Artificial Intelligence in Healthcare Industry: A New World Order in Medicine and Allied

Artificial intelligence (AI) or machine learning is the simulation of human minds in learning and analysis. AI is mainly concerned with implementing neural network algorithms on a physical computation platform. There has been an explosive interest in AI in recent years, and AI will continue its momentum to develop as a powerful tool for biomedicine.[1] As AI can imitate human cognitive abilities, it has revolutionized industries, unlocked new opportunities and avenues of research, and increased efficacy. AI has emerged in various technical fields, from smart robotic systems for living, enabling people with disabilities to function efficiently, to biomedical information processing systems for multi-hospital clinical data analysis technology.[1] Breakthroughs in AI have been made especially for researchers in the biomedical field, as AI is doing wonders in disease diagnostics and prognostics. AI comprises a rich realm of complex algorithms that promptly adapt to the healthcare industry's needs, significantly contributing to biomedical engineering and healthcare. The research converging healthcare and AI has accelerated rapidly.[2]

Integrating AI in healthcare can revolutionize the industry, improving patient outcomes, streamlining clinical workflows, and reducing costs. Hence, there is a need to build these intelligent systems for automated diagnosis because they are powerful tools for reducing physician burnout and intraoperative differences and providing radiologists and pathologists exceptional support in managing workload. Results are more reliable, and efficacy is increased. It can improve the consistency of diagnosis and standardization of care. Due to the need for more healthcare practitioners in developing countries, the healthcare ecosystem has realized the role of AI-based tools as the next-generation technology in the industry. These intelligent systems have multiple uses in healthcare, such as disease detection, diagnosis and medical imaging, treatment planning, personalized medicine, drug discovery and development, and predictive analysis and risk assessment.[3] They are used clinically in identifying malignant melanoma, medical imaging (CT scans, MRIs, mammograms, and x-rays), and blood pressure. They can predict the risk of heart and kidney disease and assist in diagnosis in pulmonary medicine, brain waves, and histopathology. Moreover, they can also be used for bladder volume prediction, epileptic seizure prediction, diabetic retinopathy screening, and much more.[4] Much work is being done on diagnostics and histopathology concerning AI. Evidence from the literature shows that the accuracy of cancer prediction outcomes improved by 15%–20% over the years with machine learning techniques. Despite the perceived threat of AI, it is possible that AI tools can be a boon to pathologists by increasing their value, efficiency, accuracy, and personal satisfaction. AI is also revolutionizing dental imaging as it can interpret the imaging and diagnose caries and other dental pathologies.[5] AI can facilitate timely disease detection and assist in following the progression of disease over time. These AI-augmented healthcare systems will transform the healthcare industry and the delivery system. The superior computing power of modern computers and the considerable amount of digital data available for collection and utilization have made it possible for AI applications to flourish in the healthcare industry.

The progression of research in AI is expected to bring innovations in future healthcare. The future of AI in healthcare holds immense potential for improving patient outcomes, streamlining clinical workflows, and revolutionizing medical research. However, addressing the challenges and ensuring responsible AI development will be crucial. The future ventures may include Artificial General Intelligence (AGI): Human-like intelligence for complex decision-making, autonomous healthcare systems: self-sustaining, AI-driven healthcare networks, precision health: AI-driven prevention and treatment of diseases, Brain-Computer Interfaces (BCIs): AI-powered neurological treatments, synthetic biology: AI-designed biological systems for disease prevention, personalized medicine 2.0: AI-driven tailored treatments and therapies, AI-Assisted Surgery: Enhanced precision and dexterity, healthcare robotics: AI-powered robots for patient care and assistance and population health management: AI-driven insights for community health.[6]

There are substantial challenges regarding the widespread adoption and deployment of AI into healthcare delivery systems. These challenges include data quality and access, technical infrastructure, organizational capacity, ethical and responsible practices, and safety and cyber security related to AI.[7] Moreover, regulation of new AI-based medical devices is also needed. Utilizing healthcare data is the biggest issue for patient data protection. Compared to a skilled

healthcare practitioner, AI algorithms cannot provide a holistic approach to clinical scenarios as they cannot consider the psychological and social aspects of human nature. AI bias and accountability are also questionable. Other than that, healthcare workforce augmentation and training and patient engagement and acceptance are also very crucial challenges in the realm of machine learning healthcare system.[4]

In conclusion, this superior technology can significantly assist the medical staff in decision-making and improving the treatment outcome. There is great optimism that incorporating AI in the healthcare industry will improve diagnosis and treatment, enhancing the patient experience in the healthcare system. However, AI poses certain privacy, reliability, safety, and liability issues.[7] For the active application of AI technology in the health care system, the general public has to be on board by making them aware of AI and establishing standardized guidelines. For the healthcare leadership, it is important to anticipate the potential changes, forecast their impact, and make strategic plans for the long-term use of AI.

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