

Literature Review: The Role of Artificial Intelligence in Healthcare

Student's Name

Institutional Affiliation

Course Number and Course Name

Instructor's Name

Due Date

Literature Review: The Role of Artificial Intelligence in Healthcare

Introduction

The use of Artificial Intelligence has now come to be a wonderful innovation that assists in various activities in the huge health care segment in aspects such as diagnosis, treatment, patient care, and medication. Some of these include systems that use; machine learning as well as other approaches to thereby perform tasks that would otherwise be done by a human. This literature review examines the use of AI in relation to the healthcare system including its advantages and disadvantages, and potentials for ethical concerns.

AI Applications in Healthcare

The use of AI in healthcare can be found in different categories: diagnostics, personalized medicine, interventions, and organizational procedures. Machine intelligence is gradually becoming an acquaintance in helping clinicians to diagnose or to come up with the right decision. For instance, AI systems have more precision than normal techniques in diagnosing diseases from images such as Radiographs to diagnose conditions such as tumors and fracture at an early stage. In the findings of a research, deep learning AI algorithms show the possibility of achieving comparable performance to radiologists in identifying abnormalities on diagnostic images, thus minimizing the risk of error (Jiang et al., 2017).

Besides diagnostic imaging, the use of AI also extends to personal medicine. Combining big data on patients' history, genetics, and other features, AI can define better treatment regimens based on patients' profiles. Furthermore, AI is also being applied to enhance drug development procedures. This application reduces the time it takes to find a compound to develop, making clinical trials faster than analytical ones (Mak & Pichika, 2019).

AI systems are also enhancing administrative activities in healthcare facilities. AI systems could supplement all clinical and administrative work, including record keeping, paperwork, and scheduling. For example, virtual agents, such as chatbots, respond to patient inquiries, help them schedule appointments, and track their compliance with prescribed treatments (Topol, 2019).

Benefits of AI in Healthcare

AI's interventions are more comprehensive than simplifying and automating various tasks in the healthcare system. One of the most significant advantages of artificial intelligence is the improved diagnostics that can be provided in less time. For instance, a study showed the AI algorithms' ability to diagnose skin cancer with equal precision rates to that of a certified dermatologist (Esteva et al., 2017). Due to this, AI can analyze large amounts of data in short periods and diagnose diseases at an earlier stage than ever before, leading to improved patient satisfaction due to more personalized attention being paid to patients with different diseases.

Another aspect where AI positively contributes to operational improvement is minimizing manual work on repetitive activities like data input and resource tracking. In a study, the authors pointed out that AI-enhanced systems can help reduce the time physicians, nurses, and other healthcare professionals spend on paperwork, thus allowing them to spend time with the patients (Yu et al., 2018). This could help solve some of the staffing issues that the healthcare industry is experiencing, especially in areas such as radiology and nursing.

The application of AI to predictive analytics builds on its healthcare advantages. Consequently, with the aid of AI predictive models, physicians, and other caregivers can forecast possible adverse effects, advise on preventive measures, and minimize the increasing number of patients readmissions. For instance, IBM Watson for Health has made patient prognoses,

enabling cost control within health facilities and enhancing patient results (Miller & Brown, 2018).

Ethical Considerations and Challenges

However, there are numerous ethical concerns with the integration of AI into healthcare, for example, privacy, fairness, and accuracy of the Algorithm, as well as the displacement of human clinicians. Many patient data used to build AI algorithms are personal, which raises questions about data protection and privacy. Abuse or unauthorized disclosure of patients' information could adversely affect people and health facilities.

Algorithmic bias is another crucial consideration: the AI systems' algorithms. Like any other AI system, this includes biases in the training data used such that if the data set contains biases or discriminant cases, then the algorithms produced only magnify these biases. For example, a study reveals the case of a popular AI healthcare decision-supporting tool that suggested Black patients receive less care than white patients due to machine learning's tendency to rely on the data feeding it and the racism of the US health system feeding it racist statistics (Obermeyer et al., 2019).

Additionally, advances in AI usage contribute to automating healthcare workers' jobs. As much as AI promises to improve the competencies of healthcare professionals, there are concerns that it will displace some roles, such as transcriptionists, radiographers, and even surgeons. A report estimated that up to 22% of healthcare-related activities could be automated, a move that may disrupt employment in the healthcare sector if practitioners fail to re-skill for the future (Spatharou et al., 2020).

Limitations and Areas for Further Research

Despite the various benefits it brings to healthcare delivery, the application of AI has its drawbacks. The first limitation is the problems related to interpreting the results of many AI algorithms, which often can be described as the "black box" model. Some of these systems can provide predictions or diagnoses nearly as accurate as the provided tests, but they need to explain why the result arrived. Thus, healthcare professionals cannot place their trust in the system. The opacity of AI systems has always been an obstacle to adoption in healthcare since decision-makers need to understand the reasoning behind treatment decisions.

Another disadvantage is that their application is expensive and demands much more infrastructure. The creation and sustenance of artificial intelligence implementation are capital-intensive, and health facilities in developing states may not be able to afford the adoption of such solutions. Moreover, AI is efficient in giving customized disease diagnoses and treatments based on some unique body analysis, but it is rare in the feelings it has towards its patients, like the feeling a human healthcare worker has towards the patient.

Conclusion

AI can become a critical tool for increasing healthcare activity's effectiveness and efficiency, enhancing diagnosis accuracy, tailoring treatments, and optimizing managerial tasks. Some of them are improved outcomes, early identification of disease, and predictive abilities. Nevertheless, issues regarding privacy, the fairness of the Algorithm, and job loss are still significant issues. However, like any innovation, AI has weaknesses, and more must be done to improve AI's robustness, usability, and fairness. For this reason, there is a need for healthcare professionals and policymakers to engage in a close working relationship as AI develops to ensure that its deployment brings out the intended benefits while at the same time avoiding adverse impacts.

References

- Esteva, A., Kuprel, B., Novoa, R. A., Ko, J., Swetter, S. M., Blau, H. M., & Thrun, S. (2017). Dermatologist-level Classification of Skin Cancer with Deep Neural Networks. *Nature*, 542(7639), 115–118. <https://doi.org/10.1038/nature21056>
- Jiang, F., Jiang, Y., & Zhi, H. (2017). Artificial Intelligence in healthcare: past, Present and Future. *Stroke and Vascular Neurology*, 2(4), 230–243. <https://doi.org/10.1136/svn-2017-000101>
- Mak, K.-K., & Pichika, M. R. (2019). Artificial intelligence in drug development: present status and future prospects. *Drug Discovery Today*, 24(3), 773–780. <https://doi.org/10.1016/j.drudis.2018.11.014>
- Miller, D. D., & Brown, E. W. (2018). Artificial Intelligence in Medical Practice: The Question to the Answer? *The American Journal of Medicine*, 131(2), 129–133. <https://doi.org/10.1016/j.amjmed.2017.10.035>
- Obermeyer, Z., Powers, B., Vogeli, C., & Mullainathan, S. (2019). Dissecting Racial Bias in an Algorithm Used to Manage the Health of Populations. *Science*, 366(6464), 447–453. <https://doi.org/10.1126/science.aax2342>
- Spatharou, A., Hieronimus, S., & Jenkins, J. (2020, March 10). *Transforming Healthcare with AI: the Impact on the Workforce and Organizations* | McKinsey. [www.mckinsey.com. https://www.mckinsey.com/industries/healthcare/our-insights/transforming-healthcare-with-ai](https://www.mckinsey.com/industries/healthcare/our-insights/transforming-healthcare-with-ai)
- Topol, E. J. (2019). High-performance medicine: the Convergence of Human and Artificial Intelligence. *Nature Medicine*, 25(1), 44–56.
- Yu, K.-H., Beam, A. L., & Kohane, I. S. (2018). Artificial intelligence in healthcare. *Nature*

Biomedical Engineering, 2(10), 719–731. <https://doi.org/10.1038/s41551-018-0305-z>