International Journal of Scientific Research in Science, Engineering and Technology

Print ISSN - 2395-1990
Online ISSN : 2394-4099

OPEN ACCESS

Available Online at : www.ijsrset.com
doi : https://doi.org/10.32628/ IJSRSET24114107

Artificial Intelligence in Healthcare : A Review

Miss. Isha Anand Bhagat*[1], Miss. Komal Gajanan Wankhede[1], Mr. Navoday Atul Kopawar[1], Prof. Dipali A. Sananse[2]

*[1]Department of CSE, Jawaharlal Darda Institute of Engineering & Technology, Yavatmal, Maharashtra, India

[2]Professor, Jawaharlal Darda Institute of Engineering & Technology, Yavatmal, Maharashtra, India

ARTICLEINFO

Article History:

Accepted: 10 July 2024
Published: 25 July 2024

Publication Issue :
Volume 11, Issue 4
July-August-2024
Page Number :
133-138

ABSTRACT

Artificial Intelligence (AI) is revolutionizing healthcare by enhancing diagnostic accuracy, personalizing treatments and streamlining administrative tasks through advanced algorithms and machine learning. This review examines AI's impact across various areas, including medical imaging, diagnostics, personalized medicine, drug discovery, patient monitoring, and surgical procedures. AI's capacity to analyze complex medical data improves clinical decision-making, predicts patient outcomes, and optimizes hospital operations. AI offers significant benefits, including reduced diagnostic errors and lower healthcare costs. The future of AI in healthcare promises further innovations, such as robotic-assisted surgery, virtual patient care via remote consultations, and advanced health monitoring with wearable devices. Embracing AI not only enhances patient outcomes but also transforms medical research and administrative efficiency, paving the way for a more accessible and effective global healthcare system. Ongoing research and regulatory oversight are essential to fully harness AI's potential while ensuring ethical standards and patient safety.

Keywords : Artificial Intelligence, Healthcare, Health Monitoring, Disease Detection, Scope of AI.

I. INTRODUCTION

Artificial Intelligence (AI) has emerged as a transformative force in healthcare, revolutionizing clinical practice, medical research, and administrative operation. By leveraging advanced algorithms and machine learning techniques, AI promises to enhance diagnostic accuracy, personalize treatment plans, streamline administrative tasks, and improve patient outcomes. This review explores the multifaceted applications of AI in healthcare, examining its impact on medical imaging, diagnosis, personalized medicine, drug discovery, patient monitoring, and surgical procedures.

Artificial intelligence (AI) and the technologies are progressively being used in various fields and disciplines and are now imitated in the healthcare

sector. AI is being effectively utilized in a multitude of settings such as hospitals, and clinical laboratories as well as in research approaches [1]. AI in healthcare is used to solve complex algorithms and software to estimate human cognition in the analysis of complicated medicine data. Artificial intelligence is the ability for computer algorithms to approximate conclusions without direct human input. Algorithms can recognize patterns in behaviour and creates its own logic [2].

Integrating AI technologies in healthcare is not just a futuristic vision but a present reality, driven by the exponential growth in healthcare data, advancements in computational power, and significant breakthroughs in machine learning algorithms [3].

In healthcare, AI applications range from image analysis and pattern recognition in medical imaging to personalized treatment recommendations based on patient data and genetic information. Machine learning algorithms can predict patient outcomes, optimize hospital operations, and even assist in drug discovery processes by analysing vast datasets that would be overwhelming for humans to process manually. Despite its promise, integrating AI into healthcare comes with challenges, such as ensuring data privacy, maintaining ethical standards, and validating the accuracy and reliability of AI-driven diagnostics and treatments. However, with ongoing research, development, and regulatory oversight, AI holds the potential to significantly improve patient outcomes, reduce healthcare costs, and reshape the future of medicine.

Healthcare costs now comprise nearly one-fifth of the United States' gross domestic products, with the last 25 years marked by rising administrative costs, a lack of labor productivity growth, and rising patient and physician dissatisfaction [4]. AI is gradually changing medical practice. There are several AI applications in medicine that can be used in a variety of medical fields, such as clinical, diagnostic, rehabilitative, surgical, and predictive practices [5].

II. LITERATURE REVIEW

Paper [1] describes the artificial intelligence (AI) is changing healthcare by using smart systems that can learn and improve themselves. These (AI) system can analyse huge amounts of medical better decisions about treatment and diagnosis. AI is used in many ways, such as designing personalized treatments, predicting how diseases will progress, and monitoring patients' health in real-time. AI helps doctors focus more on caring for patients. As AI continues to advance, it will play an even bigger role in improving healthcare.

Paper [3], This paper reviews the use of Artificial Intelligence (AI) in healthcare, focusing on how it is being applied and the challenges it faces. AI technologies like machine learning, natural language processing, and predictive analytics are making a big impact in areas such as helping with diagnoses, personalizing treatments, monitoring patients, improving healthcare operations, and supporting public health.

Paper [5], The author of the paper argues that AI is gradually transforming medical practice. They highlight several AI applications across various medical fields, including clinical care, diagnosis, rehabilitation, surgery, and predictive practices. The paper emphasizes that AI enhances accuracy, efficiency, and patient care, thereby making medical practices more effective and innovative.

Paper [11] says, The COVID-19 pandemic has popularized telehealth, rapidly expanding its use to minimize virus spread. Initially driven by necessity, telehealth's positive impact has led to widespread adoption. This paper reviews telehealth's current state, benefits, and limitations, and explores how it can evolve into comprehensive virtual care for patient-centered solutions.

Paper [12] describes Effective health monitoring is crucial as many patients suffer from inadequate systems. Numerous internet-connected devices now assist health professionals in monitoring patients. Machine learning is transforming healthcare, with new technologies emerging. This paper proposes a Health Monitoring System to record various health metrics, providing early risk predictions and personalized recommendations.

III.WHAT IS AI IN HEALTHCARE

AI in healthcare refers to the application of artificial intelligence technologies, such as machine learning and natural language processing, to improve healthcare delivery, delivery, diagnostics, treatment planning, patient monitoring, and administrative functions. It involves using algorithms to analyse complex medical data and make predictions or recommendations to support clinical decision-making and enhance patient outcomes. AI in healthcare aims to automate processes, personalize patient care, reduce medical errors, and ultimately, advance the efficiency and effectiveness of healthcare services.

Figure (A) AI in Healthcare

Artificial intelligence (AI) tries to copy how humans thinks. In healthcare, it's changing how things works because there's a lot more health data available now. Also, new ways to analyse this data are getting better and faster [6]. AI technology in healthcare has helped pharmaceutical companies speed up their drug discovery process, leading to faster development of life-saving medications [7]. Another challenging topic related to AI applications is patient data and diagnostics.

AI technologies can help medical researchers deal with the vast amount of data from patients (i.e., medical big data) [5]. As AI continues to evolve, its role in healthcare will only because more critical, driving innovations that enhance the quality and accessibility of care worldwide.

IV. ROLE OF AI IN HEALTHCARE

1. Robot-Assisted Surgery:

Robot-assisted surgical devices allow surgeons to perform different surgical procedures in a patient's body via incisions [8]. Robot-assisted surgery combines robots and smart computer programs to help doctors perform surgeries more accurately. These robots use detailed information from scans and patient data to assist surgeons during operations. They can make surgeries less invasive, with smaller cuts and faster recoveries. The smart programs also predict problems and suggest better ways for surgeons to work, which helps patients get better faster. It's like having a super-precise helper in the operation room, making surgeries safer and more successful.

2. Virtual Patient Care:

Virtual patient care refers to medical services provided remotely through technology, such as video calls or apps. Instead of visiting a doctor in person, patients can consult healthcare professionals from the comfort of their homes. The term "visiting care" is an umbrella term for a wide variety of terms that are used to describe the various ways and means that health care may be provided from a distance [9]. The purpose of virtual care is to improve our healthcare systems-that is the "organization of people, institutions, and resources that deliver health care services to meet the health needs of people" whilst constraining the ever-

increasing costs of healthcare [10]. Virtual care should be considered as a supplement to face-to-face and telehealth services. It will provide additional choice for patients about when where and how they seek healthcare that suits their needs. We need to move from the theoretical construction of what virtual care can provide to the reality of creating a healthcare system that implements and supports virtual care [11].

3. Health Monitoring:

One of the main challenges today is achieving effective health monitoring. Patients suffer from serious health problems due to lack of proper health monitoring systems. There are numerous devices available today that can monitor a patient's health via the internet [12]. Health monitoring using AI involves using advanced technology to keep track of people's health. AI can analyzed data from wearable devices like fitness trackers and smartwatches, which monitor things like heart rate, sleep patterns, and physical activity. We propose an automatic system to monitor patient's body temperature, heart rate, body movements and blood pressure. Further we extend the existing system to predict if the patient is suffering from any chronic disorder or disease using the various health parameter and various other symptoms that are obtained by the system [13].

4. Disease Detection:

AI in healthcare have included a CNN-bases brain tumor diagnosis system which helps in detecting brain tumor. This helps in rapid treatment planning, to carry out pre-processing on images, the process of feature extraction, reduce the feature space, and lastly classify the images for diagnosis of brain tumor. They improved the performance of their model with the help of geometrical and statistic data augmentation on the images that they had acquired. Their model achieved an accuracy of 100% [14].

Machine learning algorithms is used to support the decision-making process so that it determines the correct diagnosis with help of chest x-rays. They have concentrated on only one disease that is pneumonia and have used a CNN algorithm to classify the chest X-ray images. Pneumonia is a disease which affects the lower part of respiratory tract [15]. Dermatology is at a particular advantage in the implementation of machine learning due to the availability of large clinical images databases that can be used for machine training and interpretation [16].

Figure B shows the various roles of AI in healthcare,

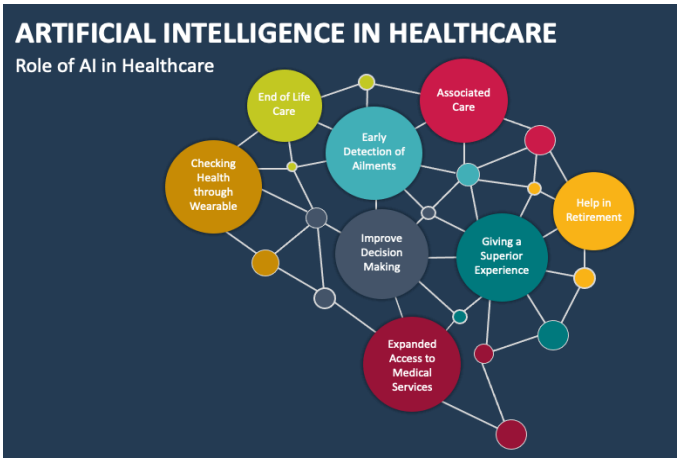

Figure (B) Roles of AI in Healthcare

V. SCOPE OF AI IN HEALTHCARE

In the future, it is likely that AI systems will become more advanced and attain the ability to carry out a wider range of tasks without human control or input [17]. In healthcare, these strategies have proven to offer many potential advantages for both physicians and patients. Monitoring these systems, on the other hand, is a touch job [18]. Artificial intelligence (AI) is making great progress in the medicare program, and it will have a substantial impact on all areas of primary care. Because of AI-enable computing applications, basic healthcare professionals will be able to correctly identify people who need further attention and provide individualized regimens for each [19].

The rise of biomedical science, including genomics, digital medicine, artificial intelligence (AI), and its subset, namely, machine learning (ML), provides the

backdrop to healthcare transformation, with novel emerging technologies. There is a prerequisite of a new type of labor force and standard of practice. Genomics and other thchnologies, including biometrics, tissue engineering, and the vaccine industry, can improve and transform diagnostics, therapeutics, care delivery, regenerative treatment, and precision medicine models [20].

Figure (C) Future of AI in Healthcare

AI is a powerful tool for image analysis that is increasingly being used by radiology professionals for the early diagnosis of different diseases and for reducing diagnostic errors in the context of prevention. Likewise, AI is a smart and potential tool for analysing ECG and echocardiography charts that cardiologists use to support their decision-making [21]. Additionally, AI has applications in areas that need regulation, including healthcare, research, and privacy. Nonetheless, AI is developing rapidly and commercially, which could challenge the know outlines [22].

Concerning future research perspectives, researchers believe that an analysis of the overall amount that a healthcare organization should pay for AI technologies could be helpful. If these technologies are essential for health services management and patient treatment, governments should invest and contribute to healthcare organizations modernization [23].

VI. CONCLUSION

Artificial Intelligence (AI) is changing healthcare for the better. It's helping doctors diagnose illnesses more accurately, customize treatments, and make hospital tasks easier. From improving scans to assisting in surgeries and offering virtual doctor visits, AI is revolutionizing how healthcare works. Even though there are challenges like keeping patient information safe and following rules, AI has the potential to lower healthcare costs and make patients healthier worldwide. As AI continues to advance, it will likely make healthcare more accessible, efficient, and focused on patients, bringing exciting new innovations to medicine.

VII. REFERENCES

[1] Ekampreet Kaur, Akash bans, Uwom Okereke Eze, Jaskaran Singh, "Artificial Intelligence in Healthcare: A Prospective Approach", Multidisciplinary Journal of Geeta University, Volume 1, Issue 1, 2023.

[2] G.V.K.S. Abinav, Dr. Naga Subrahmanyam S, "Artificial Intelligence in Healthcare", Journal of Drug Delivery & Therapeutics, Issue 15 Oct 2019, ISSN: 2250-1177.

[3] Francisca Chibugo Udegbe, Ogochukwu Roseline Ebulue, Charles Chukwudalu Ebulue, Chukwunonso Sylvester Ekesiobi, "The Role of Artificial Intelligence In Healthcare: A Systematic Review of Applications and Challenges", International Medical Science Research Journal, P-ISSN: 2727-3394, E-ISSN: 2707-3408, Volume 4, Issue 4, P.No.500-508, April 2024, DOI: 10.51594/imsrj.v4i4.1052

[4] Private Community Hospitals Labor Productivity: U.S. Bureau of Labor Statistics. Accessed June 29, 2023. https://www.bls.gov/productivity/highlights/hospitals-labor-productivity.htm

[5] Silvana Secinaro, Davide Calandra, Aurelio Secinaro, Vivek Muthurangu, Paolo Biancone,

"The Role of Artificial Intelligence in Healthcare: A Structured Literature Review", BMC Medical Informatics and Decision Making. 2021.

[6] Fei Jiang, Yong Jiang, Hui Zhi, Yi Dong, Hao Li, Sufeng Ma, Yilong Wang, Qiang Dong, Haipeng Shen, Yongjun Wang, "Artificial Intelligence in Healthcare: Past, Present and Future", Stroke and Vascular Neurology, publish-22 June 2017, doi: 10.1136/svn-2017-000101.

[7] Shaheen, M.Y.(2021), "Application of Artificial Intelligence (AI) in Healthcare: A Review".

[8] Shagufta Quazi, Rudra Prasad Saha, Manoj Kumar Singh, "Applications of Artificial Intelligence in Healthcare", Journal of Experimental Biology and Agriculture Sciences, February-2022; Volume-10, ISSN No. 2320-8694. DOI: http://dx.doi.org/10.18006/2022.10(1).211.226

[9] Schwamm LH, Erskine A, Licurse A, A digital embrace to blunt the curve of COVID19 pandemic. NPJ Digit Med, 2020. 3: p.64.

[10] Van Velthoven MH, Cordon C. Sustainable Adoption of Digital Health Innovations: Perspectives From a Stakeholder Workshop. Journal of medical Internet research, 2019 21(3): p.e11922-e11922.

[11] Lua Perimal-Lewis, Patricia A.H. Williams, Ginger Mudd, Gihan Gunasekara, "Virtual Care: The Future for Telehealth", 2021, doi: 10.3233/SHTI210033

[12] Anirban Chakraborty, "Healthcare Monitoring Using Artificial Intelligence", International Journal of Research Publication and Reviews, ISSN 2582-7421, Volume 2, no 12, pp 250-253, December 2021.

[13] Deepthy C A, "Healthcare Monitoring Using Artificial Intelligence", International Journal of Creative Research Thoughts (IJCRT), Volume 9, Issue 3, March 2021, ISSN 2320-2882.

[14] Hossain, T., Shishir, F.S., Ashraf, M., Ai Nasim, M.A. and Shah, F.M., 2019,May. Brain tumor detection using convolutional neural network. In 2019 1st international conference on advances in science, engineering and robotics technology (ICASERT)(pp. 1-6). IEEE.

[15] Racic, L., Popovic,T. and Scandi, S., 2021, February. Pneumonia Detection Using Deep Learning Based on Convolutional Neural Network. In 2021 25th International Conference on Informational Technology (IT) (pp.1-4).IEEE.

[16] Hetal Pandya, Tanay Pandya, "Application of Artificial Intelligence in Medical Care: Review of Current Status", International Journal of Advances in Medicine, February 2023, Volume 10, Issue 2. DOI: https://dx.doi.org/10.18203/2349-3933.ijam20230073

[17] Bostrom N and Yudowsky E (2014) The ethics of artificial intelligence in The Cambridge handbook of artificial intelligence Frankish K and Ramsey WM.

[18] A. Haldorai and A. Ramu, "Canonical Correlation Analysis Based Hyper Basis Feedforward Neural Network Classification for Urban Sustainability", Neural Processing Letters, Aug. 2020. Doi:10.1007/s11063-020-10327-3

[19] J.EW and H. Grove D, "Physician Opinions about HER Use by EHR Experience and by Whether the practice had optimized its HER Use", Journal of Health & Medical Informatics, vol. 7,no. 4, 2016. Doi: 10.4172/2157-7420.1000240

[20] Ng,R.; Tan, K.B. Implementing an Individual-Centric Discharge process across Singapore Public Hospitals. Int. J. Environ. Res. Public Health 2021, 18, 8700.

[21] Ghosh, P. AI Early Diagnosis Could Save Heart and Cancer Patients. Science Correspondent. BBC News. 2018. Available online: https://www.bbc.com/news/health-42357257

[22] Houses of Lords. AI in the UK: Ready, Willing and Able? House of Lords Select Committee on Artificial Intelligence: Report of Session 2017-2019. Authority of the House of Lords. 2018.

[23] Picek O. Spillover effects from next generation EU. Intereconomics. 2020;55(5):325-31.