

ORIGINAL RESEARCH ARTICLE

Explorative study on potential of machine learning and artificial intelligence for improved healthcare diagnosis and treatment

Prakash Date*, Varsha Pimprale, Sakshi Mandke

Department of Computer Engineering, Cummins College of Engineering for Women, Karve Nagar, Pune, Maharashtra 411052, India

* Corresponding author: Prakash Date, prakash.date@cumminscollege.in

ABSTRACT

Machine learning (ML) and Artificial intelligence (AI) have demonstrated substantial promise for enhancing healthcare diagnostics and therapy. This study compares the benefits, drawbacks, and uses of these tools to examine their potential in healthcare. ML systems can find trends, increase diagnosis precision, and support professional judgment. Their efficacy may be constrained, though, by bad data quality, a lack of interpretability, and execution issues. On the other hand, AI can support clinical judgment, enhance patient results, and boost healthcare productivity. However, difficulties in implementing them can arise due to restricted generalizability, data protection issues, and legal conformance. To ensure the effective application and acceptance of these technologies in healthcare, it is essential to understand these benefits and constraints. Healthcare providers of the future will be able to make wiser choices regarding patient assessment and therapy options using AL and ML, resulting in an overall enhancement of healthcare services.

Keywords: AI; diagnosis; health; healthcare industry; ML

ARTICLE INFO

Received: 1 August 2023
Accepted: 29 August 2023
Available online: 26 December 2023

COPYRIGHT

Copyright © 2023 by author(s).
Journal of Autonomous Intelligence is published by Frontier Scientific Publishing. This work is licensed under the Creative Commons Attribution-NonCommercial 4.0 International License (CC BY-NC 4.0).
<https://creativecommons.org/licenses/by-nc/4.0/>

1. Introduction

“Artificial intelligence” (AI) is the capability of computers to perform various activities with the help of mood analysis and natural language processing (NLP). With the help of this technology, computers are now able to understand the information provided to them and use it to perform a variety of business duties. Machine learning (ML) or deep learning, which are subsets of AI, each has different roles to play in training computers. AI is used in health care in a variety of settings, including genetic testing, genomic, and medical imagery, studying diagnosis codes, and forecasting infectious disease outbreaks as part of health emergency defense programs. According to the research, despite significant advancement and a high degree of clinical AI maturity in several fields, the application of AI is still uncommon in clinical practice. Despite this, its use is still limited and typically confined to laboratories and testing^[1].

The identification, management, and tracking of patients have all changed as an outcome of AI, which has had a major effect on the healthcare industry. This technology greatly improves healthcare studies and results by enabling more individualized therapies and producing more precise diagnostics. The potential of AI in health care to rapidly evaluate large amounts of clinical paperwork helps identify disease indicators and patterns that would otherwise go unnoticed by

medical experts. There are many possible applications for healthcare and AI, from studying radiography pictures for early discovery to forecasting results from digitized health data. By utilizing AI in hospital and community settings, healthcare systems can provide better, quicker, and more efficient treatment for millions of people around the world. AI seems to be the key to improving health results while lowering expenses for caretakers and changing how patients receive high-quality care^[2].

The potential of AI in the medical industry is astounding. AI in healthcare will make forecasts about how we manage healthcare data, recognize illnesses, develop remedies for them, and possibly even prevent them entirely. AI in healthcare helps healthcare providers make better decisions based on more accurate data, thereby reducing costs, freeing up time, and improving the governance of medical data. The use of AI in the healthcare industry has the potential to drastically transform the industry, opening the door to a day when patients will receive high-quality care and treatment faster and more accurately than ever before, and also in relationships with patients will improve.

1.1. Role of AI in healthcare

To create precise and efficient inventions that will help heal people who are suffering from these conditions and, ideally, discover a cure, AI is being used in imaging and chronic diseases like cancer. AI has several advantages over traditional statistical and medicinal decision-making techniques. As AI programs learn from training data, the systems' accuracy increases, as seen in **Figure 1**. This enables people to learn things about how treatment works, how care is given, how assessments are made, and how patients turn out that were previously unachievable.

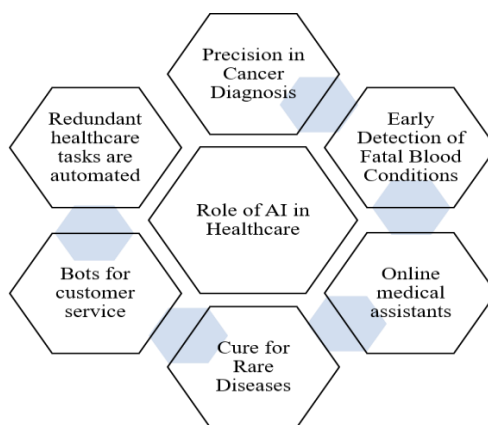


Figure 1. Illustrate the various roles of AI in the healthcare industry.

1.2. Machine learning

In healthcare, machine learning (ML) is one of the most commonly employed types of AI. There are many more variations of this broad concept, which is at the heart of multiple methods for integrating AI with healthcare technology. By making it possible to utilize AI for medical diagnosis and treatment, ML has changed how the healthcare system operates. Healthcare is now more accurate than ever to process huge volumes of clinical paperwork quickly, identify trends, and predict the results for patients. By analyzing patient records, medical images, and other data, machine learning is helping healthcare professionals uncover new drugs while also enhancing treatments and reducing costs. By using AI technologies like ML for tasks like disease diagnosis or drug research and development, doctors may more accurately detect illnesses and customize therapy to the needs of unique patients (**Figure 2**). AI in healthcare may also help professionals recognize tiny changes in vital signs that could indicate a potential problem or uncover previously unknown correlations between disorders in healthcare data^[3,4].

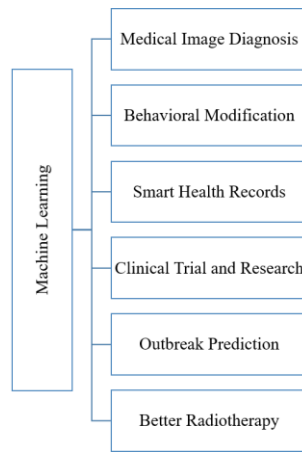


Figure 2. Role of machine learning in the healthcare sector.

The most widespread application of traditional machine learning is in precision medicine. The ability to predict which therapeutic approaches would be beneficial with patients based on their features and the treatment framework is a significant leap in data science for many healthcare organizations. Medical imaging and clinical data are needed for training in the majority of ML and precision medicine applications used in healthcare when the outcome is known. This is what directed learning is. NLP is also used for speech recognition in healthcare AI which is built on deep learning. Deep learning models typically have few characteristics that matter to human observers, making it challenging to comprehend the model's output. With the development of deep learning technology, it will be more important than ever to understand how it works and how to efficiently apply it in clinical contexts^[5].

This present study focuses on the role of machine learning (ML) and artificial intelligence (AI) in improved healthcare diagnosis and treatment. Making more accurate diagnoses, creating individualized treatment plans, and improving patient care are the main goals of ML and AI for healthcare diagnosis and treatment. This complete study is divided into several sections like first section is an introduction that gives the general background of the present study after the literature review section explain the various study related to our present study and the end of this section has one paragraph that explains why this study is different from others, next section is a discussion which discusses the working principle, application, benefits, future of ML and AI in Healthcare industry for diagnosis and treatment, etc. and last section is the conclusion which gives the outcome of the study.

2. Literature review

Sunarti et al.^[6] explored in their study the future risk and opportunities of AI in healthcare services. Three sources (Google Scholar, Web of Science, or EBSCOhost) were searched thoroughly for papers that addressed the topic of implementing artificial intelligence to improve health services. The effectiveness of research utilizing the Joanna Briggs Institute was evaluated by two evaluators separately. They also discussed the need to use AI to manage healthcare services more effectively and make better medical decisions. As they facilitate their early uptake and continuous application in the healthcare system, they look at some of the ethical challenges that AI clinical apps confront.

Stewart et al.^[7] studied the use of AI in the area of emergency medicine by examining recent advancements in patient care administration and emergency department operations. With the growth of AI, new apps have been created in a variety of disciplines, including medicine, to assist medical workers in clinical evaluation. Emergency medicine has generated a lot of untapped potential for AI solutions to improve organizational performance and healthcare quality, which has piqued researchers' curiosity. The Emergency Department is the first point of interaction for patients outside of main healthcare institutions because they frequently arrive with a variety of unclear symptoms.

Bohr and Memarzadeh^[8] studied the use of AI in the field of healthcare. The primary applications of AI in healthcare will be discussed, including those that are directly related to healthcare or are included into the healthcare value chain, such the creation of new medications and healthier lifestyle habits. All of this data can be combined to build extremely thorough personal profiles, which can be very helpful for understanding and identifying behavioral patterns as well as predicting healthcare trends. The use of AI has the potential to considerably progress all aspects of healthcare, from diagnostics to treatment. Healthcare workers may benefit from AI's capacity to assist with a range of activities, including patient engagement, clinical documentation, and specialized assistance like medical equipment automation, patient monitoring, and image analysis.

Jiang et al.^[9] studied the three major categories of prevention, early identification, and therapy, as well as prognostic assessment and result projection. The increasing accessibility of healthcare data and the quick advancement of analytics methods are causing a fundamental change in the healthcare industry. They evaluate the state of AI applications in healthcare now and forecast where they will be in the future. Healthcare data comes in a variety of formats that AI can manage. NLP is a popular AI tool for unstructured data, whereas ML techniques like the traditional “support vector machine” or “neural network” as well as contemporary deep learning are utilized for structured data. The three main medical specialties that use AI technologies are neurology, heart, as well as cancer.

Lee and Yoon^[10] studied the state of AI-based technology usage at the current moment and how they influence the healthcare business. This study examined several real-world examples of AI implementation in healthcare, as well as a thorough assessment of the literature. According to the results, huge enterprises are now using AI-enabled solutions to assist medical practitioners with patient assessment and treatment procedures for a variety of conditions. AI systems influence the efficiency with which hospitals handle their managerial and therapeutic employees. Healthcare personnel are interested in AI, but its applications provide both the ideal and the worst-case scenario. To give a balanced view of the value of AI applications in healthcare, we discuss the details of those opportunities and challenges.

Chen and Decary^[11] studied the basics of AI technologies, like ML, NLP, and AI speech ideas ,as well as how they ought to be applied in medical treatment. It also provides useful advice to help decision-makers develop an AI strategy that will support their transition to a digital healthcare system. A variety of AI applications have been created to handle some of the most serious difficulties that health organizations are presently confronting owing to the quickly developing area of healthcare AI. Executives in the healthcare industry need to be knowledgeable about the state of AI technologies and how to use them to improve the efficacy, security, and usability of healthcare services and adopt value-based care.

Noorbakhsh-Sabet et al.^[12] studied therapeutic, experimental, and public health uses of ML in the field of health care, as well as a general summary of the significance of genomic data, anonymity, and data exchange. Artificial intelligence (AI)-using life sciences scholars are under more strain than ever to develop quickly. By revealing unexpected discoveries, large, multi-dimensional, and integrated data sets have the potential to accelerate scientific advancement. Even though there is a greater number of data than ever, very little of it gets integrated, processed, ingested, and evaluated. How computers can learn from data and emulate human thinking is the topic of AI.

All earlier studies discussed the benefits, challenges, techniques, methods and characteristics of AI in healthcare. It was discovered that AI still outperforms humans in terms of management operations related to medicine and related sectors being implemented with accuracy, efficiency, and promptness. Patients gain from relevant AI skills in the areas of diagnosis, therapy, counseling, and health monitoring for “self-management of chronic conditions” in a close-knit manner. Future research should focus on “medical decision-making” patient data security or protection, “value-added healthcare services”, “health monitoring

features,” and innovative AI-powered IT service delivery methods. However, the author of this paper contrasts AI with ML in the healthcare sector.

3. Discussion

Artificial intelligence (AI) and machine learning (ML) have developed into promising technologies that have the potential to revolutionize the detection and treatment of medical conditions. By assisting physicians and other healthcare professionals in swiftly and effectively analyzing massive volumes of data, finding patterns, and coming to wise judgments, ML and AI have the potential to increase the accuracy and efficiency of healthcare systems. Disease diagnosis is one of the main uses of ML and AI in healthcare. These technologies may be used to identify illnesses, forecast how they will develop, and recommend the best therapies. Healthcare professionals may use ML and AI to analyze complicated patterns in medical data and even use them to diagnose illnesses early on. Healthcare professionals may identify which patients are most likely to get a certain illness using machine learning algorithms, which can aid in early intervention. Personalization of care is another way that ML and AI are used in healthcare. Machine learning algorithms can provide personalized therapies that are catered to the particular requirements of the patient by reviewing the medical history, demographics, and other pertinent data for the patient. Long-term, this strategy may provide better results and reduced costs^[13].

The creation of novel medicines and treatment strategies may benefit from the use of ML and AI. Large datasets may be analyzed to help researchers find prospective drug targets and forecast the effectiveness of novel therapies. This may hasten the search for new drugs and aid in the creation of more potent medical interventions. However, there are certain difficulties with using ML and AI in the healthcare industry. The privacy and security of medical data are the main issues. Healthcare providers require access to enormous volumes of patient data to apply machine learning algorithms, which creates privacy issues. Furthermore, ML and AI are only as good as the data they are trained on; if the data is biased or missing important information, the algorithms may produce false or misleading results. To sum up, ML and AI are exciting new technologies that have the potential to raise the precision and effectiveness of healthcare systems. The effectiveness of ML and AI in healthcare, however, depends on the quality of the data utilized, and their application requires careful consideration of privacy and security issues.

3.1. Working principle of ML and AI for improved healthcare diagnosis and treatment

The basic concept of machine learning (ML) and artificial intelligence (AI) is the use of algorithms to analyze massive volumes of data to find patterns and insights that might aid in the diagnosis, treatment, and prevention of illness. The following are the main stages in the ML and AI process, as shown in **Figure 3**:

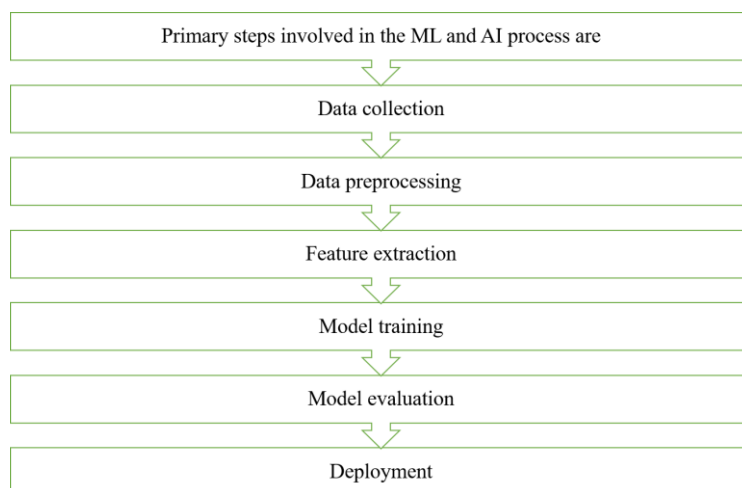


Figure 3. Steps involved in the ML and AI process.

- A. Data gathering: The initial stage in machine learning and artificial intelligence (ML and AI) is the gathering of enormous volumes of data, including medical records, patient demographics, clinical notes, and imaging data.
- B. Data preprocessing: Missing data, outliers, and mistakes must be removed from acquired data to make it comprehensive, consistent, and noise-free.
- C. After preprocessing the data, the next stage is to identify pertinent characteristics that might aid in illness diagnosis and therapy.
- D. Model training: Supervised learning, unsupervised learning, and reinforcement learning are some of the methods used to train ML algorithms on preprocessed and extracted data.
- E. Model evaluation: After the model has been trained, its accuracy and usefulness are assessed using test data.

The ML and AI model must then be put into use in the healthcare system so that they can be used to identify ailments, forecast outcomes, and suggest treatments.

The foundation of machine learning and artificial intelligence in healthcare is the use of complex algorithms that learn from the data to generate predictions, judgments, and recommendations. These tools are designed to find links and patterns in data that may not be obvious to people. Improved patient care, more accurate diagnoses, and better treatment results may all be brought about through the application of ML and AI in the medical field^[14].

3.2. Use of machine learning in healthcare

- a) Disease prediction and treatment
- b) Medical imagery and testing services
- c) Developing and discovering novel medicines

3.2.1. Organizing medical records

As data sets in the healthcare sector grow in size, they are frequently organized as unorganized data in electronic health records (EHRs). Machine learning organizes this data into more organized groups using natural language processing so that healthcare workers can rapidly conclude them. For pharmaceutical firms, machine learning and AI have also affected medication research and development. Drug makers are hoping that machine learning (ML) will be able to anticipate how patients will react to different medications and pinpoint which patients have the best chance of profiting from the drug. The technology has already assisted central nervous system clinical studies^[15]. The development of ML in healthcare has also helped telemedicine, as some machine learning companies are investigating ways to improve processes by organizing and delivering patient information to physicians during telemedicine meetings as well as by capturing information during virtual visits.

3.2.2. Healthcare benefits of machine learning

Healthcare has a lot to gain from machine learning. Here are just a few advantages that businesses are experiencing as a result of using machine learning in healthcare.

Speed up data collection:

Healthcare professionals are using wearable technology to collect real-time data that ML can quickly evaluate and learn from. The American Food and Drug Administration has been attempting to incorporate ML and AI into the software for medical devices because of this. Data is abundant because of tremendous need of healthcare diagnosis.

Accelerated drug development and discovery: To more precisely forecast effective drug compounds, researchers create models by merging deep learning and machine learning. The process of finding new drugs

is sped up by this.

Affordable Processes: Machine learning systems can rapidly search through EHRs for particular patient data, make patient appointments, and handle a variety of tasks. The ability to concentrate on more pressing issues gives healthcare employees more freedom.

A Personalized Response: Machine learning technology can assist healthcare workers in developing exact medication solutions that are tailored to each individual's traits by processing large quantities of data. Additionally, ML algorithms can forecast how patients will respond to specific medications, enabling healthcare professionals to anticipate patients' requirements.

Machine learning has a broad variety of possible applications in clinical care, from enhancing patient data, diagnostics, and therapy, to cutting expenses and increasing patient safety. Just a few advantages that machine learning apps in healthcare can offer medical workers are listed below:

3.2.3. Improvement in diagnosis

Machine learning can be used in the healthcare sector to create more accurate diagnostic tools for reviewing medical images. For instance, an ML approach can be used to look for patterns that indicate a particular disease using pattern identification in medical imaging (like MRI scans or X-rays). This may make it possible for medical personnel to recognize patients more swiftly and efficiently.

3.2.4. Creating novel therapies

To find relevant information in data that could lead to the discovery of new medications, their development, and new methods to treat diseases, deep learning algorithms can be used. ML may be used, for instance, to search through clinical research data for undiscovered adverse medication effects. This may enhance the quality of patient care and the efficiency and security of medical interventions.

3.2.5. Lowering expenses

Machine learning can be used to boost healthcare efficiency, which could lead to cost savings. For instance, better scheduling or patient record administration tools could be made using machine learning in the healthcare industry. This can result in a decrease in the time or money spent on repeated activities by the healthcare system.

3.2.6. Enhancing care

ML could help the healthcare sector improve the standard of patient treatment. For instance, "deep learning algorithms" might be used to create systems that track people continuously and notify "electronic health records" or medical devices when their status changes. This may help to guarantee that patients receive the right care at the right time.

3.2.7. Drug development and production

Finding early-stage medications is one of the main uses of machine learning in medicine. This also includes "research and development" (R&D) techniques like "next-generation sequencing" or "precision medicine", which might help uncover different therapy alternatives for difficult illnesses. To find patterns in data without making predictions, ML approaches are increasingly using autonomous learning. Microsoft's Project Hanover employs machine learning (ML) technologies for a range of initiatives, including developing AI-based cancer treatment technology and developing novel drug combinations for "Acute Myeloid Leukaemia" (AML).

3.2.8. Diagnosis using medical imaging

Both ML and deep learning enable the revolutionary area of computer vision. This has been acknowledged by the Microsoft Inner Eye initiative, which creates image analysis tools for picture diagnostics. As machine learning becomes more accessible and as their capacity for thinking increases,

anticipate seeing more data sources from different medical pictures included in this AI-driven diagnostic process.

3.3. Individualized medicine and individualized healthcare

Predictive analytics or personal health may be used to provide individualized therapeutics that are not only more effective but also more suited for future research and disease assessment. Doctors can presently only access a small number of diseases, and the only information they have on a patient's risk is his symptom history and the DNA data that is currently available. Even though ML in medicine is still in its infancy, IBM Watson Oncology is setting the bar high by leveraging patient medical data to provide a range of treatment options. In the next few years, new devices and biosensors with sophisticated health assessment capabilities will hit the market, making it easier for these cutting-edge ML-based healthcare solutions to collect more data^[16].

3.4. Applications in diagnosis and treatment

The fundamental objectives of AI in healthcare have been the detection and treatment of illnesses over the last 50 years. Although early rule-based systems could accurately diagnose and cure illnesses, the professional practice did not completely adopt them. They exhibited poor interfaces with body processes and health information networks, and they did not substantially outperform humans at diagnosing. Although integrating clinical procedures and EHR systems with the usage of AI in healthcare for diagnosis and treatment techniques, whether rules-based or autonomous, can at times be challenging. The accuracy of ideas has been less of a deterrent to the mainstream implementation of AI in healthcare than integration concerns inside healthcare institutions. For clinical studies, diagnosis, and treatment, the majority of AI and healthcare features provided by medical software companies are standalone and concentrate on just one element of care^[17,18]. Even though this is still in its early stages, some vendors of EHR software are starting to add crucial AI-powered healthcare data capabilities to their product lines. To fully profit from the usage of AI in healthcare with a standalone EHR system, clinicians will need to either undertake significant integration initiatives themselves or acquire third-party vendors with AI knowledge and the capacity to interact with their EHR.

3.5. Healthcare artificial intelligence challenges

Healthcare businesses are investing more and more in the use of AI for a variety of jobs, although there may not be as many ethical and legal concerns elsewhere. These difficulties need to be overcome. Some of the most significant issues are gaining the confidence and cooperation of physicians, maintaining compliance with federal legislation, and teaching computers to recognize patterns in data privacy, medical data, security, accuracy, as well as patient safety. Because AI systems collect a lot of delicate personal health information that might be misused if handled improperly, data privacy is essential. To further prevent the unauthorized use of sensitive patient data, appropriate security measures must be used. Precision or patient safety are critical factors to take into account when employing AI in healthcare. AI systems must be trained to recognize patterns in medical data, comprehend the relationships between various diseases and therapies, and make precise suggestions that are specific to each patient. Furthermore, medical professionals may find it difficult to integrate AI with existing IT systems since doing so requires a thorough grasp of how the technology works to assure optimal utilization^[19].

ML and "deep learning algorithms" help us in a variety of ways when used in the healthcare sector. They not only aid in improved illness avoidance, detection, and therapy, but they are also more effective and quicker than current technologies. They have been proven in reality in addition to theory. The healthcare sector is expanding its issues and increasing its costs. To fix these problems, several machine learning methods are employed. So, for the benefit of humanity, the union should be encouraged. In addition to

presenting ML techniques for the detection of malaria and pneumonia, this study also discusses ML techniques for the detection of cardiac disease, diabetes, and liver disease. AI and ML have demonstrated substantial promise for enhancing healthcare diagnostics and therapy. By contrasting these technologies' advantages, disadvantages, and possible uses, this comparison research hopes to reveal how useful they might be in the healthcare industry.

3.6. Machine learning's advantages in healthcare

- a) Large data sets can be analyzed by ML systems to find trends and make predictions. This can be especially helpful in spotting early indications of illnesses, forecasting therapy results, and customizing treatment regimens for specific patients.
- b) ML algorithms can evaluate medical pictures to find anomalies that might not be apparent to the human eye, leading to more precise findings. This can increase diagnosis precision.
- c) Clinical decision-making can be aided by machine learning (ML) tools, which can offer data-driven suggestions based on patient information and medical background.

Machine learning in healthcare has some limitations

Data quality: The reliability and caliber of the data used to build machine learning models can have a big influence on how successful those models are. Results that are skewed or incorrect can be caused by poor-quality data.

Lack of interpretability: It can be challenging to comprehend how ML models came to a specific conclusion because of their interpretability issues.

Implementation difficulties: Due to problems with data merging, privacy issues, and legal conformance, ML implementation in the healthcare industry can be difficult.

3.7. Healthcare applications for artificial intelligence

- a) AI can help with medical decision-making and AI systems can offer data-driven suggestions to healthcare professionals to help with medical decision-making.
- b) By examining patient data, AI systems can spot trends and forecast results, resulting in more individualized therapy plans and better patient outcomes.
- c) By handling repetitive chores, AI can increase healthcare productivity and open up the time of healthcare workers.

Artificial intelligence in healthcare has some limitations

- a) **Data privacy issues:** Because AI systems need access to a lot of medical data, there may be issues with patient privacy.
- b) **Regulatory compliance:** The application of AI systems in the healthcare industry may be complicated by regulatory compliance standards.
- c) **Limited generalizability:** Since AI systems can be taught on particular data sets, their applicability to other groups may be constrained.

Both AI and ML can have a substantial effect on healthcare, but it's challenging to compare them without taking particular use cases and uses into account. Robotics, machine learning, NLP, and other methods and technologies are all included under the umbrella word of "artificial intelligence". AI is the process of creating models and programs that can mimic aspects of human cognition like thinking, learning, and sensing^[20,21]. On the other hand, ML is a particular branch of artificial intelligence that entails teaching models to make judgments or predictions based on data rather than being explicitly programmed. In healthcare, machine learning can be used for various applications, such as clinical decision support, medical image analysis, and drug discovery. In general, machine learning has shown promise in healthcare,

especially in improving diagnosis accuracy, predicting treatment outcomes, and personalizing treatments based on patient characteristics. For example, ML can help identify early signs of disease, analyze medical images to detect tumors, and predict the risk of adverse events in hospitalized patients. However, AI also has potential applications in healthcare beyond machine learning, such as natural language processing for analyzing medical records, robotics for surgical procedures, and computer vision for monitoring patients.

3.8. Future of ML and AI in healthcare diagnosis and treatment

With continuing research and breakthroughs in these technologies, machine learning (ML) and artificial intelligence (AI) in healthcare diagnosis and treatment are predicted to have a bright future. Healthcare professionals will be able to develop more precise predictive models to detect illness risks and the efficacy of treatment choices as big data and machine learning algorithms continue to emerge. Medical professionals will be able to customize treatment for specific patients by using ML and AI to analyze their distinctive traits, such as genetics, medical history, and lifestyle. AI may assist in the interpretation of medical pictures, such as CT scans and MRIs, to properly identify and diagnose illnesses in advanced imaging analysis. AI can monitor patients in real time, enabling early identification of possible health risks, lowering readmission rates to hospitals, and enhancing patient outcomes. AI may aid in the creation of new medications by analyzing massive volumes of data to find possible drug targets and forecast the effectiveness of new therapies. By automating mundane operations like appointment scheduling and medication refills, AI may improve the patient experience by freeing up healthcare personnel to concentrate on patient care.

To integrate ML and AI with healthcare, there are still obstacles to be solved. The necessity for ongoing investment in research and development, ethical concerns around the use of AI in healthcare decision-making, and data privacy and security issues are a few of the major hurdles. Overall, ML and AI in healthcare diagnosis and treatment have a bright future, and with further research and investment in these technologies, patient outcomes, disease prevention, and treatment, and the effectiveness of the healthcare system will all improve.

4. Conclusion

In conclusion, given the volume and intricacy of health data, we conclude that deep learning models and their uses in medicine and healthcare systems have enormous promise. Finally, the endorsement and trust of medical experts are crucial for AI to be effectively implemented in healthcare. Doctors must have confidence that the AI system is guiding them correctly and won't lead them astray. Doctors must have access to information regarding the decision-making processes used by the AI system to verify that it is based on trustworthy, up-to-date medical research. Furthermore, government rules must be followed to guarantee that AI systems are utilized properly and do not risk patient safety. In conclusion, "machine learning and artificial intelligence" both offer advantages and potential uses in the medical field. The unique use case, data availability, or the issue that has to be handled all influence the technology that is chosen. Future healthcare practitioners will be able to use AL and ML to make better decisions about patient evaluation and treatment options, improving healthcare services as a whole.

Author contributions

Conceptualization and literature review, PD, VP; methodology PD, VP; data collection, SM; draft manuscript preparation, PD, VP; formal analysis, PD; investigation, VP, SM; resources, SM; data curation, PD; writing—original draft preparation, PD; writing—review and editing, PD, VP, SM. All authors have read and agreed to the published version of the manuscript.

Conflict of interest

The authors declare no conflict of interest.

References

1. Powles J, Hodson H. Google DeepMind and healthcare in an age of algorithms. *Health and Technology* 2017; 7(4): 351–367. doi: 10.1007/s12553-017-0179-1
2. Mehta N, Pandit A, Shukla S. Transforming healthcare with big data analytics and artificial intelligence: A systematic mapping study. *Journal of Biomedical Informatics* 2019; 100: 103311. doi: 10.1016/j.jbi.2019.103311
3. Bhattad PB, Jain V. Artificial intelligence in modern medicine—The evolving necessity of the present and role in transforming the future of medical care. *Cureus* 2020; 12(5): e8041. doi: 10.7759/cureus.8041
4. Manickam P, Mariappan SA, Murugesan SM, et al. Artificial Intelligence (AI) and Internet of Medical Things (IoMT) assisted biomedical systems for intelligent healthcare. *Biosensors* 2022; 12(8): 562. doi: 10.3390/bios12080562
5. Chugh G, Kumar S, Singh N. Survey on machine learning and deep learning applications in breast cancer diagnosis. *Cognitive Computation* 2021; 13(6): 1451–1470. doi: 10.1007/s12559-020-09813-6
6. Sunarti S, Rahman FF, Naufal M, et al. Artificial intelligence in healthcare: Opportunities and risk for future. *Gaceta Sanitaria* 2021; 35: S67–S70. doi: 10.1016/j.gaceta.2020.12.019
7. Stewart J, Sprivulis P, Dwivedi G. Artificial intelligence and machine learning in emergency medicine. *Emergency Medicine Australasia: EMA* 2018; 30(6): 870–874. doi: 10.1111/1742-6723.13145
8. Bohr A, Memarzadeh K. The rise of artificial intelligence in healthcare applications. In: *Artificial Intelligence in Healthcare*. Elsevier; 2020. pp. 25–60.
9. Jiang F, Jiang Y, Zhi H, et al. Artificial intelligence in healthcare: Past, present and future. *Stroke and Vascular Neurology* 2017; 2(4): 230–243. doi: 10.1136/svn-2017-000101
10. Lee D, Yoon SN. Application of artificial intelligence-based technologies in the healthcare industry: Opportunities and Challenges. *International Journal of Environmental Research and Public Health* 2021; 18(1): 271. doi: 10.3390/ijerph18010271
11. Chen M, Decary M. Artificial intelligence in healthcare: An essential guide for health leaders. *Healthcare Management Forum* 2020; 33(1): 10–18. doi: 10.1177/0840470419873123
12. Noorbakhsh-Sabet N, Zand R, Zhang Y, Abedi V. Artificial intelligence transforms the future of health care. *American Journal of Medicine* 2019; 132(7): 795–801. doi: 10.1016/j.amjmed.2019.01.017
13. von Gerich H, Moen H, Block LJ, et al. Artificial intelligence—Based technologies in nursing: A scoping literature review of the evidence. *International Journal of Nursing Studies* 2022; 127: 104153. doi: 10.1016/j.ijnurstu.2021.104153
14. Ball HC. Improving healthcare cost, quality, and access through artificial intelligence and machine learning applications. *Journal of Healthcare Management* 2021; 66(4): 271–279. doi: 10.1097/JHM-D-21-00149
15. Getz L. Artificial intelligence forges a path in health care. *For the Record* 2018; 30(1): 18–21.
16. Romiti S, Vinciguerra M, Saade W, et al. Artificial intelligence (AI) and cardiovascular diseases: An unexpected alliance. *Cardiology Research and Practice* 2020; 2020: 4972346. doi: 10.1155/2020/4972346
17. Mei Y, Chen Q, Lensen A, et al. Explainable artificial intelligence by genetic programming: A survey. *IEEE Transactions on Evolutionary Computation* 2023; 27(3): 621–641. doi: 10.1109/TEVC.2022.3225509
18. Muhsen IN, Rasheed OW, Habib EA, et al. Current status and future perspectives on the Internet of Things in oncology. *Hematology/Oncology and Stem Cell Therapy* 2021; in press.
19. Ahmad SG, Iqbal T, Javaid A, et al. Sensing and artificial intelligent maternal-infant health care systems: A review. *Sensors* 2022; 22(12): 4362. doi: 10.3390/s22124362
20. Daghotra A, Jain D. From humans to robots: Machine learning for healthcare. *International Journal of Scientific Research in Computer Science Engineering and Information Technology* 2021; 705–714. doi: 10.32628/CSEIT2173152.
21. Bourechak A, Zedadra O, Kouahla MN, et al. At the Confluence of artificial intelligence and edge computing in IoT-Based applications: A review and new perspectives. *Sensors* 2023; 23(3): 2023. doi: 10.3390/s23031639