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An Empirical Study on Artificial Intelligence in Health Care

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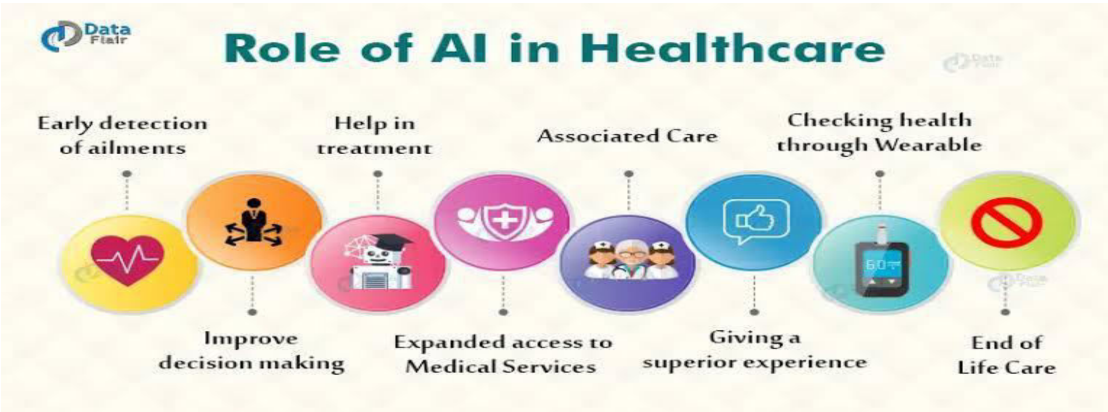
ABSTRACT: Due to the complexity and expansion of the data in the healthcare industry, artificial intelligence (AI) will be utilised more and more in this industry. Several AI technologies are presently used by payers, healthcare providers, and life sciences organisations. Recommendations for diagnosis and treatment, patient involvement and adherence, and administrative chores are the key application categories. Implementation challenges will prevent the jobs of healthcare professionals from becoming extensively automated for a considerable amount of time, despite the fact that AI can perform healthcare tasks in many instances just as well as or better than humans. Ethics issues and the application of AI in healthcare are also discussed.

I. INTRODUCTION

AI and related technologies are starting to be employed in healthcare. THEY are becoming more and more common in business and society.Several facets of patient care could be changed by these technology, as well as internal administrative procedures at payer, provider, and pharmaceutical organisations.

II. TYPES OF AI RELEVANCE TO HEALTHCARE

In fact, there are many different technologies that make up artificial intelligence. Although the majority of these technologies are immediately applicable to the healthcare industry, the precise procedures and jobs they assist differ greatly. Some particular AI technologies of high importance to healthcare are defined and described below.Several studies have already shown that AI is capable of doing important healthcare jobs including disease diagnosis as well as or better than humans. Today, algorithms already surpass radiologists in identifying cancerous tumours and advising researchers on how to create cohorts for expensive clinical trials. Nonetheless, we think it will be a long time before AI completely replaces humans in large medical process domains for a variety of reasons. In this essay, we discuss both the potential for AI to automate portions of treatment as well as some of the obstacles to its quick adoption in the healthcare industry.



III. NATURE LANGUAGE PROCESSING

Since the 1950s, AI researchers have been trying to understand how human language works. NLP is a field that comprises language-related applications like speech recognition, text analysis, translation, and others. The two main methods are statistical NLP and semantic NLP. Statistical NLP is based on machine learning, specifically deep learning neural networks, and has helped to improve recognition accuracy recently. To learn it, you need to have a big vocabulary.

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The generation, comprehension, and classification of clinical documentation and published research are the primary applications of NLP in the field of healthcare. NLP systems are able to conduct conversational AI, create reports on radiology exams, analyse unstructured clinical notes on patients, and transcribe patient dialogues.

IV. RULE BASED EXPECT SYSTEM

Throughout the 1980s and succeeding decades, expert systems built on databases of "if-then" rules dominated the field of artificial intelligence. For the past couple of decades, they were used extensively in the healthcare industry for "clinical decision support" purposes, and they are still used extensively today. Today, a lot of suppliers of electronic health records (EHRs) provide a set of guidelines with their systems.
A set of rules in a certain knowledge domain must be built by human experts and knowledge engineers for expert systems. They are simple to understand and operate well up to a point. Unfortunately, they frequently fail when there are a lot of rules (typically over a few thousand) and when the rules start to conflict with one another. Also, it can be challenging and time-consuming to update the rules if the knowledge domain does. More approaches based on data and machine learning algorithms are gradually replacing them in the healthcare industry.

Physical robots:
Given that more than 200,000 industrial robots are installed each year worldwide, physical robots are at this point well-known. In settings like factories and warehouses, they carry out predetermined activities including lifting, moving, welding, or assembling goods, as well as transporting supplies in hospitals. More recently, robots have improved their ability to work cooperatively with people and are simpler to teach by having them perform a desired activity. Also, they are developing greater intelligence as additional AI capabilities are integrated into their "brains" (really their operating systems). It would appear reasonable that over time, physical robots would include the same advancements in intelligence that we have seen in other branches of artificial intelligence.
Surgical robots give surgeons "superpowers," enhancing their vision, ability to make precise, minimally invasive incisions, close wounds, and other surgical procedures. They were first approved in the USA in 2000. Yet, important choices are still made by human surgeons. Gynecologic surgery, prostate surgery, and head and neck surgery are among the common surgical procedures performed with robotic surgery.
For administrative systems, this technology executes structured digital tasks as though a human user were following instructions or regulations. They are less expensive, simpler to programme, and more transparent than other types of AI. Robotic process automation (RPA) primarily use server-based software rather than actual robots. To behave as a semi-intelligent user of the information systems, it depends on a combination of workflow, business rules, and 'presentation layer' integration. They are employed in the healthcare industry for routine duties like billing, prior authorization, and patient record updates.
Although we have only discussed these technologies individually, they are increasingly being combined and integrated. For example, robots are getting AI-based "brains," and RPA and image recognition are being combined. Perhaps these technologies will become so intertwined in the future that composite solutions will become more possible or practical.

Diagnosis and treatment applications:
Since at least the 1970s, when Stanford developed MYCIN to identify blood-borne bacterial infections, the diagnosis and treatment of sickness has been a primary focus of artificial intelligence (AI). Although this and other early rule-based systems demonstrated promise for precisely identifying and treating disease, practical use of these systems was not pursued. They weren't noticeably superior to human diagnosticians, and the workflows of clinicians and medical record systems didn't fit them well.
In more recent times, IBM's Watson has drawn a lot of media attention due to its emphasis on precision medicine, particularly cancer diagnosis and treatment. Watson uses a combination of NLP and machine learning techniques. But as clients learned how challenging it was to educate Watson how to handle certain types of cancer and to integrate Watson into care processes and systems, their initial excitement for this technological use has subsided.Watson is a group of "cognitive services" offered through application programming interfaces (APIs), including speech and language, vision, and machine learning-based data-analysis programmes. Watson is not a single product. The majority of analysts believe that the Watson APIs are technically sound, but that tackling cancer treatment was an overly ambitious goal. Watson and other proprietary programs have also suffered from competition with free ‘open source’ programs provided by some vendors, such as Google's TensorFlow.
Several healthcare organisations struggle with AI implementation. While being widely utilised, particularly at the NHS, rule-based EHR systems lack the accuracy of more algorithmic systems based on machine learning. These rule-based clinical decision support systems are challenging to keep up with as medical knowledge evolves and frequently cannot handle the explosion of data and knowledge based on genetic, proteomic, metabolic, and other care-oriented approaches.

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Whilst it is more prevalent in IT companies and research labs than in healthcare settings, this scenario is starting to change. It hardly ever happens that a research lab doesn't declare that it has created a method for leveraging AI or big data to diagnose and treat a disease with as much accuracy as human practitioners. While some of these studies also use other types of images, such those from retinal scanning or genomic-based precision medicine, many of them are based on analysis of radiological images. This new era of evidence- and probability-based medicine, which is widely considered as beneficial but brings with it many issues in medical ethics and patient/clinician relationships, is being ushered in by the type of findings that are based on statistically-based machine learning models.

Also, a number of companies specialise in making suggestions for the diagnosis and treatment of particular tumours based on their genetic profiles. Human clinicians have found it more difficult to comprehend all genetic variants of cancer and their response to new medications and treatments because many tumours have a genetic foundation. Companies that specialise in this strategy include Foundation Medicine and Flatiron Health, both of which are currently acquired by Roche.

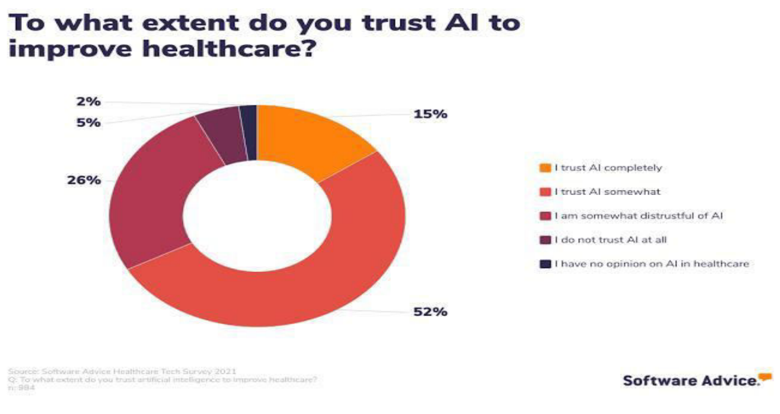
Yet, it can be difficult to integrate AI-based diagnosis and treatment suggestions into clinical workflows and EHR systems, regardless of whether they are rules-based or algorithmic in nature. Many AI-based capabilities for diagnosis and treatment from tech corporations are standalone in nature or only target a specific component of care, and these integration challenges have likely been a greater impediment to broad application of AI than any inability to give accurate and effective suggestions. Although these are still in the early phases, some EHR companies have started to integrate limited AI functionalities (beyond rule-based clinical decision support) into their products. Either providers will need to take on significant integration efforts on their own, or they will have to wait until EHR suppliers include more AI capabilities.

The future of AI healthcare:

In our opinion, AI will have a significant impact on future healthcare options. It is the main capability underlying the development of precision medicine, which is widely acknowledged to be a critically needed improvement in healthcare. It takes the form of machine learning. Although early attempts at making recommendations for diagnosis and therapy have been difficult, we anticipate that AI will eventually develop that expertise as well. With the rapid developments in AI for image processing, it seems likely that most radiology and pathology images will eventually be examined by a computer.It will become more common to use speech and text recognition for purposes like patient communication and clinical note transcription.

The largest challenge for AI in varied areas is not establishing whether the technologies will be capable enough to be beneficial, but rather ensuring their adoption in ordinary clinical practise.sectors. In order for AI systems to be widely adopted, they need to be endorsed by regulatory bodies, integrated with EHR systems, sufficiently standardised so that similar products function similarly, taught to clinicians, paid for by public or private payer organisations, and improved over time in the field. These difficulties will eventually be resolved, but it will take considerably longer than it will for the technology to advance. So, we anticipate limited adoption of AI in clinical practise within 5 years and more widespread use within that time frame.

Furthermore, it is increasingly obvious that AI systems will not substantially replace human clinicians in patient care but rather support them. Human physicians may eventually gravitate towards duties and work arrangements that make use of particularly human abilities like empathy, persuasion, and big-picture integration. The only healthcare experts who may lose their jobs in the future may be those who refuse to work with artificial intelligence.



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V. CONCLUSION

Artificial intelligence will be particularly beneficial for a nation like India where access to healthcare is not universally available and is considered a luxury by some. All people would be able to afford the services they need in their daily lives thanks to the implementation of cost reduction in basic healthcare facilities. As the prevalence of non-communicable diseases and communicable diseases increasing, AI will be more useful to people as it will be able to diagnose illnesses much sooner and save patients' lives lot more successfully.Our healthcare staff is under a lot of strain as a result of the growing population, which prevents them from getting enough sleep and causes them to become mentally exhausted, which in turn reduces how effectively they can care for and treat patients. By using AI smart robots, we can help our staff care for and treat patients much more effectively while also easing their workload. AI will allow for the treatment of more patients, narrowing the current gap between supply and demand in our nation. Ordinary men and women will be able to identify minor illnesses on their own with the use of AI-powered smart watches and bands, which will not only save their lives but alsotime which they saved and also used to offset the cost of their medical visit. Artificial intelligence has huge potential and will continue to develop yearly along with societal advancements and greatly benefit humankind.

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