Turkish Online Journal of Qualitative Inquiry (TOJQI)
Volume 11, Issue 3, September 2020: 695-701

Artificial Intelligence in Health Diagnostics

Jatinder Kaur

Asst. Prof. ,GSSDGS Khalsa College,Patiala jkkcp17@gmail.com

ABSTRACT

Artificial intelligence (AI) is a branch of computer science that attempts to replicate human cognitive functions. It has brought in a paradigm shift in the medical industry, owing to the rapid growth of healthcare data and analytical techniques[1]. In various medical fields, AI has recently outperformed humans, and this has resulted in widespread usage in healthcare. AI also has the ability to prevent, detect, diagnose, and treat a wide range of diseases using analytical approaches. This research paper will discuss different types of applications of Artificial Intelligence and how AI has been used in healthcare including its opportunities and challenges. Also, it will provide a view of the future of Artificial Intelligence in healthcare.

Keywords: AI, COVID-19, CT scans, GDPR, Chatbots

1. INTRODUCTION

In recent decades, Artificial Intelligence (AI) has played an increasingly important role in the world. Many people are unaware of the various ways artificial intelligence might manifest itself in their daily lives. Artificial intelligence algorithms are used to improve customer experience when entering into email accounts, purchasing on online platforms, and requesting automobile riding services, among other things. But the most important field where AI is growing rapidly in the medical field, especially in treatment management and diagnostic [2]. As a result, there is a fear that Artificial Intelligence would outperform humans in terms of tasks and abilities. Several studies have proven that Artificial Intelligence can support human judgment, aid clinical decisions, and increase treatment efficiency in the future.

Artificial intelligence in medicine is the use of machine learning models to search medical data and uncover insights to help improve health outcomes and patient experiences. Healthcare is transforming due to artificial intelligence. Artificial intelligence helps medical professionals in diagnosing. Artificial intelligence serves as a virtual nurse for patients. Artificial intelligence is similar to virtual assistance for doctors. Artificial intelligence also aids in the storage of large amounts of medical data. Artificial intelligence is also revolutionizing vaccine discovery. Artificial intelligence is playing vital role in finding vaccine. Millions of chemical equations are manipulated by artificial intelligence in the production of vaccinations. With the help of artificial intelligence, a large number of chemical compounds are invented in the vaccine creation process. Many healthcare organizations throughout the world have begun field-testing novel AI-supported

solutions, such as algorithms to help monitor patients and AI-powered tools to screen COVID-19 patients, in response to the issues that the COVID-19 pandemic has presented for many health systems.

The use of machine learning models to explore medical data and reveal insights to assist improve health outcomes and patient experiences is known as artificial intelligence in medicine. Artificial intelligence (AI) is increasingly becoming a vital aspect of modern healthcare, thanks to recent developments in computer science and informatics. In clinical settings and ongoing research, AI algorithms and other AI-powered apps are being used to assist medical professionals. Clinical decision support and image analysis are now the most prominent uses of AI in medical contexts. Clinical decision support tools assist practitioners in making therapy, medicine, mental health, and other patient-related decisions by providing quick access to relevant information or research. AI technologies are being utilized in medical imaging to assess CT scans, x-rays, MRIs, and other images for lesions or other findings that a human radiologist may overlook.

In response to the issues that the COVID-19 pandemic has created, many healthcare institutions around the world have started field-testing various AI-supported solutions, such as algorithms to help monitor patients and AI-powered tools to screen COVID-19 patients.

2. TYPES OF DISEASE PROGNOSIS

Robotics in artificial intelligence involves in low risk surgery. It involves in diagnosis and makes medical decisions in healthcare. Artificial intelligence guesses vaccines. It predicts medicine rapidly and accurately than medical professionals. It, in particular, predicts a particular medicine based on a patient's medical data very quickly. Artificial intelligence imitates human reasoning behavior. In the healthcare industry, AI is a prototype change. In the healthcare industry, a large volume of data is accumulated, which allows for quick analysis.

AI is beneficial in a variety of medical-related tasks. It also leads to advancements in tumor diagnosis, peripheral nervous system treatments, and heart surgery. It's very astounding to consider AI as a replacement for medical doctors. The first thing to remember is that in terms of accuracy and speed, AI outperforms medical doctors. Many medical experts have questioned the benefits of AI in medicine in a variety of publications. It also contains a sophisticated algorithm that allows machines to learn about medical data and process it for clinical use.

At the same time, it aids the system's learning and correcting capabilities, resulting in accurate response outputs. In order to do so, AI assists medical practitioners in acquiring real-time knowledge from resources in order to respond to patients. Humans, not machines, make mistakes. Prognostic flaws, which are inescapable in humans, are omitted by AI.

A) Watson, an international business machine, has discovered a way to detect skin cancer. Artificial intelligence aids oncologists in the diagnosis of skin cancer at various stages. Watson examines medical photos to determine the type of skin cancer that has been detected.

B) Cervical syndrome causes quadriplegia. Quadriplegia is caused by a spinal cord injury. Quadriplegia patients suffers in lack of movement. Quadriplegia patients can benefit from artificial intelligence to help them move and control themselves. This artificial intelligence is used to control

the movement of apps on the user's Smartphone.

C) By recognizing heart pictures, artificial intelligence in cardiology aids in the identification of cardiac disorders. A computer program analyses MRI pictures of the heart to detect irregularities in cardiac function. The disorders mentioned above are fatal syndromes. Artificial intelligence aids in the treatment of many diseases, and as a result, artificial intelligence plays a critical role in saving lives.

D) A typical cause of high blood sugar is retinopathy and cataract. Artificial intelligence analyses retinal pictures and predicts the progression of eye disorders. In artificial intelligence, machine learning is used for diagnosis, whereas deep learning is used for both diagnosis and treatment. Stroke is another fatal disease on Asia's continent.

E) Early stroke prognosis is now possible because to artificial intelligence. A significant symptom of stroke is thrombus in the brain. In stroke prognosis, machine learning approaches like generic fuzzy algorithms are used. Images from MRI and CT scans are crucial in determining the prognosis of a stroke. Artificial intelligence uses scan images to predict stroke prognosis. Artificial intelligence aims to mimic human cognitive functions. Artificial intelligence aids in the extraction of patient opinions from hospital records. The number of patient opinions gathered is enormous. More manpower is required.

3. AI APPLICATIONS IN MEDICICALSCIENCE

There are numerous ways AI can positively impact the practice of medicine, whether it's through speeding up the pace of research or helping clinicians make better decisions. Here are some examples of how AI could be used:

A) CREATION OF DRUG: Every system that uses Artificial Intelligence has the added benefit of completing its duty in a short amount of time. Analysts have been taking longer to generalize findings in healthcare, but Machine Learning algorithms are being employed in health systems to reduce drug discovery timeframes. Developing medications using clinical test procedures, for example, will take physicians and analysts several years and cost a lot of money [3]. As a result, using AI to reconstruct sections of the drug discovery process will be less expensive, faster, and safer.

However, AI technology may not be able to be used in all drug discovery methods. Rather, it aids in stages such as the discovery of novel molecules that could be used as medications. AI can also be used to determine the applicability of previously studied substances held in the laboratory. After the Ebola outbreak in West Africa, for example, Artificial Intelligence technology was employed to check for available drugs that may be tailored to combat the disease [5]. Two treatments were identified in a single day, although human intellect takes months to years to undertake identical analysis. In order to expand the capacity to offer quicker drug research and development, the future of AI in drug creation is the combination of in-memory computing technologies with AI platforms [6].

B) TREATMENT DESIGN: AI technology has enhanced treatment tactics and aided the analytic process, providing a fulfilling treatment strategy as well as monitoring therapies, resulting in

advanced therapy in healthcare. In addition, Artificial Intelligence can analyze and recognize indications and symptoms in medical imaging such as X-rays, CT scans, MRIs, and ultrasounds. This allows for speedier diagnostics, lowering the time it takes for a patient to receive a diagnosis from months to hours.

C) MANGING MEDICAL DATA AND RECORDS: Every day, significant amounts of healthcare data are generated, necessitating the use of more data analytic technologies. These tools have aided healthcare companies in collaborating with patients and making informed decisions about enormous amounts of data while also reducing waste [4]. Artificial Intelligence allows for the modeling of intelligent behavior in a computer system, which can improve patient care by combining clinicians' knowledge, information, and human contact with the power of AI.

D) AI IN DISEASE DETECTION AND DIAGNOSIS : AI, unlike humans, does not require sleep. Machine learning algorithms could be used to monitor the vital signs of critically ill patients and notify clinicians if specific risk indicators rise. While medical gadgets such as heart monitors can follow vital signs, AI can take that data and hunt for more complex illnesses like sepsis. A predictive AI model for premature newborns created by an IBM client is 75 percent accurate in detecting serious sepsis.

E) PERSONALIZED DISEASE TREATMENT : With virtual AI aid, precision medicine may become easier to support. Because AI models can learn and remember preferences, AI has the ability to give patients with personalized real-time recommendations at any moment. Instead than having to repeat information with each new person, a healthcare system might provide patients with 24/7 access to an AI-powered virtual assistant that could answer inquiries depending on the patient's medical history, preferences, and personal needs.

F) AI IN MEDICAL IMAGING: In medical imaging, AI is already playing a significant role. According to studies, AI powered by artificial neural networks is just as good as human radiologists at detecting signs of breast cancer and other diseases. In addition to assisting physicians in recognising early signs of sickness, AI can also assist in making the massive quantity of medical images that clinicians must maintain more manageable by detecting important aspects of a patient's history and presenting the relevant images to them**.**

G) CLINICAL TRIAL EFFICIENCY: During clinical trials, a lot of work is spent assigning medical codes to patient outcomes and updating the appropriate datasets. By delivering a faster and more intelligent search for medical codes, AI can assist speed up this procedure. Two IBM Watson Health clients recently discovered that by using AI, they were able to minimize their medical code searches by more than 70%.

H) ACCELERATED DRUG DEVELOPMENT: Drug discovery is frequently one of the most time-consuming and expensive aspects of drug development. AI has the potential to assist lower the costs of producing new medications in two ways: by improving drug design and identifying viable novel drug combinations. Many of the life sciences industry's big data concerns could be solved using AI.

4. AI OPPRTUNITIES IN MEDICAL SCIENCE

A) INFORMED PATIENT CARE: Integrating medical AI into clinical workflows can provide important context to doctors as they make treatment decisions. While the patient is still in the room, a trained machine learning system can help clinicians save time by providing valuable search results with evidence-based insights about treatments and procedures.

B) ERROR REDUCTION: There is some evidence that artificial intelligence (AI) can aid in patient safety. AI-powered decision support tools can aid improve error detection and drug management, according to a recent systematic assessment of 53 peer-reviewed papers assessing the influence of AI on patient safety.

C) REDUCING THE COSTS OF CARE: There are numerous ways in which artificial intelligence (AI) could help the healthcare business save money. Reduced medication errors, personalised virtual health aid, fraud protection, and support for more efficient administrative and clinical workflows are just a few of the most promising potential.

D) INCREASING DOCTOR-PATIENT ENGAGEMENT: Many patients have inquiries when they are not in the office. Chat bots that can answer basic queries and offer patients with information while their provider's office is closed can use AI to provide around-the-clock support. AI might also be used to triage inquiries and highlight information for further study, alerting doctors to health changes that require further attention.

5. PROVIDING CONTEXTUAL RELEVANCE: Deep learning has the advantage of allowing AI algorithms to distinguish between different types of data based on context. For example, if a clinical note includes a list of a patient's current drugs as well as a new prescription that their provider suggests, a well-trained AI system can recognize which medications belong in the patient's medical history using natural language processing.CHALLEGES OF AI IN MEDICAL SCIENCE

A) ENFORCING PRIVACY: While privacy is vital in any industry, it is often enforced even more stringently when it comes to medical information. Many hospitals and research organizations are wary of cloud platforms and prefer to utilize their own servers because patient data in European countries is often not allowed to leave Europe. It's difficult for startups to gain access to patient data in order to develop products or business propositions. Medical researchers usually have it easier because they may utilize standard application techniques designed to make research based on patient clinical data easier.

B) APPLY REGULATION: In Europe, AI algorithms utilized in healthcare must apply for CE certification. More specifically, they must be classified in accordance with the Medical Device Directive, as Hugh Harvey explains so clearly in this blog article. Class II medical devices are typically stand-alone algorithms (algorithms that are not integrated into a physical medical device).

The General Data Protection Regulation (GDPR) directives, which went into effect in May 2018, will result in several new requirements that must be followed and that are, in some cases, unclear. For example, some amount of transparency in automated decision-making will be necessary (see below), but it's unclear from the directives what level of transparency will be sufficient, so we'll have to wait for the first court cases to see where the line is drawn. Other concerns are anticipated to arise as a result of the informed consent requirement.

C) IMPLEMENTING TRANSPARENCY: Despite the challenges of setting boundaries, openness of decision support is, of course, critical in medical AI. A clinician must be able to comprehend and explain why an algorithm advised a particular procedure. As a result, more straightforward and clear prediction-explanation technologies are required. With the latest generation of AI systems that use neural networks, there is typically a trade-off between forecast accuracy and model transparency, which makes this issue even more critical. A article titled Counterfactual Explanations Without Opening the Black Box: Automated Decisions and the GDPR, co-written by a lawyer, a computer scientist, and an ethicist, offers an unusual perspective on transparency and algorithmic decision-making.

D) SOCIO-CULTURAL : Doctors make decisions based on their training, prior experience, intuition, and problem-solving abilities. It can be challenging to persuade doctors to consider recommendations from an automated system. Some components of AI literacy will almost certainly need to be incorporated into medical curricula so that AI is not viewed as a threat to doctors, but rather as a tool and amplifier of medical knowledge. Indeed, if AI is implemented in a way that empowers rather than replaces human workers, it might free up their time to conduct more important activities or provide more resources to hire more people.

E) ENGINEERING/TECHNICAL DEBT : In the last five to seven years, the latest AI algorithms that utilize deep neural networks have achieved incredible results. However, the technology and infrastructure required to enable these methodologies are still in their infancy, and few people possess the technical expertise required to address the full range of data and software engineering concerns. AI solutions will frequently face issues linked to limited data and fluctuating data quality, particularly in health. When fresh data comes in, predictive models will need to be re-trained, with an eye on changes in data-generation procedures and other real-world factors that could cause data distributions to drift over time. If several data sources are used to train models, additional types of "data dependencies," which are seldom documented or explicitly handled, are introduced.

In medical applications, transfer learning — using a pre-trained model and adapting it to one's specific use case — is often applied, but then a "model dependency" is introduced where the underlying model may need to be retrained or change its configuration over time. The large amount of "glue code" typically needed to hold together an AI solution, together with potential model and data dependencies, makes it very difficult to perform integration tests on the whole system and make sure that the solution is working properly at any given time.

Many of these engineering and technical debt difficulties might be solved by an operational AI platform like the one building at Peltarion, which can handle the complete modeling process, including software dependencies, data and experiment versioning, and deployment.

6. CONCLUSION

AI has a lot of promise in healthcare, but it will take a lot of work and progress in many areas before AI solutions can be used in a safe and ethical manner. Society as a whole must handle issues like regulation, privacy, and sociocultural elements, but AI software solutions like the Peltarion platform can assist minimize some of the challenges associated with engineering and technical debt. An AI developer can avoid worrying about software library dependencies, discrepancies in input data processing processes, and the unintended introduction of flaws into production code by using

an operational AI platform. This paper can help the readers to deeply understand the role of AI in disease prognosis and applications of AI in health care. The opportunities and challenges of AI in medical science are discussed.

References

1. Spector, L. (2006). Evolution of artificial intelligence. Artificial Intelligence, 170(18), 1251-1253. doi:10.1016/j.artint.2006.10.009
2. Puaschunder, J., & Feierabend, D. (2018). Artificial Intelligence in the Healthcare Sector. SSRN Electronic Journal. doi: 10.2139/ssrn.3469423
3. Ibric, S., Djuric, Z., Parojcic, J., & Petrovic, J. (2009). Artificial intelligence in pharmaceutical product formulation: Neural computing. Chemical Industry And Chemical Engineering Quarterly, 15(4), 227-236. doi: 10.2298/ciceq0904227i
4. Ali, O., Shrestha, A., Soar, J., & Wamba, S. F. (2018). Cloud computing-enabled healthcare opportunities, issues, and applications: A systematic review. International Journal of Information Management, 43, 146-158.
5. Agrawal, P. (2018). Artificial Intelligence in Drug Discovery and Development. Journal Of Pharmacovigilance, 06(02). doi: 10.4172/2329-6887.1000e173
6. Shahar, Y., & Combi, C. (2011). Artificial Intelligence in Medicine AIME 2009. Artificial Intelligence In Medicine, 52(2), 57-58. doi: 10.1016/j.artmed.2011.04.006