



REVOLUTIONISING HEALTHCARE INDUSTRY WITH ARTIFICIAL INTELLIGENCE

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ABSTRACT

Artificial Intelligence can easily and efficiently analyse vast amount of complex data and is continuously evolving. Healthcare industry produces a large amount of complex data whose analysis can benefit patients in a number of ways such as Diagnostics, Personalized Medicine, Drug Discovery, Virtual Health Assistants, Predictive Analytics, Administration. This incorporation will not only fasten the patient's recovery but can also help timely diagnosis of several deadly diseases. This article summarizes several areas where AI can play vital role and the challenges that AI may pose.

KEYWORDS: AI in health, Healthcare industry, Artificial Intelligence in the Healthcare Industry, Virtual assistance.

Artificial Intelligence (AI) has surpassed its position and nowadays is not regarded as a future notion; it is posing significant impact on many sectors, healthcare being the most impacted. AI is changing healthcare through better drug development speed, personalised treatments, operational outcome and diagnoses. AI is continuously evolving, and thus promising to enhance overall healthcare system delivering better results (Bajwa et al., 2021; Maleki Varnosfaderani et al., 2024).

AI in Drug Discovery

AI continues to play vital role in drug discovery, remarkably decreasing the duration and expense needed to deliver novel pharmaceuticals to market. Normally, drug development is a lengthy and costly process, that often takes years of experimentation and optimisation. However, AI can optimise this process by estimating the efficacy of molecules thus speeding viable drug candidates' identification (Schork, 2019).

AI driven systems can predict specific compound-receptor interactions by analysing intricate biological data. AI can uncover interesting medication candidates quickly by modelling molecular interactions.

Atomwise, a machine learning based drug discovery platform, uses the strength of neural network algorithms to identify different combinations of compounds binding to proteins, thus identifying possible drugs for various diseases like COVID-19, Ebola, and Zika (Wallach et al., 2015).

Another proven valuable application of AI is in repurposing of drugs that allows existing medicines to treat new conditions. For example, during COVID-19 pandemic, AI algorithm-based systems were used to screen potential antiviral drugs to treat pandemic virus (Zhang et al., 2020).

AI in Personalized Medicine: AI has also advanced in personalised medicine, which is based on patient's factors such as genetic profile, environmental factors and lifestyle choices to develop a customised therapy plan. AI data-processing prowess enables the development of unique treatment programs.

AI algorithms in oncology can mine patients' data to analyze mutations to extract information about effective cancer treatments and personalised therapies (Schork, 2019; Parekh et al., 2023). This prediction of response based on genetic profile towards medicines can reduce adverse drug response and thus improved recovery. In pharmacogenomics, AI can help analysing genetic data to gather information about a person's response towards drugs and can recommend specific medications reducing time and risks involved in trial and error (Doherty et al., 2018).

AI in Diagnostics: The integration of AI in diagnostics is one of the most profound ways in which the technology is transforming healthcare. AI algorithms, particularly machine learning (ML) models, are adept at analyzing complex medical data, including imaging, genetic data, and electronic health records (EHRs). AI-

driven diagnostic tools have already been shown to outperform human experts in specific tasks. For instance, AI has been used to enhance the accuracy of detecting various diseases, such as cancer, neurological conditions and heart diseases (Esteva et al., 2019; Alowais et al., 2023).

In radiology, Deep learning models can identify various disorders such as tumours, fractures, etc through analysis of CT scans, X-rays, and MRIs medical images. Google's Deep Mind AI system may detect breast cancer in mammograms more accurately than doctors (McKinney et al., 2020). AI enables physician to diagnose quickly and accurately minimising human errors and accelerating therapy.

AI in Virtual Health Assistants: AI based Virtual health assistants, have grown popular because they can help patients become more involved and make more efficient treatment. These AI-based applications make personalised suggestions to patients, can track their health, regulate severe conditions, can schedule and set reminders for appointments, daily routines and medications. They may also assist in providing primary health advice and can suggest appropriate nearest healthcare provider to patients. Furthermore, virtual assistants may integrate with wearable devices such as

smartwatches and trackers, and record regular activities to provide a continuous health monitoring that can suggest timely check-ups and future risks.

AI in Healthcare Administration: Another sector, healthcare administration is also significantly influenced by AI. With the help of AI regular time consuming and error-prone tasks, such as time management, billing, and managing insurance claims, can be automated leading to the reduced administrative costs and burden on healthcare workers.

Hospital procedures can also be standardised with the help of AI. These algorithms can predict patients' number, bed occupancy etc enabling smoother healthcare system, and improved resource utilisation (He et al., 2020).

AI in Predictive Analytics: AI powered predictive analytics with the help of massive data gathered from wearable devices, medical history, genetical data, smartwatches can predict the onset of illness such as early signs of hypertension, mental health issues and diabetes (Rajkomar et al., 2018). This prompt detection lets medical doctors to act early, that may delay the onset or may completely prevent the disease.



Figure 1: Applications of AI in healthcare industry

Challenges of AI in Healthcare: Amalgamation of AI and healthcare industry presents several benefits but there are numerous ethical and legitimate issues associated with this integration. One of the primary concerns is data safety and confidentiality as AI models for their accuracy should be trained with huge diverse sensitive patients' data. Organisations must comply with regulatory guidelines to guard patient data from misuse (Farhud & Zokaei, 2021).

Conclusion and Future Prospects: The use of AI has the potential to revolutionise healthcare by streamlining administrative tasks, improving diagnostics, speeding up medication development, and enhancing patient outcomes. As artificial intelligence (AI) continues to grow, its applications within the healthcare industry will

expand, providing unequalled prospects to improve the quality of treatment as well as accessibility. However, in order to ensure that artificial intelligence is beneficial to all patients, regardless of their origins, it is crucial to tackle ethical concerns, preserve data security, and promote diversity. The healthcare sector is on the verge of a new era, where AI and humans' partner to deliver better, more personalised, and more precise treatment to patients.

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