

Artificial Intelligence In Medicine

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Abstract- Artificial Intelligence (AI) refers to the creation of intelligent behaviour in computers with minimal human intervention. The concept began with early robot designs, influenced by Da Vinci's sketches. In 1956, AI became recognized as a formal field in science and engineering of making intelligent machines. In medicine, AI focuses on two main branches: virtual and physical. The virtual branch includes informatics techniques such as deep learning, managing health information, and aiding physicians in treatment decisions and health system control, including electronic health records. The physical branch includes robots used to assist the elderly patient or the attending surgeon.

Keywords- Artificial Intelligence, Future of medicine, Machine Learning, Neural Networks, robots.

I. INTRODUCTION

Artificial intelligence (AI) traces its roots to the concept of robots, a term introduced by Czech writer Karel Capek in his 1921 play *R.U.R.* (Rossum's Universal Robots), where robots were biosynthetic machines used as forced labour. The idea of humanoid automatons dates back to the 3rd century in China, when Yan Shi presented a mechanical figure to the Emperor Mu of Zhou. In the 12th century, al-Jazari, a Muslim polymath, created a cymbal-striking humanoid robot. During the Renaissance, Leonardo da Vinci designed a humanoid robot in 1495, capable of standing, sitting, and moving its head and arms, powered by pulleys and cables. Da Vinci's work later inspired robotic researchers, including those at NASA.

In medicine, a surgical system made by the American company, Intuitive Surgical, was named Da Vinci in recognition of his inspirational impact. It was approved by the Food and Drug Administration (FDA) in 2000, and the number of units in operation around the world is now over 5000. Da Vinci surgical systems facilitate complex surgery using a minimally invasive approach, and can be controlled by a surgeon from a console. The system is commonly used for prostatectomies and gynaecologic surgical procedures. It is starting to be used for cardiac valve repair.

II. APPLICATION OF A.I. IN MEDICINE

Early atrial fibrillation identification was the focus of the first AI application in medicine. In 2014, the FDA authorised AliveCor's smartphone-based ECG and atrial fibrillation monitoring, with the KardiaMobile device showing promise for mobile patients. Another Apple smartphone app for atrial fibrillation detection and ECG monitoring been authorised by the FDA. However, these devices have drawbacks, such as the potential for false positive results from artefact movement and the discomfort of wearing wearable technology for older patients with atrial fibrillation. AI has been used to predict the risk of cardiovascular diseases like acute coronary syndrome and heart attacks and alert patients accordingly, even though the results were generally inaccurate.

AI tools can also interpret pulmonary function results and make predictions. AI support devices for diabetic patients allow for continuous glucose monitoring and provide information on the direction and rate of change of blood glucose levels. FDA-approved Medtronic, for instance, has smartphone apps to monitor blood glucose levels in patients. These devices help diabetic patients optimise their blood glucose control, reducing the stigma associated with hypoglycaemic episodes, but occasionally the notifications also increase anxiety levels when patients are unable to regulate their blood glucose levels. Although their applications are limited, AI tools are seen in nephrology, where they can predict the decline of glomerular filtration rates in patients with polycystic kidney disease, and generate risk alerts for progressive IgA nephropathy.

III. ADVANTAGES

AI can positively impact the practice of medicine in various manners, whether through speeding up the pace of research or helping clinicians make better decisions. Followings are some examples of application of AI in medicine AI in disease detection and diagnosis:

ML models are used in healthcare to monitor vital signs of patients especially those in critical care, to prevent any possible risks. These AI models can alert doctors in cases

of emergency by assessing the input data. For example, AI can detect severe conditions like sepsis in premature babies, and it's shown to be 75% more accurate in identifying it. IBM'S Innocens BV uses AI technology to predict sepsis in newborns, helping doctors to respond faster and more effectively.

AI in medical imaging:

The artificial neural network has proven to detect disease symptoms as accurately as many radiologists. With the help of computer systems, number of medical images can be stored, making it easier for doctors to track a patient's history. This information is really valuable and also highly useful for providing the right treatment.

Accelerated drug development:

Developing new drugs is difficult, costly and slow, so computer-aided drug discovery is being used to make the process faster and to study their physiochemical and biological properties. This technology helps find the existing drug that can be repurposed for new treatments as they include low-risk compounds, with lower cost and shorter timelines. AI also helps design better drugs and personalized treatments based on patient history, while addressing challenges with big data in the drug industry.

Error reduction:

AI helps to improve the safety of patients and AI safety tools help spot mistakes, manage medications more accurately, and supports healthcare workers in their daily tasks. AI can make healthcare safer by helping doctors and nurses make better decisions. Overall, AI tools make healthcare more efficient and reduce the chances of errors.

Save time and resources:

AI tools help doctors and hospitals save time, allowing them to see more patients and provide better care. These AI tools make the process of diagnosing and treating patients faster and more efficient, saving hospitals time and money. AI also helps doctors review medical cases more easily, avoid mistakes, and improve the accuracy of health insurance decisions. It can reduce medication errors, prevent fraud, and help with both the administrative and medical tasks in hospitals, making everything run more smoothly.

IV. FUTURE DIRECTIONS:

As AI models keep getting better, new potential models are being designed to assist doctors with even more complex medical decisions by understanding different types of medical information. For example, a recent study tested how well ChatGPT-3.5 could assist with decisions about treating brain tumors. While it's not yet as good as expert doctors, ChatGPT-3.5 can still be a helpful tool to support medical professionals, especially in areas like diagnosis and treatment plans. In the future, AI could improve patient care, make it easier for caregivers, and help lower healthcare costs. However, there's still a big challenge in making sure AI is used ethically and in a way that works well with human judgment, especially when it comes to making decisions in healthcare.

V. CONCLUSION

AI has the potential to make healthcare much more efficient and effective. By taking over repetitive tasks, it can lighten the load for doctors and other healthcare workers, allowing them to spend more time directly helping patients. This means doctors can focus on what matters most—caring for people. AI can also make it easier for doctors to access important health data, which helps them make better decisions to prevent diseases and improve treatments. Additionally, AI can help diagnose illnesses more quickly and accurately, which could lead to better outcomes for patients. It also reduces errors in administrative tasks, like paperwork, which can be a source of confusion and mistakes.

While there are still challenges, such as dealing with cyber security threats, AI's role in healthcare is growing stronger. Small and medium-sized companies are helping to make AI tools even smarter and more useful. Despite some hurdles, AI is expected to bring huge benefits to the healthcare industry in the future, making it safer, faster, and more effective overall.

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