healthcare sector might not favor the integration of AI into healthcare and may curtail the attempts to adopt this technology due to the fears that they might be replaced by this technology. This is because it has been established that some AI technologies can execute some tasks better than clinicians. Nevertheless, the time for artificial intelligence to fully replace human clinicians is not yet here. We have a long way to go. Human clinicians are still needed to perform various tasks which are beyond the scope of AI technology. For example, AI is incapable of exhibiting some human traits like compassion. At the moment, AI will only help

healthcare professionals discharge their duties faster and more efficiently. Moreover, there are concerns that have been found from this study with regard to data security, privacy and confidentiality, ethical issues, malicious deployment of AI technology, reliability and safety, as well as transparency and accountability. Since AI is a programmed system, it may not be able to contextualize patient's situation and it may give erroneous recommendations for the patient's condition. There is also a possibility that AI can be used to obtain information from patients without their knowledge. Therefore, there is a great need to develop some mechanisms to overcome these challenges in order to realize the full potential of this revolutionary technology offered by AI to transfor the healthcare sector.

8.   CONCLUSION

Artificial intelligence is being employed in healthcare sector for various roles and purposes. This technology is being used for disease diagnosis, chronic conditions management, healthcare services delivery, drug invention and research. AI has the potential to address myriad of challenges affecting the modern healthcare sector. However, the AI may be curtailed by the quality of available data and its inability to exhibit human characteristics such as feelings. In addition, integration of artificial intelligence in the health sector raises some ethical and social, and confidentiality issues which need to be addressed.

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