Future of Medicine with Artificial Intelligence

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ABSTRACT

Artificial Intelligence (AI) is one of the fastest growing technologies around the world. AI based system are capable of learning through various inputs provided to them and generate output based on their own analysis. These systems are substituting human effort and workload in various sectors, one of these sectors is healthcare and medicine as well. The use of such technologies have made decision making easier in some way, however there has been issues and problems associated with AI being used in medicine.

Keywords: Artificial Intelligence; Medicine; Imaging.

INTRODUCTION

Artificial Intelligence (AI), the advanced technology, is a set of system which includes computer and robust robotic components that can perform complex task without human assistance. AI is simply a branch of computer science, which includes a smart machine that has human like cognitive functions, ability of critical thinking and analysis. On general comparison, traditional machine work based on "YES" or "NO" (1 or 0), while AI has the capability of separating the outcomes in between 0 and 1. Additionally, conventional technology is designed to perform a specific task but AI on the other hand is capable of learning things to perform variety of task. In other words, AI technology allows computers to learn from various inputs provided to them and make independent decisions by themselves.[1]

With growing technology and huge budget being invested into the field of science and technology, many companies around the world are in race to produce AI based machines. Some of these include "ChatGPT", smart home solutions, face/fingerprint ID and so on. All these technologies are being used in our daily life knowingly or unknowingly, however they have made human life easier and reduced human effort in complex works.

The most common areas in medicine where artificial intelligence is used includes medical imaging, telemedicine, clinical decision support system and hospital database management systems. AI incorporated system are used in analysis of Computed Tomogrpahy (CT) scans, Magnetic resonance Imaging (MRI), ultrasound and other medical images, allowing the radiologist for quick and easy diagnosis and interpretation.[2] Similarly, robotic surgeries are being carried out, even when the surgeon is away from the operation theatre.[3] Clinical decision support system helps to maintain patient history, guide about medications, interact with patient's queries promptly and so on.[4] Some sectors of medicine where AI is observed to excel are discussed in the following sections.

AI tools in Medicine

With booming use of Artificial Intelligence in different fields, there has been significant advancement in AI based technologies used in medical field as well.[5] These technologies have the capability of revolutionizing the healthcare system. Various software and machine with artificial intelligence are already introduced and are widely used in medical field. The most common field of medicine where the extensive use of AI can be observed include:

Medical Imaging: AI algorithms are capable of analyzing medical images such as X-rays, MRIs, and CT scans to assist radiologists in diagnosing diseases. AI models detects patterns and anomalies that may be difficult for human eyes to identify, leading to faster and more accurate diagnoses.[2]

Drug Discovery and Development: AI is being used to speed up the process of drug discovery and development. Machine learning algorithms can analyze vast amounts of data to identify potential drug candidates, predict their effectiveness, and optimize drug dosage. This technology would potentially save time and resources in bringing new drugs to market.[6]

Personalized Medicine: AI can analyze an individual's genetic information, medical records, and lifestyle factors to provide personalized treatment plans. This has helped doctors to tailor therapies and medications to the specific needs of each patient, leading to improved outcomes.[7]

Medical Laboratory: Labs require precision and accuracy for good results. Chemicals and reagents need to be mixed with blood samples in precise amount and time. Various devices that can are self-capable of mixing required reagent in testing a specific a sample for specified test are widely used as automated analyzers in medical laboratories.[8]

Virtual Assistants and Chabot: AI-powered virtual assistants and chatbot provide basic medical information, answer common questions, and assist with triage. They are being used in healthcare settings to provide quick and accurate responses to patient queries, reducing the burden on healthcare staff.[9]

Robot-Assisted Surgery: AI-powered robots can assist surgeons during complex procedures, providing more precise movements and reducing the risk of human error. These robots are controlled by surgeons and perform tasks with increased accuracy and dexterity.[10]

Disease Diagnosis and Prognosis: AI models can analyze symptoms, medical history, and test results to aid in disease diagnosis and prognosis. They can provide doctors with additional insights and support in decision-making, leading to more accurate diagnoses and treatment recommendations.[11]

Predictive Analytics: AI algorithms can analyze large datasets to identify patterns and predict patient outcomes. This can be particularly useful in predicting disease progression, identifying individuals at high risk of developing certain conditions, and optimizing treatment plans.[9]

Hospital Management Information System (HMIS): The HMIS keeps track of overall hospital. Patient data, hospital income and expenses, staff management, hospital utilization indicators are recorded and analyzed through HMIS. In past, HMIS used to be based on "If-then" rule, but now they are incorporated with machine learning and are capable of analyzing hospital records and predict the outcomes of hospital for upcoming years, making every stake holders alert for necessary preparations.[4]

There are still many more aspects of AI in medical field that are currently under evaluation and process of development. These tools have certainly provided healthcare professionals an additional benefit, saving their time and increasing the efficiency of work. However, there has been clash between two schools of thoughts regarding use of AI in medicine. A group in favor of AI promote these technologies in healthcare backing up its ability of replace human effort and time, while the other group suggest, human life and medicine is sensitive and cannot be relied upon the decision made by computers, these should be backed by critical thinking of doctors and healthcare professional.[12]

CONCLUSION

Technology has revolutionized the way healthcare facility is delivered and managed. From telemedicine to machine learning, AI empowered system has fabricated the next generation of healthcare system. AI is a boon for improving productivity and efficiency while at the same time reducing the potential for human error. But there are also some disadvantages, like development costs, which makes them non accessible to low income countries, ethical and emotional setbacks, privacy concerns and diminished creativity among healthcare workers making them bland.

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