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Review JoAIRA

Artificial Intelligence: Revolutionizing Indian Healthcare

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Abstract

Artificial Intelligence (AI) has achieved a tipping point. The blend of the innovation, information and ability that makes astute frameworks conceivable has achieved minimum amount, driving uncommon development in AI venture. Over the world, G20 nations have been developing their AI capacities. Individuals and insightful improvements cooperating inside and outside organizational boundaries to produce improved results for clients and society are at the heart of AI's power. AI has also a great impact in healthcare. AI applications have immense impact on not only doctors but also on patients, drug industries and medical institutions. AI helps in surgery, neurology, dermatology, etc. It also helps medical studies by providing students monitoring and screening facilities. AI can also prove as an efficient tool in identification of infections like COVID-19, monitoring patient's health and vaccine development as well. India is a rising superpower and artificial intelligence holds a major role in developing India. India has noted a rise in startups that mainly focus on artificial intelligence; and during Covid scenario, this rise was at its peak. India has played a major role in delivering products which were helpful in Covid times whether it may be detection of corona using artificial intelligence or treating it with the help of vaccination. Everywhere, artificial intelligence was in a huge demand. Hence, we can see a great future for artificial intelligence in medical field in India. Apart from corona, Indian medical technology is updated with artificial intelligence in every way. Machine learning algorithms play a major role in detecting disease with the help of data samples as inputs. Artificial intelligence is just not used in treatment but also used for virtualization and simulations with the help of which doctors can have a detailed study.

Keywords: Artificial intelligence, Natural Language Processing (NLP), Fuzzy Logic, Deep Learning, COVID-19

INTRODUCTION

Artificial Intelligence (AI), often known as "new electricity", is becoming a hot topic in India. The ability of machines to execute cognitive functions such as thinking, perceiving, learning, problem solving, and decision making is referred to as artificial intelligence (AI). The majority of AI systems rely on big historical datasets to forecast future trends and outcomes at a rate that humans cannot match. In India, AI is still in its early phases, and there is no regulatory agency dedicated only to AI [1–5]. When it comes to healthcare, artificial intelligence offers a wide range of applications. AI in healthcare offers a wide range of applications, including analyzing radiographs and forecasting operation needs in hospitals and medical departments [4]. On a few occasions, RT-PCR methods for COVID diagnosis have failed to detect novel COVID variants. The DRDO's Centre of Artificial Intelligence and Robotics assisted in the development of ATMAN AI, an AI-based intelligent COVID detection application software.

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Using chest X-rays, this software may identify pictures as "normal", "COVID-19", or "pneumonia" [5]. ATMAN AI can be used on mobile phones, tablets, laptops, and PCs; according to DRDO, and it has a 96.73% accuracy rating. COVIRAP was also launched by IIT Kharagpur. It consists of pre-programmable control units and a genomic analysis detection unit. It also comes with a special app that shows the test results. Qure.ai, a Mumbai-based startup, has also created a qXP screening tool for COVID-19 diagnosis.

OBJECTIVE

- To have a better understanding of Indian healthcare's position in the field of artificial intelligence.
- To learn about Artificial Intelligence's use in Indian healthcare.
- To learn about the major roadblocks to AI implementation in India's healthcare system.
- AI's role in the future of healthcare.

LITERATURE REVIEW

According to the BCG research, "The Ghost in the Machine: Artificial Intelligence in the Factory of the Future" [6], India is placed third after the United States and China in terms of AI implementation. According to a review, India's recently released draught, National Strategy for Artificial Intelligence highlights increased technological advances, as well as interest and activity from innovators, as an opportunity for India to address long-standing challenges in providing proper healthcare to a large segment of the population [7]. According to the recent policy documents for National Health Stack (2018) [7] and National Digital Health Blueprint (2019) [8], the government is also attempting to develop a national digital health infrastructure (Ministry of Health and Family Welfare, 2019). The Indian government's focus of AI in healthcare has resulted in more collaboration between the government, technology businesses, and healthcare providers. The government's official policy think-tank, NITI Aayog, is collaborating with Microsoft and medical technology startup Forus Health to establish a pilot for early identification of DR. The Maharashtra government has inked a pact with the National Institute of Transformative Artificial Intelligence (NITI Aayog) to establish the International Centre for Transformational Artificial Intelligence (ICTAI), which would focus on rural healthcare (According to Hebber, 2018) [6, 7]. Telangana's government is most likely using Microsoft's Intelligent Network for Eyecare (According to Gupta, 2017) [10]. As the first (of many planned) pilot project in healthcare, we are concentrating on increasing the productivity of existing pathologists and radiologists. Based on AI algorithms, the NITI Aayog is working on early identification and diagnosis of cardiac risks and diabetic retinopathy. In the long run, such initiatives would benefit patients by putting them on proactive treatment in the early stages of their illness rather than reactive therapy later on, lowering healthcare expenditures and increasing their chances of recovery. According to Research and Markets, the use of artificial intelligence in healthcare in India would be worth Rs. 431.97 billion by 2021, rising at a rate of nearly 40% [8].

WHAT IS ARTIFICIAL INTELLIGENCE?

AI is a collection of technologies that enable machines to function with more intelligence and to mimic human sense, comprehension, and action. By acquiring and processing images, sound, and speech, computer vision and audio processing may actively comprehend the world around them. AI systems can use natural language processing and inference engines to examine and interpret the data they collect (Figure 1).

AI Tools and Technologies

AI encompasses a wide variety of computer models and techniques. The following are the many AI tools and technologies.

Neural Networks

Neural networks are computer programs that, after being trained, recognize objects and recognize patterns. Artificial neural networks are made up of processing units known as neurons that perform mathematical calculations.

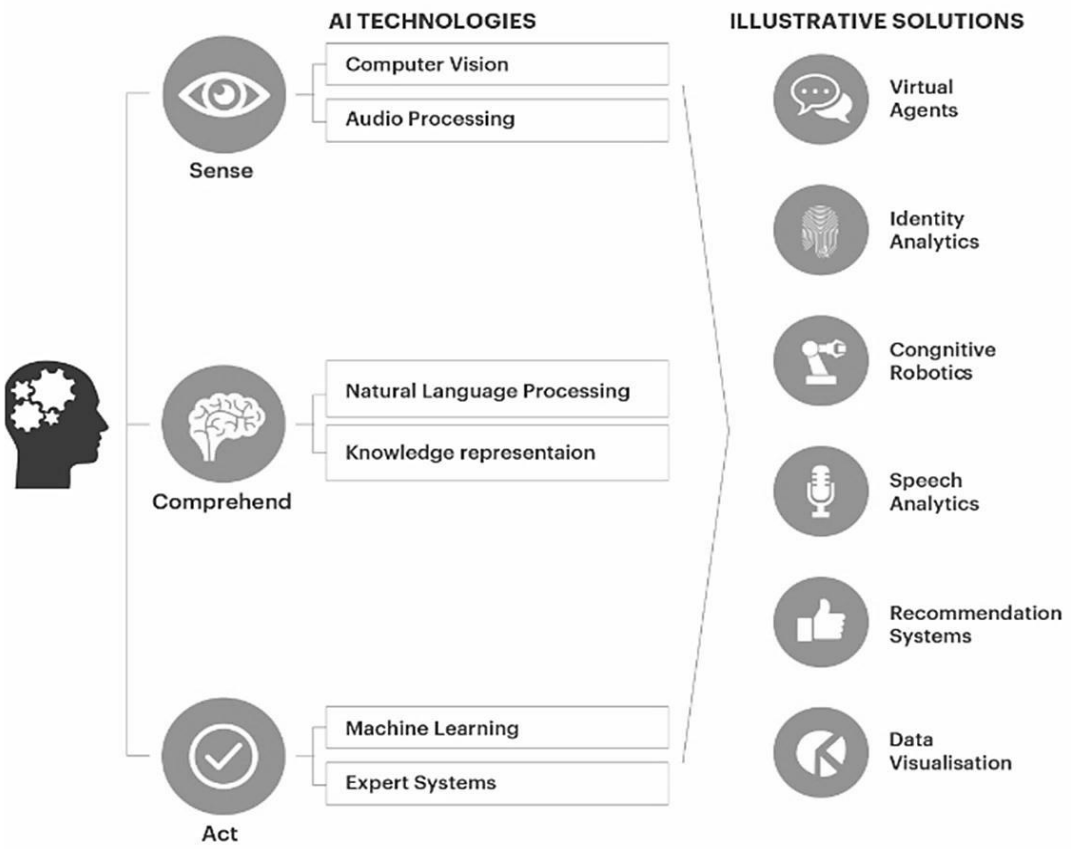

Figure 1. Artificial intelligence Human Process.

Expert Systems

These systems assist computers in making decisions by evaluating facts and making decisions in the same way that humans do.

Natural Language Processing (NLP)

Speech recognition, text analysis, and any other task related to language translation are examples of NLP applications. It is a computer program that deciphers human speech.

Data Mining

Data mining is concerned with the use of algorithmic tools such as statistics, regression models, and neural networks, among others. This is a method for extracting information from huge data collections.

Machine Learning (ML)

Machine learning (ML) is a statistical technique for fitting models to data and training with models. Supervised learning, reinforcement learning, unsupervised learning, and deep learning are the most common machine learning algorithms.

Deep Learning

Deep Learning is a subset of machine learning that has a deep hierarchy of layers. It is mostly used to solve complex problems in the real world.

Fuzzy Logic

Fuzzy logic models human thinking with incomplete or fuzzy data by dealing with uncertainty in knowledge. The fuzzy model is resistant to parameter shifts and impressions [10, 11].

IMPLEMENTATION OF AI IN HEALTHCARE

Artificial Intelligence Assisted Surgery

Some operations necessitate sophisticated invasive processes that can be redesigned with AI. We can also use precision robotic technology in such procedures [4].

Predictive Detection

We may use machine learning models to forecast the likelihood of a disease occurring before it is ever identified in a patient. This technology is still a fiction, but it has enormous potential in the future.

Drug and Vaccine Development

AI can be employed in drug delivery design, drug manufacturing, and drug research. A slew of firms has sprung up with the goal of making protein folding more affordable and accessible. This has also opened up a new field of possibilities, such as simulating pharmacological activities using an AI-based molecule interaction system rather than using the brute force approach of simulating hundreds of chemicals on a specific virus or bacteria, which is both expensive and time consuming [2, 4].

Computational Biology and Medicines

Due to AI, it is possible to predict structures of protein, this helps in understanding its functions. Alpha Fold of Google Deep- Mind is using this technique to predict proteins associated with COVID-19 based on their amino acid sequences. This approach is cost effective as well as time efficient.

ADAPTION OF AI IN INDIAN HEALTHCARE

Since there are a lot of initiatives taken by Indian Government in introducing AI in Indian Medical facilities, there is a huge demand in the AI based medical tools and products. Due to high demand of products, there are rising startups and demand of foreign companies to invest in Government policies for healthcare. According to an article published in Inno Health Magazine, below is the graph of top 5 AI organizations in India and their Funding in terms of millions (Figure 2) [10, 12, 13].

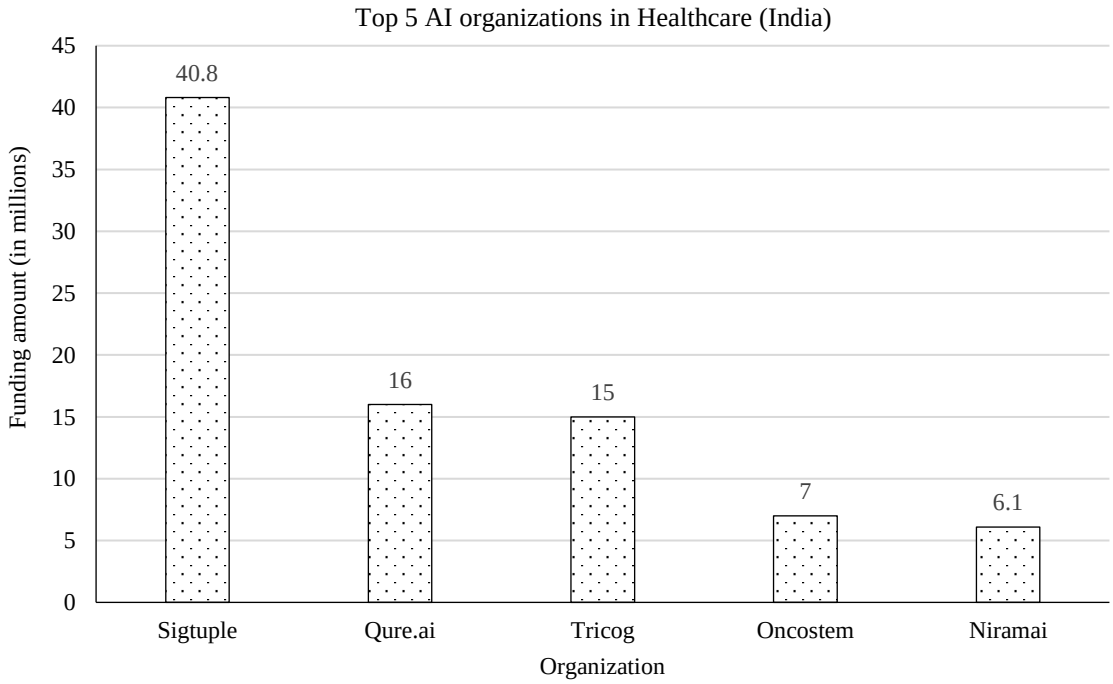

Figure 2. Top 5 AI organization in healthcare (India) [10].

Current List of Indian Companies Bringing AI into Healthcare

The current list of Indian companies bringing AI into healthcare [8]:

- ***Sig Tuple Technologies***
  When it comes to research, it is one of the best AI companies in healthcare. Tathagoto Rai Dastidar, Apurv Anand, and Rohit Pandey launched this startup in Bengaluru in 2015. Sig Tuple uses artificial intelligence to automate the manual assessment of medical data such as blood tests, urine and sperm microscopy, and retinal image analysis. This company primarily serves the fields of pathology and ophthalmology, providing technologies such as automated digital microscopes and AI platforms.
- ***Qure.ai***
  This startup was started in Mumbai in 2016 by Prashant Warier and Pooja Rao. Qure.ai utilizes artificial intelligence (AI) to make healthcare more affordable and accessible. They analyze radiological photos and scans, such as chest X-rays and head CT scans, in a matter of seconds using deep learning algorithms. In COVID-19, this company also gave solutions to the community.
- ***Tricog***
  Chirat Bhograj, Zainul Charciwala, Udayan Dasgupta, and Abhinav Gujjar started this company. Tricog's products include Insta ECG, which provides ECG findings in under 10 min, and InstaEcho, which helps doctors diagnose echocardiograms quickly within hours after the test. In 2018, it was also honored with the NASSCOM Artificial Intelligence Game Changer Award.
- ***Niramai***
  This startup was formed in Bengaluru in 2016 by Geetha Manjunath and Nidhi Mathur. Thermalytix is a product developed by this business that employs artificial intelligence and high-resolution thermal sensor devices to identify breast cancer earlier than standard approaches. Its gadget is low-cost, automated, and portable, allowing it to be employed in even the most remote parts of the country on a huge scale.

AI DURING COVID-19

According to a report from India's Ministry of Science and Technology, the new platform will aid in the quick screening of COVID-19 using chest X-rays. XraySetu was developed in conjunction with healthcare based startup Nirmai by the ARTPRK (AI and Robotics Technology Park) foundation, which was formed by Indian Institute of Science (IISc) with backing from the Department of Science and Technology (DST) of the Indian Government. It is a WhatsApp-based app that can identify COVID-positive individuals even from very low-resolution chest X-ray photos (Figure 3) [12, 14, 9].

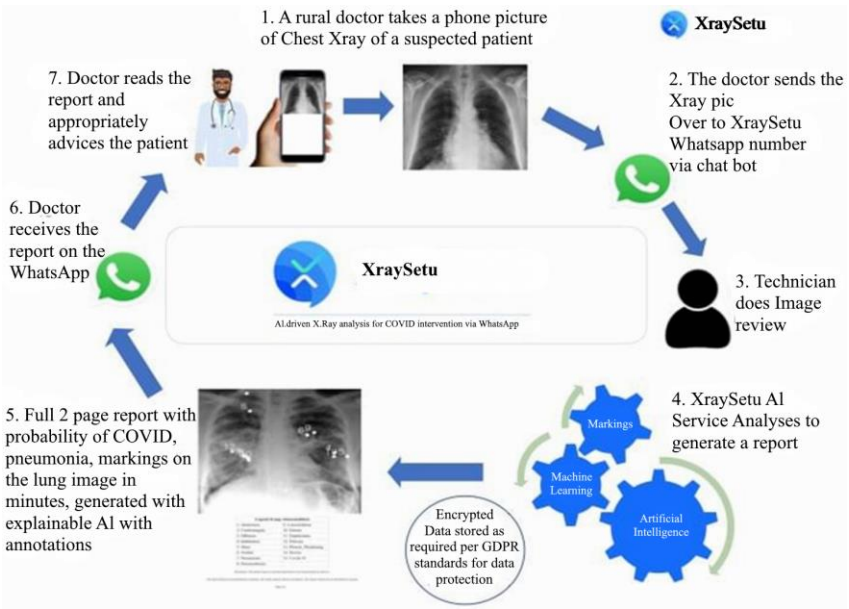

Figure 3. Xray Setu [13].

According to a global survey conducted by PxC India, India saw the greatest increase in AI use during COVID-19 period. This year, 73% of healthcare organizations have used AI, according to the report.

RESEARCH METHODOLOGY

The current research work is based on Artificial Intelligence revolutionizing healthcare of India. The data used is secondary and the sources are reliable such as discussion papers, annual reports, press release, journals by tech firms and media companies that cover the topic of artificial intelligence and its future in India. Besides that, we have also conducted a survey among a group of 36 people where we asked them few questions like:

- *How much percentage do you think Indian healthcare should implement AI technologies in field of Medical Science?*

In this survey we found out that 44.4% people said that Indian healthcare should implement 90% AI technologies in field of Medical Science while 38.9% said that Indian healthcare should implement 50% AI technologies in field of Medical Science and 16.7% said that Indian healthcare should implement 100% AI technologies in field of Medical Science (Figure 4).

- *Do you believe expert Systems are superior to humans and will eventually replace them in the field of medicine?*

According to the results of this survey, 66.7% of people said that maybe expert systems are designed to replace humans in the future of medical science as they are better than us, while 30.6% strongly believe that expert systems are better than humans and are designed to replace them in the future of medical science, and 2.8% believe expert systems are not better than humans and cannot replace them in the future of medical science (Figure 5).

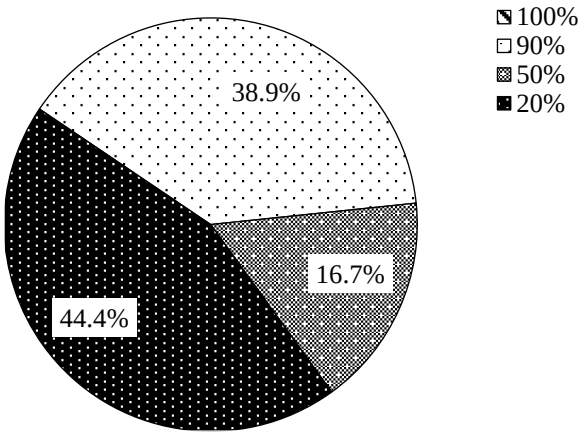

Figure 4. Survey conducted through Google forms.

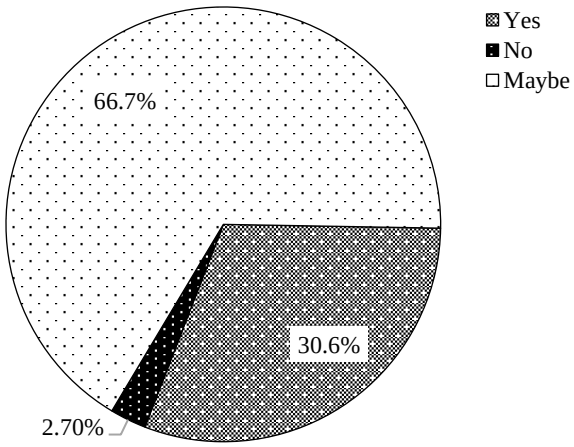

Figure 5. Survey conducted through Google forms.

CHALLENGES

- **Working with Large Data**
  Some of the problems in AI-driven healthcare include unstructured data sets, a lack of open collections of medical data, and insufficient analytic solutions for big data [3].
- **Shortage of Trained Professionals**
  Another issue in AI-based healthcare in India is a lack of qualified specialists. To deal with sensitive health information, as well as to secure data from theft, training is essential [3].
- **Costs and Infrastructure**
  Collecting data sets on a large amount and training and testing them can prove expensive. Also, most of the healthcare lacks in data infrastructure needed for training algorithms. Building up the infrastructure necessary for AI technologies can also be costly and hence requires lot of funding. As these infrastructures require large scale for implementation and huge amount of money, it is not possible for AI based healthcare to reach rural and remote parts of the countries where still some basic facilities like electricity have not reached yet.

CONCLUSION

There is a rapid growth in use of AI in healthcare within years. AI has as much as opportunities for doctors, patients as well as the medical staff also have major challenges to overcome in India or any other country. Healthcare will be delivered as a seamless continuum of care in the near future, with a stronger emphasis on prevention and early intervention. AI has the potential to transform the role of the doctor and revolutionize the practice of medicine in future, still policy makers should avoid thinking that AI is going to solve all the problems the health and healthcare systems across our country. Also, after viewing the positive feedback of Indians towards implementation of AI in healthcare through the survey conducted, we can conclude that AI has revolutionized Indian healthcare and also has a great future scope in Indian Healthcare.

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