ISSN: 3066-9812
Review Article

Journal of Clinical Epidemiology and Public Health

Artificial Intelligence Transforms the Health Care System: Challenges & Opportunity

Ram Kumar Garg[1*], & Bhartendra Sharma[2]

Department of Community Health , Teerthanker Mahaveer College of Nursing, Teerthanker Mahaveer University Moradabad Uttar Pradesh India 244001

[*]Corresponding author: Dr Ram Kumar Garg, Department of Community Health, Teerthanker Mahaveer College of Nursing, Teerthanker Mahaveer University Moradabad Uttar Pradesh India 244001

Submitted: 16 January 2022 **Accepted:** 02 February 2023 **Published:** 06 February 2023

https://doi.org/10.63620/MKJCEPH.2023.1001

Citation: *Garg, R. K., & Sharma, B. (2023). Artificial intelligence transforms the health care system: Challenges & opportunity. J of Clini Epi & Public Health, 1(1), 01-03.*

Abstract

For data-intensive analysis and knowledge-based management, artificial intelligence requires knowledge and skills about data quality. The advancement of computer science through the incorporation of innovation in fields like epidemiology, biology, medicine, and public health is necessary for AI to help the larger purpose of public health. Applications fall into three main categories: administrative tasks, patient engagement and adherence, and diagnosis and treatment suggestions.AI implementation is required to improve the effectiveness of managing health services and making medical judgments.AI could be used in the healthcare industry to improve patient care, particularly in handling massive data, exponential computer power, and the always rising demand on the health care system. The main concern is making sure that the solutions being created have the ability to benefit everyone equally, balance risk and reward, and reduce dependence.

It is challenging to facilitate initial adoption and continuous deployment in the healthcare system, so we examine some of the moral dilemmas that AI clinical applications face.

Keywords: Artificial Intelligence, Healthcare, Challenges, Opportunities

Introduction

Artificial intelligence, or AI, is frequently defined as the science and engineering of creating intelligent systems, particularly intelligent computer programmes. We employ computers to increase our understanding of human intelligence. AI is not constrained to acting in ways that can be observed in the body. AI need not limit itself to biologically observable techniques.
AI has made significant advancements, and its applications have been successful across a variety of health-related industries and in various academic fields [1]. To process complex data, intelligent systems must be created, which is what artificial intelligence requires. Artificial intelligence professionals use pre-programmed computer software routines to carry out a range of tasks that need the human brain, including as understanding and processing spoken language, identifying sounds and objects, and learning patterns to build problem-solving approaches. Such computerised software rules are known as algorithms.

Artificial intelligence is gradually replacing the healthcare system (AI) [2]. It transforms the manual healthcare system into one that runs automatically in order to manage patients and medical resources. Prior to automation, regular tasks in medicine were handled by people. When programmers develop artificial intelligence systems to carry out tasks, the technical difficulties of digitising health care cause extra issues [3].

In today's world, technological utilisation is essential. Technology has a place and helps to facilitate and enhance human labour. Technology is also essential in the health sector for minimising errors caused by negligence. For instance, surgical treatments performed by doctors may be hazardous and unsuccessful if technology is not used. AI is another word for artificially developed computer intelligence that is intended to resemble human intelligence. AI will improve professional judgement, patient diagnosis, treatment, and prevention [4].

The health care sector has undergone a radical change thanks to rapid breakthroughs in artificial intelligence (AI). Humans perform the usual duties/tasks in the management of patients and medical resources, converting the manual health system into an

automated one. The technical challenges of digitising health care bring additional problems when programmers create artificial intelligence systems to perform jobs

AI has the potential to dramatically increase patient care while reducing healthcare costs [5]. As the population grows, it is expected that there will be a greater need for health services. To increase the effectiveness and efficiency of the health services sector without adding extra expenditures, innovative ways are needed [6].

Personalized therapeutics, medical diagnostics, genetic engineering, and drug-related interventions are just a few of the health-related fields where artificial intelligence has been successfully researched. Artificial intelligence (AI) as a more widespread application in society focuses on the art or science of preventing illness, prolonging life, and boosting health and productivity through coordinated community effort [7].

With the use of this special technology, medical care management is carried out more successfully. Though the technology has many advantages, the future of AI in healthcare is less certain. In light of this development, a number of concerns have been expressed on how AI can protect privacy concerns, exercise doctors' rights and obligations, and enforce current regulations. The application of artificial intelligence (AI) in the global healthcare system shows that the laws now in place are supportive of it. It has been demonstrated that guidelines may be created and implemented for the creation of technology and health care goods [8].

Artificial Intelligence: Challenges

Although AI techniques ease the processing power constraints now applied to public health data, their application is still unclear. To create and execute automated planning and scheduling applications, significant data are required [9].

It is challenging and time-consuming to compile such statistics, especially in developing nations like India. Even while global internet connectivity is growing, it is still challenging to collect high-quality health systems data in environments with limited resources because poorer nations lack access to the necessary upload capacity. However, despite technological advancements in web delivery, internet consumption is still quite low in impoverished nations. In addition, there are the normal privacy concerns associated to the use of data in the systems. Hence it is advised that the deployment of Artificial Intelligence should be seen only as an extension rather than replacement of traditional system [10].

The obstacles include promoting early acceptance, sustainable deployment in the healthcare system, a lack of user perspective, and the inability of technology to be exploited to its full potential despite the need for AI adoption in the public health sector. The integration of AI into the public health system offers a route for future study that concentrates on various aspects of AI use in the public system [11].

Ethics must be carefully considered when using AI in areas like gene editing, stem cell research, and other applications [12].

The most private information a person can have about another person is their use of a health service. Because privacy is constrained by patient autonomy or self-government, personal identity, and well-being, preserving individual privacy in the healthcare industry is essential. Therefore, it is morally imperative to uphold patient confidentiality and make sure that the right procedures are in place to get informed permission [13].

No healthcare employment have yet been lost as a result of AI, as far as we know. The industry's sluggish adoption of AI and the difficulty integrating it into clinical procedures and EHR systems can be partly blamed for the lack of job impact. Contrary to jobs that involve direct patient contact, those in the healthcare sector that deal with digital information, such as radiology and pathology, are most likely to be automated [17].

Artificial Intelligence: Opportunities

The virtual branch is primarily concerned with the fundamental applications of AI, such as the exploration of in-depth knowledge processing for health management systems, electronic health records, and the direct supervision of medical personnel during patient care [14].

The current disease surveillance system uses artificial intelligence (AI) to automate the entire process in order to reduce reliance on humans. This has allowed for more rapid and predictive surveillance and the use of data from various sources, including traditional systems. This technological application has made it possible for public health officials to use such data to further improve the public health surveillance system [15].

Clinical professionals and researchers in public health now have the chance to gain a deeper understanding of physiological variability at both the individual and population level thanks to technological development, improved mobile connectivity, and the popularity of wearable devices. This knowledge will help with diagnosis, better care delivery, and better planning for the implementation of preventive and therapeutic measures for the same. A new sort of surveillance system known as "digital surveillance" has emerged as a result of all these developments. It seeks to educate the public about issues in public health by examining digitally stored health data [16].

We are aware of no instances where AI has replaced a job in the healthcare industry. The industry's slow adoption of AI and the challenge of incorporating it into clinical procedures and EHR systems are partially to blame for the lack of job impact. Instead of positions involving direct patient contact, it appears likely that the jobs most at risk of automation in the healthcare industry will be those using digital information, such as radiography and pathology [17].

One significant use of AI and computer vision in surgical technology is to improve certain procedures and abilities like suturing and knot-tying. In various surgical operations, such as animal bowel anastomosis, the Johns Hopkins University's smart tissue autonomous robot (STAR) has proven that it can outperform human surgeons. Although a fully autonomous robotic surgeon is still a dream for the far future, academics are interested in applying AI to improve several elements of surgery. An illustration of this is a team from the Alpen-Adria Universität Klagenfurt's

Institute of Information Technology, which uses surgical movies as training material to pinpoint a specific surgical intervention [18].

AI has the potential to speed up medical research and diagnostics. To speed up the development of novel medicines, more and more collaborations involving biotech, medical technology, and pharmaceutical businesses have emerged in recent years. These collaborations are frequently the result of societal necessity rather than just study motivated by curiosity. Collaboration between different disciplines is essential in a society where some expertise is scarce, research is expensive, and viable cures for some ailments have not yet been developed [19].

Conclusion

Future healthcare options will significantly benefit from the use of artificial intelligence. It is the primary skill that underpins the growth of precision medicine, which is widely regarded to be a much needed advancement in healthcare. It takes the form of machine learning. Although there may be certain challenges, they may be addressed and overcame with the help of AI and other technical breakthroughs. AI has significant promise for health care services in underdeveloped countries. Several AI applications can be used to improve public health outcomes. While implementing the usage of AI, it is necessary to establish human-cantered design, which means that we must take into account all legal and ethical issues through the lens of human rights. These concerns include ownership, discretion, data security, and informed consent.

References

1. McCarthy, J. (2022). What is artificial intelligence? Retrieved from http://www.formal.stanford.edu/jmc/whatisai/whatisai.html
2. Hamet, P., & Tremblay, J. (2017). Metabolism, 69(S), 36–40.
3. Coeckelbergh, M. (2010). Health care, capabilities, and AI assistive technologies. Ethical Theory and Moral Practice, 13(2), 181–190.
4. Triantafyllidis, A. K., & Tsanas, A. (2019). Applications of machine learning in real-life digital health interventions: Review of the literature. Journal of Medical Internet Research, 21(4), e12286. https://doi.org/10.2196/12286
5. Tobore, I., Li, J., Yuhang, L., Liu, Y., Al-Handarish, Y. (2019). Deep learning intervention for healthcare challenges: Some biomedical domain considerations. JMIR mHealth and uHealth, 7(4), e11966. https://doi.org/10.2196/11966
6. Pee, L. G., Pan, S. L., & Cui, L. (2019). Artificial intelligence in healthcare robots: A social informatics study of knowledge embodiment. Journal of the Association for Information Science and Technology, 70(4), 351–369. https://doi.org/10.1002/asi.24145
7. Wilson, C. E. (1920). Science, 51, 23–33.
8. Government of Indonesia. (2009). Undang-undang Republik Indonesia nomor 36 tahun 2009 tentang Kesehatan. Jakarta: Republik Indonesia.
9. AAAI Spring Symposium. (2010). Routing for rural health: Optimizing community health worker visit schedules. Artificial Intelligence for Development.
10. Polgreen, P. M., Chen, Y., Pennock, D. M., Nelson, F. D., & Weinstein, R. A. (2008). 47(11), 1443–1448. (Journal name not provided—please add)
11. Sun, T. Q., & Medaglia, R. (2019). Mapping the challenges of artificial intelligence in the public sector: Evidence from public healthcare. Government Information Quarterly, 36(2), 368–383. https://doi.org/10.1016/j.giq.2018.09.008
12. Gopal, G., Suter-Crazzolara, C., Toldo, L., & Eitelhuber, T. (2019). Digital transformation in healthcare – Architectures of present and future information technologies. Clinical Chemistry and Laboratory Medicine, 57(3), 328–335. https://doi.org/10.1515/cclm-2018-0658
13. Reddy, S., Allan, S., Coghlan, S., & Cooper, P. (2020). A governance model for the application of AI in healthcare. Journal of the American Medical Informatics Association, 27(3), 491–497. https://doi.org/10.1093/jamia/ocz192
14. Sinha, G. R., & Suri, J. S. (2020). Computer modelling and cognitive science. Academic Press, 133–147.
15. Yan, P., Zeng, D., & Chen, H. (2006). A review of public health syndromic surveillance systems. In S. M. Zeng, D. D., Hsinchun C., Bhavani T., & Fei-Yue W. (Eds.), Intelligence and security informatics (pp. 249–260). Springer.
16. Milinovich, G. I., Williams, G. M., Clements, A. C. A., & Hu, W. (2014). Internet-based surveillance systems for monitoring emerging infectious diseases. The Lancet Infectious Diseases, 14(2), 160–168.
17. McKinsey Global Institute. (2017). A future that works: Automation, employment, and productivity. Retrieved from https://www.mckinsey.com/media/mckinsey/featured%20insights/Digital%20Disruption/Harnessing%20automation%20for%20a%20future%20that%20works/MGI-A-future-that-works-Executive-summary.ashx
18. Petscharnig, S., & Schöffmann, K. (2018). Learning laparoscopic video shot classification for gynecological surgery. Multimedia Tools and Applications, 77(6), 8061–8079.
19. Hu, Z., Melton, G. B., Moeller, N. D., Arsoniadis, E. G., Wang, Y. (2016). Accelerating chart review using automated methods on electronic health record data for postoperative complications. AMIA Annual Symposium Proceedings, 2016, 1822–1831.