

Present State and Future Uses of Artificial Intelligence (AI) in Healthcare: A Review

Narendra Devarasetty^{1*}

¹ Anna University 12, Sardar Patel Rd, Anna University, Guindy, Chennai, Tamil Nadu
600025, INDIA

ABSTRACT

At the present time, AI is poised to revolutionise nearly every sector of the healthcare industry. Research into this technology is necessary so that its various medicinal uses may be identified. Analysed "Artificial intelligence" and "Artificial intelligence in the medical field" scholarly articles and found major uses for AI. Through in-depth analysis and investigation, this article demonstrates how artificial intelligence is assisting in the resolution of complex medical issues. The research uncovered five major AI technologies that are being used in healthcare and AI implementation. At the end of the piece, 10 main uses of AI in healthcare are highlighted and briefly explained. With the help of AI, a beneficial therapeutic choice may be made to enhance patient results. The medical industry is becoming increasingly automated as new technologies are accepted and experimented with. The medical profession is currently implementing AI to digitally store patient records and perform smart technology-based exams. It offers answers, particularly in the areas of tailored therapies, specifically designed pharmaceuticals, and focused treatments. AI is a cutting-edge tool that aids the surgeon with the administration of medication, therapy, and surgery. The primary use of this technology is to improve the decision-making process in complex scenarios. Additionally, it can aid in hospital infection tracking, detection, investigation, and management. An online platform for patient appointments is created and enhanced by this technology. It will be useful for the benefit of mankind in the future across all fields of medicine.

Keywords: Artificial intelligence (AI); AI Application; AI Technologies; Medical; Treatment;

INTRODUCTION

Though the idea of AI has been around since 1956, the last twelve years have seen tremendous advancements in the field [1-3]. Looking at thousands of

medical records helps doctors give better, more efficient care more quickly. Artificial intelligence (AI) is the practice of developing computer systems that mimic human intellect and cognitive abilities [4-9]. Automated learning, prediction, analysis, and conclusion-drawing capabilities are all a part of this technology [10-13]. Planning, imaging, speech recognition, and learning a certain feature are some of the medical challenges that it helps tackle. Artificial intelligence systems learn from examples in order to make more accurate predictions and to solve difficult tasks more quickly and efficiently [14-18].

By digitally preserving patient data and forming a database, artificial intelligence helps healthcare personnel minimise paperwork time. This database may then be utilised for diagnosis, treatment, and routine Medicare. Medical experts, in conjunction with software and hardware experts, must create a system for regular operations and data collecting according to the final specifications [19-25]. Applications are being tailored to use generic software. As a result, evaluation, individual patients' needs have to be taken into account while designing therapy and follow-up care modules. On the other hand, the AI system's performance depends on the data analysis [26-31].

At this time, artificial intelligence appears to be the most promising technology for increasing life expectancy. Robotic surgery with artificial intelligence assistance is available for complex cases. This gadget routinely interacts with the patient and generates data through various forms of virtual assistance. Using this technology in a productive way can help alleviate the scarcity of healthcare practitioners in rural regions [32-39]. It raises the bar for medical students, who can then meet the immediate need in underserved rural areas. Health care providers are able to work more efficiently and provide better treatment at lower costs because to this technology. In order to help doctors make correct diagnoses, it gives them guidance.

Imaging technologies that use scanning, such as X-rays, CT, MRI, and 3D scanners, rely heavily on artificial intelligence [40-43]. With these, we can make a more informed choice for the patient. Artificial intelligence can help you eat better and stay healthy. It handles patient scheduling and appointment reminders efficiently. Deploying this technology makes the medical industry more effective in solving numerous problems, and it also helps with virtual engagement with physicians [44-49].

BENEFITS OF ARTIFICIAL INTELLIGENCE IN MEDICAL FIELD

AI may improve the quality and result of complex surgeries by sorting out varying degrees of difficulty. This is only one example of the many medical problems that AI can handle. Thanks to the correct and prompt choice, the patient may now relax [50-52]. Here are some of the many ways artificial intelligence may improve healthcare:

To detect abnormalities and recommend medical treatment • To foretell future illnesses • To make an accurate and efficient diagnosis • To aid in the development of complex and novel treatments • To keep patients' blood sugar and blood pressure levels stable • To ensure that medical students receive adequate training • To make hospitals safer

Take notes during surgery that can be used to enhance the process in the future. There will have a positive impact on patients, on physicians' and surgeons' work experiences, on medical outcomes, on pathology results, on diagnostic costs, on record keeping, and on patient care [53-59].

Measuring the carina angle, analysing the aortic valve, and determining the diameter of the pulmonary artery are just a few examples of the many medical jobs that might benefit from artificial intelligence. Its current application is in orthopaedics, namely in determining the severity of fractures and traumas [60].

A VARIETY OF AI TECHNOLOGIES UTILISED IN THE MEDICAL INDUSTRY

The use of various cutting-edge technologies by AI has a profound effect on healthcare. It facilitates the ease of work for doctors, surgeons, and nurses. Individualised treatment programs for patients can be facilitated by these technologies. Congenital cardiac disorders can be diagnosed using this medical diagnostic support system. Keeping medical records digitally is a crucial function. Diagnostic precision, timeliness, and reliability can all be enhanced with its help. The use of these technologies allows for more precise prediction of patient outcomes and the collection of supplementary data that clinicians may have overlooked. These help huge medical organisations run their health systems effectively by keeping tabs on things like cost recovery, health spending, and treatment responses [61-65]. The many forms of AI employed in healthcare are illustrated in Table 1.

Table 1:- Different types of Artificial Intelligence technologies for medical field

S. No	Technologies	Description	References
1	Machine Learning (ML)	- Machine learning systems are programs which is, self- improving and learning with no experience or being trained over some time - They can evaluate the medical results automatically and presents them with a probabilistic degree of accuracy - ML algorithms can make decisions with these following algorithms and methods such as supervised learning, unsupervised learning, semi-supervised and reinforced learning - In the medical field, this technology is used to identify the probability of disease - ML is helpful to save the record of the patient for better treatment	[51-69]
2	Artificial Neural Networks (ANN)	- Artificial Neural Network works and is inspired by the neural structure of the human brain, working on the concept of backpropagation and layers (Input layers, Hidden Layer, Output layers) - ANN function like neurons as each neuron is connected similarly to each ANN neuron has weight	[53-62]

		and are connected • Through the training of ANN with large sets of data, the best weight equivalent to bond strength in human brain neuron makes sure that the best path is procured through ANN • Helpful to forecast the incidence of disease and in decision making	
3	Natural Language Processing (NLP)	• NLP refers to the speech recognition and evaluation of languages with different techniques • There are many independent NLP algorithms like parsing, POS, tagging using HMM (Hidden Markov Model) • In medical, this technology is useful for clinical decision trials, supports and analyses the unstructured data • It is also used for automated coding and maintains clinical documentation of the patient	[60-68]
4	Support Vector Machines (SVM)	• Support Vector Machines determines the class groups of data for the given input data • It solves the problem of data classification in the primary basis • They are used in E-Mail Spam filters when an SVM classifier is trained; it can use and see new and unseen data-points for future correlations • Used for collection and processing of medical data • Appropriately manage patient and helpful to make an evidence-based decision	[38-42]
5	Heuristics Analysis (HA)	• This technique uses a trial and error method to detect and discovery in order to solve a problem • The basic algorithm on which heuristic work is to employ such a practical solution which it may not yield the optimal goal but works sufficient to full fill that goal • Heuristic analysis is best to approach for patient safety and efficiently identified different problems	[29-54]

Medical specialties as diverse as orthopaedics, neurology, cardiology, and cancer make use of these technologies for a wide range of health-related purposes. Because of this, the service provided to the patient is more precise and effective [69]. With this new technology, doctors may streamline their workflow and enhance their preparation, Treatment methods and clinical decision-making. Now it's easier than ever to find a patient's medical history and notify them when anything happens. The regular request is no problem for AI thanks to data storage and backend processing. The patient will receive a notification when the lab test is overdue.

THE DEVELOPMENT OF AI

The application of artificial intelligence has the potential to revolutionise healthcare. It improves digital automation and effectively examines data, medical records, and systems to produce consistent and speedy outcomes. Digital consultations and effective medication management are two areas where this technology shines. Below, we'll go over how it helps doctors obtain better results:

MEDICAL ARTIFICIAL INTELLIGENCE

Medical AI boosts diagnostics, therapy customisation, and medication discovery. It does medication, a tedious job, precisely. In order to get an accurate outcome from clinical studies, this technology is helpful for effective monitoring. The patient can be properly monitored and information may be communicated with its help [70].

SURGICAL PROCEDURES

In order to effectively incorporate AI into surgical procedures, surgeons and doctors are collecting data at every stage. Displays great potential in the future to deliver exceptional care to patients. Surgeon efficiency and patient care are both enhanced by the evidence-based clinical decisions it produces. As expected, it yields effective outcomes from intricate surgical procedures [71-76].

IMAGING

With the help of AI, surgical procedures are more precise and consistent, and the surgeons can learn from their mistakes in real time. The surgeon may be able to use them to improve the outcome of the operation or therapy. Patients benefit from active recuperation and improved operation outcomes as a result of all the changes and advancements. In addition to pre- and post-process data variables, this technology may pre-define concepts. Recent advances in artificial intelligence have enabled it to better represent and understand

complicated facts through perception, which is the interpretation of sensory input [77-81].

ADMINISTRATION OF THE HOSPITAL AND PATIENT RECORDS

With this technology, medical records are preserved digitally, which greatly enhances their accuracy and efficiency. By contrast, AI-powered hospital management systems enhance medical records, automate customer and patient data storage and collecting, and produce synchronised data and elements. This technology aids in monitoring patients' vital signs and gives doctors and family members access to this data in real-time. As a result, it's useful for health system verification, which efficiently steers the hospital. A person's disease's aetiology may be correctly predicted using this method. In order to make doctors, surgeons, and hospital employees more efficient, artificial intelligence (AI) offers computerised management of the hospital administration [82].

THE HEART

One area where AI is finding utility is in cardiology, namely in the prevention of SCD. It incorporates data backed by evidence on heart conditions. To lessen the likelihood of a heart attack, this technology alerts the user to the presence of a blocked heart valve. Additionally, accurate data on blood flow is supplied. From the moment a patient checks into a hospital to the moment they leave healthy again, AI is helping with every step of the process [83-86].

A FLOW DIAGRAM OF AI APPLICATIONS IN HEALTHCARE

In complex surgical procedures, AI enables quick and precise communication. It automatically schedules, checks, and creates follow-up processes, which is a huge help to doctors with their hectic schedules. It enhances treatment efficiency while minimising the danger of diagnosis. This technology was utilised by researchers, scientists, and doctors to aid humanity. Artificial

intelligence can scan a patient's blood results and notify them at the right moment. Automatic electrocardiograms (ECGs), cardiac monitoring, clinical laboratory analysis, medical imaging, electroencephalography, respiratory monitoring, and anaesthesia are some of the areas where these technologies have found practical use. This new technology can assess a variety of medical images, blood tests, and sugar levels in a short amount of time. Artificial intelligence (AI) can extract the necessary knowledge to tackle any medical problem by incorporating patient data into algorithms [87-90]. The use of AI in healthcare is illustrated in Figure 1, which is a flow diagram.

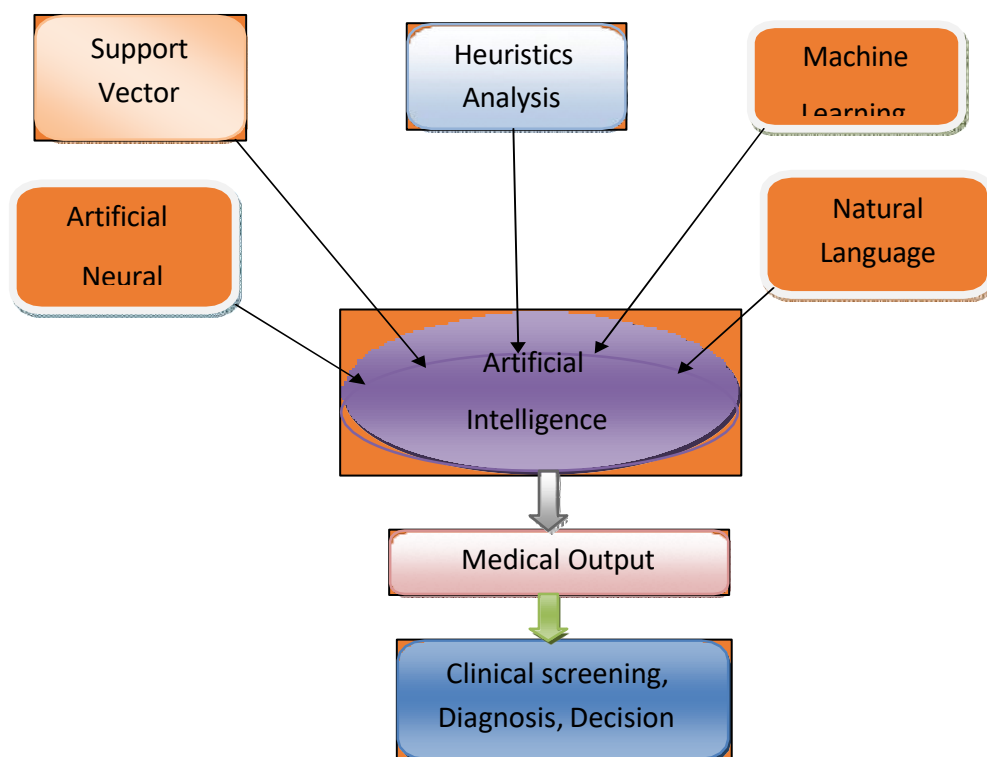


Figure 1:- Process chart of Artificial Intelligence in the medical field

By applying AI, the computer can interpret human speech and writing to manage and evaluate the patient using multiple technologies. It guides doctor, surgeon and physician that how to enhance outcomes and master the skill in real-time. AI observes the surgeon step-by-step and further analyse to make change and attain higher outcomes. It also shows what forms of innovation can be generated in the medical profession. In addition to assisting with the

treatment of new diseases, it monitors the adherence of doctors. Artificial intelligence (AI) has the potential to make everyday medical applications safer and more efficient. Through the use of neural networks, sophisticated imagery, and natural language processing, it possesses an exceptional capacity to gather data.

APPLICATIONS OF ARTIFICIAL INTELLIGENCE IN THE MEDICAL INDUSTRY

New, inventive technologies that improve people's lives are essential in our daily lives. Artificial intelligence (AI) offers many advantages that can spur innovation in the medical industry. A doctor with the help of this technology can check patient without visiting any clinics/hospital. Therefore, this technology may now be used to offer online assistance to patients. With a wide range of medical concerns, every patient inquiry may be promptly addressed \$59, \$60. It may be used for several purposes in treatment planning to improve outcomes. A variety of AI-based medical applications are detailed in Table 2.

Table 2:- Artificial Intelligence applications in medical field

S No	Technologies	Description	References
1	Recording and storage of medical data	• It collects, stores and analyses the medical data to provide faster access and decision making • Every patient data is electronically stored which facilitates diagnosis and treatment • Provide day to day improvement history of the patient • Data stored digitally can help to identify the cause of diseases and help research and development activity • It records the all medical record of an individual patient and further compares the database of illness	[22-29]
2	Analyze different test	• Artificial intelligence accurately analyse different tests like X-ray, ultrasound, MRI and CT scan • Capability to check the improvement and significant causes of the disease	[31-44]

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		• Quickly shares patient information in the emergency case which makes doctors and surgeon job easy • Efficiently perform, evaluate, validate, predict and analyse the data using different scanning technologies	
3	Patient monitoring	• It helps to monitor patient condition and follow up all treatments • Provide proper monitoring to get more exercise, needs and habits of the patient • Helps in monitoring and access information of the patient	[22-29]
4	Manage all medication system	• AI helps to manage the condition of the patient • This technology facilitates, early prediction of vascular diseases • Suggest suitable medication, protein and diet plan to the patient	[66-73]
5	Proper diagnosis and treatment	• Mainly computer techniques are used in AI for clinical diagnosis and treatment • It can handle a different clinical situation such as diagnosis, complex treatment and predict sufficient results • This technology has the potential to demonstrate several intelligent approaches and application • In the healthcare industry, all health record and information is stored digitally, thereby helping the treatment process	[36-42]
6	Medications alert	• It is a personal virtual assistant technology which can alert the patient for proper medication using the app • Provide proper monitoring, education and assist patients with personal clinical needs • AI is an innovative technology to provide better health	[12-31]
7	A complex and customised treatment	• AI is used to perform complex and customised treatment of the individual patient • This technology can accurately predict the diseases from digitally stored data • It quickly understands the human command to make successful treatment • For the individual patient, it provides proactive alert and customised experience	[56-87]
8	Patient management and service	• It improves service to the patient in the hospital • Applicable any time for significant requirements, like billing, time scheduling and other clinical applications • Quickly analyse medical images like X-ray, CT and MRI	[75-88]
9	Training	• Due to insufficient medical specialist and	[43-76]

		facilities, the mortality of patient is high in many diseases • Many patients die during practice by new doctors • Due to these untrained doctors, there is a high risk of diseases and death • AI technology is now available in the medical field to train a new doctor to fulfil different requirements	
10	Decision making	• AI provides human-like intelligence with the help of computer technology • Health professional allow this technology for greater data accessibility which helps design/customize a decision support system • It seems to be the best tool to support medical decision making with the help of available data • It helps create innovation which subsequently to increase staff efficiency and patient outcomes	[54-67]

With the help of AI, medical professionals may do more with less human intervention. The use of AI in clinical judgement, analysis, and training appears to be optimal. The correct application of this technology has demonstrated the availability of rapid and accurate diagnostics. The primary concern of patients is their safety during therapy and surgery, and AI has the potential to lessen the likelihood of human mistake in this area. With the complex medical tests and data produced, the medical staff can conduct investigations. An individual patient's genetic profile may be examined using it. Information about medical disorders, case studies, and patients' histories may be recorded using this technique. To improve health, it can appropriately notify the patient about the right medicine, food, and exercise [86-90].

DISCUSSION

Artificial intelligence analyses large amounts of complicated medical data using sophisticated algorithms and specialised software. Without any intervention from a human, it produces accurate and workable outcomes. By utilising smart equipment, this technology is able to comprehend and progress with the data. Examining how different methods of therapy and prevention affect the final results for individual patients is AI's primary focus. The hospital is able to meet the needs of its employees and patients thanks to AI

solutions that boost patient happiness, cut costs, and increase efficiency. Computing power and data collecting speed are both enhanced by this technology. This electronic health record system has the potential to improve robotic-assisted surgery. In order to get better results, this technology assesses the effects of therapy and surgery. Information on the potential occurrence of illness can be conveyed. During effective patient monitoring, AI may detect and document changes. This technology can simply gather and store data digitally, which may aid in diagnosis and treatment, and every patient's data is unique in the medical field. It examines the many lab tests and their main cause of the condition to evaluate if there has been an improvement. In times of emergency, this data might be useful to the patient. AI helped taught future doctors and medical students to be more knowledgeable and skilled surgeons. Machine learning makes it easy to enhance health outcomes by analysing existing patient and medical data.

RECOMMENDATIONS

In the future years, AI will aid medical professionals in making more informed clinical judgements across the board. The most recent data and expertise may be provided by this technology to ensure the patient receives the best treatment possible. With AI used correctly, healthcare of the future will be far better. The main focus is on automating the process of transforming unstructured text into machine-readable data. Investment management and new product development will both benefit from AI. It can handle a necessary medical duty with ease and efficiency, saving both time and money. In order to improve health conditions, this technology can digitally gather, store, and classify the data. Without the need for human doctors, AI can handle a variety of patient enquiries. It outperforms humans in collecting visual imagery and unstructured data. Opportunities in the fields of training, education, research, and development will expand as a result. The mortality rate can be decreased with the use of appropriate therapy. Thanks to its voice recognition capabilities, it will suggest a suitable course of action to avoid infections. One major

drawback of this technology is its lack of emotional intelligence, which means it currently struggles to adequately portray or imitate human emotions.

CONCLUSION

The use of AI in healthcare has the potential to improve patient monitoring and care. It evaluates the picture or outcome without the need for physicians, surgeons, or clinicians. AI-based technologies provide decision which can help to predict medical emergencies. Offering medical advice through a digital app is useful. The practical implication of this technology is to increase accuracy in diagnosis and treatment. It can be used in the prevention of disease and reduce medical cost. This technology is used to answer patient questions and reduce unnecessary hospital visits. AI provides an excellent source and identifies problems during the shortage of doctor. This technology first understands the biological origin of disease for better treatment of the patient. It easily imagines medical images and accurately performs the task. AI helps identify cancer and its treatment with the analysis of patient data. Its applications are for the diagnosis of heart disease. It speeds up the clinical trials to produce a conclusive result. AI constructs analytical algorithms of different features from the patient data, which is helpful to provide information about the patient, survival times and diseases level. In upcoming years, its applications will be for digital supervision in hospitals to improve patient care. Its primary use case in the next years will be digital monitoring in healthcare facilities with the goal of bettering patient care.

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