

# Artificial Intelligence in Healthcare

Apurva Rajendra Saraf, Rayrikar Komal Dattatray, Khule Aditi Anand

Department of Computer Engineering, Zeal College of Engineering and Research, Pune, Maharashtra, India

## Article Info

Volume 9, Issue 1

Page Number : 338-343

## Publication Issue :

January-February-2022

## Article History

Accepted :05 Feb 2022

Published: 28 Feb 2022

## ABSTRACT

Artificial intelligence (AI) is recently emerging in healthcare. AI helps to forecast diseases patients for medical procedure. AI application in healthcare is immense which is not only for doctors; but patients, drug industries, health services, insurance agencies and medical institutions are also using AI. AI helps in dermatology, echocardiography, neurology screening retinal care, diagnosis process, surgery, angiography etc. It provides user friendly accessibility for both doctor and patients and prepares feedback to medical community for research. AI helps in monitoring, screening, providing clinical and medical studies for patient.

Artificial intelligence (AI) aims to mimic human cognitive functions. It is bringing a paradigm shift to healthcare, powered by increasing availability of healthcare data and rapid progress of analytics techniques. It can increase productivity and the efficiency of care delivery and allow healthcare systems to provide more and better care to more people.

**Keywords:** Artificial Intelligence, Healthcare, Robotics, Radiology, etc.

## I. INTRODUCTION

Artificial intelligence is defined as the intelligence of machines, as opposed to the intelligence of humans or other living species.

Artificial intelligence (AI) and related technologies are increasingly prevalent in business and society, and are beginning to be applied to healthcare and Artificial intelligence (AI) aims to mimic human cognitive functions.

To improve patients' health fast, a hospital develops a clinical plan for the patient so that patient recovers fast, but sometime, the clinical plans do not go as planned. In such cases, artificial intelligence will be very helpful as, a better plan would be executed

through machine learning. Administrative work will also be made easier through artificial intelligence. All the payment transaction will be easily managed. Patients' mental health and physical condition will easily be diagnosed through artificial intelligence. Whether a particular drug given to a patient is helping the patient to fight the disease will easily able to achieve through machine learning and artificial intelligence.

Artificial intelligence simplifies the lives of patients, doctors and hospital administrators by performing tasks that are typically done by humans, but in less time and at a fraction of the cost.

## II. ARTIFICIAL INTELLIGENCE IN HEALTHCARE

Artificial intelligence in healthcare refers to the use of complex algorithms designed to perform certain tasks in an automated fashion. When researchers, doctors and scientists inject data into computers, the newly built algorithms can review, interpret and even suggest solutions to complex medical problems.

AI-enabled healthcare services like automated analysis of medical tests, predictive healthcare diagnosis, automation of healthcare diagnosis with monitoring equipment, and wearable sensor-based medical devices are expected to revolutionize medical treatment processes in the country.

Although the work done today cannot be completely replaced by AI robots or technology in the future, but medical AI technology will play a huge role and will also have a great impact on electronic health records (EHRs), diagnosis, treatment protocol development, patient monitoring and care, personalized medicine, robotic surgery and health system management.

## III. AI ALGORITHMS USED IN HEALTHCARE

Algorithms that are used in the healthcare industry to solve numerous problems are:

### 1. Support Vector Machines

Support Vector Machines are the most standard machine learning algorithm that is being used by the healthcare industry. It uses a supervised learning model for classification, regression, and detection of outliers. In recent years, the algorithm has been used to predict the medication adherence of heart patients that has helped millions avoid serious consequences, such as hospital readmission and even death. It is also being used for protein classification, image segregation, and text categorization.

### 2. Artificial Neural Networks

It is a group of deep learning algorithms inspired by the neuron organization in animal brains that can

receive signals from a previous layer and send it to the next layer. A network that can learn by analysing examples or without any human intervention. From pathologists using it for diagnosis to biochemical analysis, an artificial neural network has a bunch of other uses as well. It is further divided into two parts: convolutional neural network (CNN) and recurrent neural network (RNN).

Imaging is an important aspect of medical science since it can allow a doctor to know about a disease even before the symptoms arise. Due to this, there are several screening procedures such as Pap smears, Mammograms, Colonoscopy, etc. CNN has proved to be crucial in this segment, as the algorithm is well suited for a multi-class classification problem and binary classification. On the other hand, RNN has proved to be significant when used for pattern recognition in medical time-series data analysis.

Logistic Regression, Random Forest, Discriminant Analysis, Naïve Bayes are the other top AI algorithms used in healthcare.

## IV. DISCUSSION AND EVALUATION

### Reason of Artificial Intelligence In Healthcare

AI helps in monitoring, screening, providing clinical and medical studies for patient.

AI can help improve the experience of healthcare practitioners, enabling them to spend more time in direct patient care and reducing burnout.

- Wearing devices that detects early signs of a disease, physicians may be able to use data from such devices to treat disease at earlier stages. AI-powered machines are diagnosing disease with greater precision than physicians in curing skin cancer, breast cancer colorectal cancer, brain cancer, and cardiac arrhythmias.
- Since epilepsy often spreads across the brain, identifying abnormal scans as early as possible is crucial to improving patients' treatment options and ultimate outcomes.

- Robotics' applications in the healthcare sector include robotic arms for amputees, micro-robots repairing damage from the inside, and robot-assistants in surgeries. We may soon have telepresence robots that examine patients to free up time for medical professionals.

## V. ARTIFICIAL INTELLIGENCE TECHNOLOGY ROLE IN THE HEALTHCARE

Artificial intelligence (AI) is rapidly moving to change the healthcare system. Artificial Intelligence (AI), Robotics and Big Data revolutionized the world and opened unprecedented opportunities and potentials in healthcare. A knowledge-intensive industry like the healthcare profession highly depends on data and analytics to improve therapies and practices. In recent years, there has been tremendous growth in the range of medical information collected including clinical, genetic, behavioral and environmental data. Every day, healthcare professionals, biomedical researchers and patients produce vast amounts of data from an array of devices.

AI technology is bringing revolutionary changes that have not even been seen before and are noticed across the healthcare field. Although the work done today cannot be completely replaced by AI robots or technology in the future, medical AI technology will play a huge role and will also have a great impact on electronic health records (EHRs), diagnosis, treatment protocol development, patient monitoring and care, personalized medicine, robotic surgery and health system management.

## VI. ANALYSIS

A knowledge-intensive industry like the healthcare profession highly depends on data and analytics to improve therapies and practices. In recent years, there has been tremendous growth in the range of medical information collected including clinical,

genetic, behavioural and environmental data. Every day, healthcare professionals, biomedical researchers and patients produce vast amounts of data from an array of devices.

A global health emergency like the corona virus is a big spotlight healthcare industry, with every stakeholder fighting from the front-line. The pandemic has been called a structural shift for digital healthcare in many countries including India. Many have said that this is the time for India to reboot healthcare and support health tech start-ups in closing the gaps in the traditional healthcare system. A lot of healthcare industries in India also need automation for various tasks and they are using AI to help them in their industry.

Because of the capability to aggregate and examine a large amount of different data, AI could generate significantly quicker and more precise diagnoses for a wider section of the population. People without access to highly functional health care could obtain the advantage of that expertise through AI.

Additionally, healthcare professional able to keep themselves safe in the era of pandemic (COVID -19), with well programmed robots, which can scan the patient's vital sign without coming into direct contact with them.

According to the India Brand Equity Foundation (IBEF), India's healthcare industry is expected to reach dollar 372 billion by 2022. It is expected to generate 40 million jobs by 2030.

As seen from the graph, Sigtuple, qure.ai, Tricog, Oncostem and Niramai are the top 5 AI organisations in healthcare in India.

The healthcare sector is growing rapidly in the Indian landscape, both in terms of revenue and increasing market share.

This growing market has given rise to many emerging health-tech start-ups in India which cater to various healthcare segments, book appointments, sell medicine online, and operate as a commercialized unit of venture.

## VII. ADVANTAGES OF ARTIFICIAL INTELLIGENCE IN HEALTHCARE

- A. Cost effective robot governed surgeries and other healthcare services which are beneficial to patients' treatments
- B. Fast and efficient management of hospital records
- C. Efficient and earlier diagnosis of diseases which will help in fast treatment
- D. Easily make clinical decision with real time data
- E. Reduce human work resulting to more productive work like taking care of patients' mental health

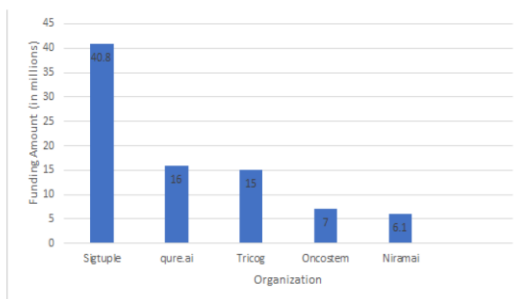


Chart 1: Top Five Artificial Intelligence (AI) organizations in healthcare in India

Source: <https://innohealthmagazine.com/2020/trends/top-artificial-intelligence-organizations-in-healthcare-in-india/>

## VIII. DISADVANTAGES OF ARTIFICIAL INTELLIGENCE IN HEALTHCARE

- A. Unemotional consideration of problems i.e. machines can't exactly think like humans which will make effects on decision making
- B. Inaccuracies are still possible as it's machine and faults may occur
- C. Needs human surveillance like operating the machines, checking whether they work accurately or not, etc.
- D. Work done today cannot be completely replaced by AI robots or technology
- E. Risk of unemployment because in some places, machines will be replacing the humans

## IX. APPLICATIONS OF AI IN HEALTHCARE

With use of AI, more patients will be treated which will help in reduce the demand and supply gap present in our country. Common men and women will be able to detect small diseases on their own.

The applications of Artificial Intelligence in Healthcare are:

**A. AI-Assisted Robotic Surgery:** AI and collaborative robots have revolutionized surgeries in terms of their speed, and depth while making delicate incisions. Since robots don't get tired, the issue of fatigue in the middle of lengthy and crucial procedures is eliminated.

AI machines are capable of employing data from past operations to develop new surgical methods. The preciseness of these machines reduces the possibility of tremors or any unintended or accidental movements during the surgeries.

**B. Virtual Nursing Assistants:** AI systems facilitate virtual nursing assistants that can perform a range of tasks from conversing with patients to directing them to the best and effective care unit. These virtual nurses are available 24/7 and can respond to queries as well as examine patients and provide instant solutions.

Presently many AI-powered applications of virtual nursing assistants presently enable more regular interactions between patients and care providers between office visits to avoid any unnecessary hospital visits. The world's first virtual nurse assistant Care Angel, can even facilitate wellness checks through voice and AI.

**C. AI-Assisted Medical Diagnoses:** AI has the capacity to surpass human doctors and help them detect, predict, and diagnose diseases more accurately and at a faster rate. Likewise, AI algorithms have proved to be not only accurate and precise at speciality-level diagnostics, but also

cost-effective in terms of detecting diabetic retinopathy.

For instance, PathAI is developing machine learning technology to aid pathologists in making more accurate diagnoses. The company's current goals include reducing error in cancer diagnosis and developing methods for individualized medical treatment.



Figure: AI Powered Bots



Figure: AI in Drug Discovery



Figure: Robot Assisted Surgery



Figure: Medical Data Security

Figure: Some Applications Of Artificial Intelligence In Healthcare

**D. Medical Image Analysis:** A team of researchers at Osaka University has developed a deep-learning algorithm that can reliably diagnose many neurological diseases including epilepsy. The program scans patients' magneto encephalography results, comparing their images with tens of thousands of other scans from healthy patients. It then identifies potential lesions and other abnormal regions in the brain.

**E. Drug Discovery:** AI solutions are being developed to identify new potential therapies from vast databases of information on existing medicines which could be redesigned to target critical threats such as the Ebola virus. This could improve the efficiency and success rate of drug development, accelerating the process to bring new drugs to market in response to deadly disease threats.

**F. Medical Data Security:** Artificial intelligence algorithms can be trained to combat healthcare

security challenges, such as detecting malware, identifying security breaches, protect from cyberattacks, and even prevent non-compliance with rules much more efficiently than traditional software.

**G. Automated Workflow Assistance:** AI analyses data throughout a healthcare system to mine, automate and predict processes. It has been used to predict ICU transfers, improve clinical workflows. Analysing tests, X-Rays, CT scans, data entry, and other mundane tasks can all be done faster and more accurately by robots. Cardiology and radiology are two disciplines where the amount of data to analyse can be overwhelming and time consuming. Cardiologists and radiologists in the future should only look at the most complicated cases where human supervision is useful.

**H. Medical Risk Prediction:** With increase in technology, many people are wearing devices that detects early signs of a disease physicians may be able to use data from such devices to treat disease at earlier stages.

**I. Fraud Detection:** Patients may make false claims. Leveraging AI-powered fraud detection tools can help hospital managers to identify fraudsters.

**J. Clinical Trial:** Digital records are much more efficient than paper-based reports and even storing these files is made a lot easier with automated systems. What's more, automation is known to produce better insights into certain clinical matters, and certainly a lot faster than through any human-related process.

Now, that's not to say AI is beneficial to clinical trials alone but rather to highlight the reason for so much demand in terms of automated systems in the healthcare industry.

**K.** These are just some of the solutions AI is offering the healthcare industry. As innovation pushes the capabilities of automation and digital workforces, more solutions to save time, lower costs, and increase accuracy will be possible.

## **X. FUTURE SCOPE**

The future of AI in health care could include tasks that range from simple to complex — everything from answering the phone to medical record review, population health trending and analytics, therapeutic drug and device design, reading radiology images, making clinical diagnoses and treatment plans, and even talking with patients.

## **XI. CONCLUSION**

AI application is for provide training, medical research, diagnosis, medical treatments, decision making in wellness care for patients. AI systems will become more advanced and will attain the ability to carry out a wider range of tasks without human control or input. AI is developed and used in a way that is transparent and compatible with the public interest whilst stimulating and driving innovation in the sector. With the help of AI, it will not only save patients' and health professionals' time, but also save their money.

The potential for artificial intelligence is enormous and will keep on growing every year with new innovations in the society and providing great help to human mankind.

## **XII. REFERENCES**

- [1]. <https://rb.gy/wgklmf>
- [2]. <https://rb.gy/gh4wxo>
- [3]. <https://ieeexplore.ieee.org/abstract/document/9416469>
- [4]. <https://ieeexplore.ieee.org/document/9377084>

- [5]. <https://ieeexplore.ieee.org/document/9441741/references#references>
- [6]. <https://rb.gy/tvzmpj>
- [7]. <https://infiniticube.com/blog/5-key-elements-of-artificial-intelligence/>
- [8]. <https://analyticsindiamag.com/top-6-ai-algorithms-in-healthcare/>
- [9]. <https://rb.gy/d944qm>
- [10]. <https://www.sciencedirect.com/science/article/pii/S2095809919301535>