

# AI in Health-Care

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**Abstract:** *AI in healthcare works with the primary aim of the relations between prevention or treatment and the various patient outcomes. AI helps in putting control over the health and well-being of the individual. AI also assists the healthcare professionals for the better understanding of the day-to-day patterns and the needs of the people they care for, with the help of this understanding the healthcare professionals provide better feedback, guidance and support for staying healthy. AI is not only getting sophisticated in doing the work of what human do but they are able to do it in much efficient and quicker manner along-with cost being lowered. Both AI and robotics in healthcare are growing at a faster pace and is now becoming a part of the healthcare ecosystem. There are eight ways in which AI and Robotics in healthcare is being booming and the transformation is also underway. They are: Keeping well, Early detection, Diagnosis, Decision making, Training, Research, End of life care, Treatment*

**Keywords:** AI, Robotics, Healthcare ecosystem, IoMT (Internet of Medical Things)

## 1. Introduction

Artificial Intelligence also referred to as machine intelligence, is basically an intelligence demonstrated by the machines which contrasts with the natural intelligence displayed by the human beings. Artificial Intelligence is the simulation of human intelligence processes by machines i.e. the computer systems. The process includes following three steps:

- Learning (it means acquiring information and rules for using the information)
- Reasoning (which uses the rule to reach to the approximate or definite conclusion)
- Self-Correction (it is when the learners correct themselves instead of the teacher doing for it)

Now moving towards the role of Artificial Intelligence in healthcare: AI in healthcare is the use of complex algorithms and software that helps in the analysis of complex medical data. In short, AI is the ability for the computer algorithms to approximate the conclusion without direct human input. The primary aim of AI applications which are health related is that to analyse the relationship between prevention or treatment techniques and the patient outcomes. There are many AI programs that are being developed and being applied to practices such as diagnosis processes, treatment protocol development, drug development, personalized medicine and patient monitoring and care. There are many reputed medical institutions like: Mayo Clinic, Memorial Sloan Kettering Cancer Centre, Massachusetts General Hospital and **National Health Service** have already developed the AI algorithms for their departments.

**Robotics in Medicine:** Robots in medicine is helping the medical personnel to be relieved from the routine tasks, so that they can take their time away from more pressing responsibilities, and hence making medical procedures safer and less costly for patients. Robotics can also perform surgeries accurately at tiny places and helps in transporting dangerous substances too. There are various types of medical robots being used in healthcare field few of them are mentioned below:

- **Surgical Robots:** They allow the surgical operations to be carried out with greater precision than an unaided human surgeon
- **Rehabilitation Robots:** They help in facilitation and supporting the lives of infirm, elderly people or people with dysfunction of body parts that effects the movement.
- **Biorobots:** These are the group of robots designed to imitate the cognition of humans and animals.
- **Disinfection Robots:** They have the capability to disinfect the whole room in few minutes, with the use of Ultraviolet lights

There are even more such robots being functional in health-sector area and making the work much easier too.

## 2. Objective of the Study

Coming to the objective of our study we mainly focus on how Artificial Intelligence and robotics are bringing transformation in the healthcare setting. As we all know that AI is getting increasingly sophisticated and are doing the works what the human does with more efficiency, quicker and at lower cost too. Both potentials of AI and robotics is very vast. There are eight ways to show how transformation is currently underway and is helping the healthcare to be much smoother. They are as follows:

- Keeping well
- Early detection
- Diagnosis
- Decision making
- Training
- Research
- End of life care
- Treatment

## 3. Methodology & Data Compilation

The research design used here is descriptive and the data collection approach is Quantitative in nature. The data collection method is secondary in nature as no primary study has been conducted for the same.

**Keeping Well:** There are many AI applications and Internet of Medical Things (IoMT) usage in consumer health and is

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benefiting the people too. Technological applications encourage more healthier behaviours in individual and assists in proactive management of healthy lifestyle too. In addition to this AI also provides better understanding of day-to-day patterns and needs of the people to the healthcare professionals. This indeed helps in providing better feedback, guidance and support for healthy life.

Below in Fig:1&2 are the data showing the IOMT global usage: -

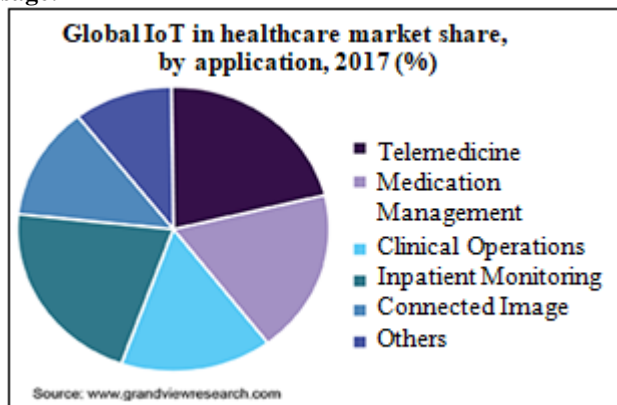


Figure 1

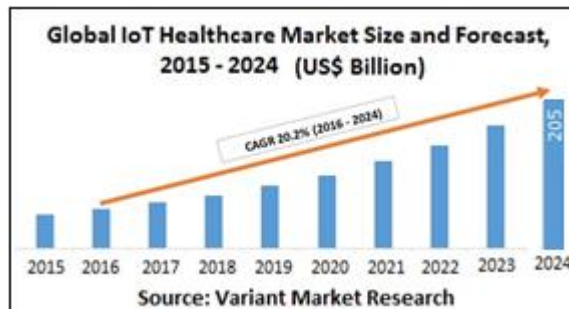


Figure 2

From the above two data it can be clearly depicted that IoT is in a booming stage and will bring great transformation in present and future too. Also, in addition to it they are in growing stage in health-care field too.

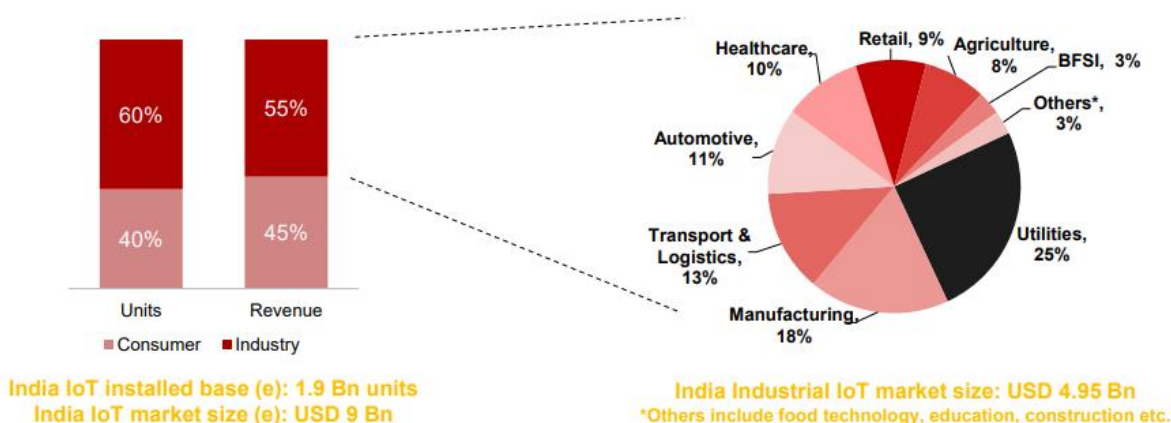


Figure 3

With the help of this above data it became very much easier for us to understand that the market of Internet of Medical Things is growing in India. It is having 10% of the area in healthcare too which clearly states that AI embedded devices are gaining their demand in health-care sectors and are being beneficial to them too.

**Early Detection:** AI is already being used in the detection of diseases such as- Cancer at a very early stage and in a more accurate manner. According to **American Cancer Society**, 1 in every 2 women are told to have cancer. Now, here comes the use of AI which enables the review and translates mammograms 30 times faster with 99% of accuracy thus reducing the need of unnecessary biopsies. The rapid increase among the consumers using wearables and other medical devices in combination with AI is now being applied to over-see early-stage heart disease which enables doctors and other care-givers to better monitor and detect life-threatening episodes at earlier, more treatable stages.

An AI software was developed by the researchers at Houston Methodist Research Institute at Texas. The software works in a manner that it reviews millions of records in a short amount of time, enabling to determine breast cancer risk more efficiently using a patient's mammogram. This software is being used in U.K. and the team uses the software to evaluate mammograms and pathology reports of 500 breast cancer patients.

**The data below in Fig:4 is showing the cancer rate detection in India with the mammograms. Now, if this software of AI being used in UK starts in India too then the detection of cancer with the help of mammograms would become much easier and there would be no need for unnecessary biopsies.**

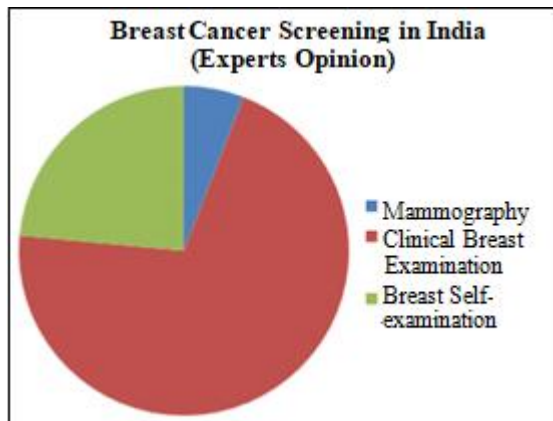


Figure 4

**Diagnosis:** There is IBM’s Watson for health that is helping the healthcare organizations to apply for the cognitive technology that unlocks the vast amount of health data and

the power diagnosis. Watson is a device that can review and store far more data i.e. medical information -every medical journal, symptoms and case study of the treatments exponentially faster than any human.

There is also a software known as Google’s DeepMind Health that is working in collaboration with clinicians, researchers and patients to solve real-world healthcare problems. This technology when combines with machine learning and systems build a powerful general-purpose learning algorithm into neural network that mimics the human brain.

The data below will be showing how the artificial intelligence is entering various medical domains for the diagnosis of the diseases.

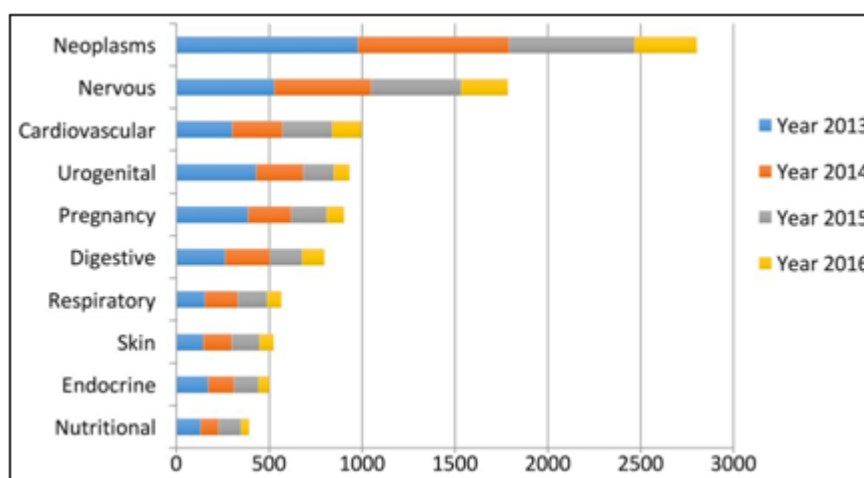


Figure 5

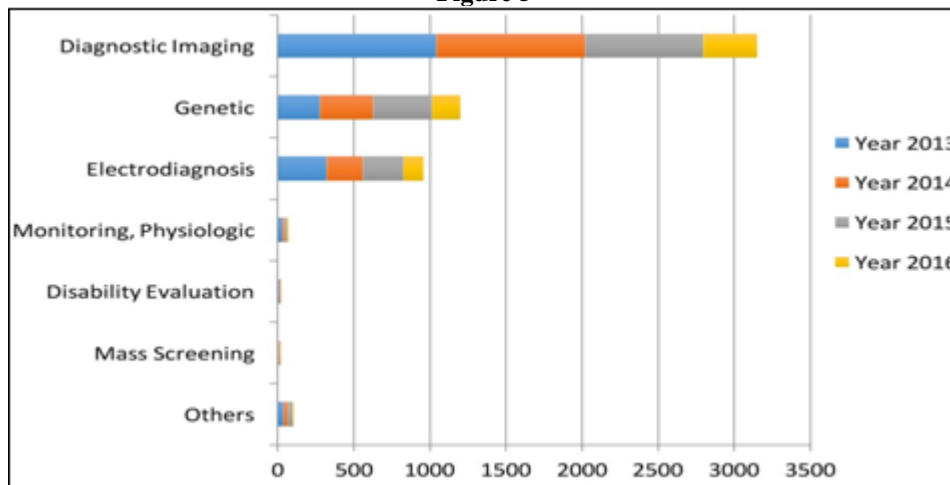


Figure 6

The data above is the data of India which is clearly depicting how the Artificial Intelligence is entering various domains of healthcare and these for the same is increasing.

Using pattern recognition that will help to identify the patient at risk of developing a disease or condition for the same due to lifestyle, genome etc. is another area where AI is beginning to take hold in healthcare.

**Decision Making:** With the improving care the appropriate alignment of big data is very much necessary along-with the predictive analysis and timely decision making. This in all will support the clinical-decision making and actions as well as will prioritize administrative tasks.

The data gathered and presented by the AI algorithms will enable the healthcare providers to see patient’s health risk and will take early actions to prevent, lessen the impact or forestall the disease progression.

There is a new model developed by MIT which is an AI based model that is used for medical decision making where experts usually identify important features in massive patient's data-sets by hands. The model is being enabled to automatically identify the voicing patterns of the people with vocal cord nodules and uses those features to identify the people having and not having the disorders.

Example for the same are:

- Sepsis care
- Design safer chemotherapy regimens
- Breast cancer and many more

**Treatment:** AI can help the clinicians to take more comprehensive approach for disease management, better co-ordinated care plans and can also help the patients to better manage and comply with their long-term treatment programmes.

Robots have been used in the medicinal field for more than 30 years now. The range is from simple laboratory robots to

highly complex surgical robots that can either aid a human surgeon or can execute the operations by their own. In addition to the surgery the robots are been used in hospitals and labs for repetitive tasks, i.e. in rehabilitation, physical therapy and in support of the patients who are in long-term conditions.

**End of Life Care:** People of today's generation are dying in a different and slower manner, i.e. from the conditions like: dementia, heart failure and osteoporosis. It is also considered to be a phase of life which is often plagued by loneliness. Here, comes the role of robots as they are having potential to revolutionise the end of life care, they are helping people to remain independent for longer, reducing the need for hospitalization and care homes. AI in combination with humanoid design are enabling the robots to go even further and have conversation and other social interactions with people to keep aging minds sharp.

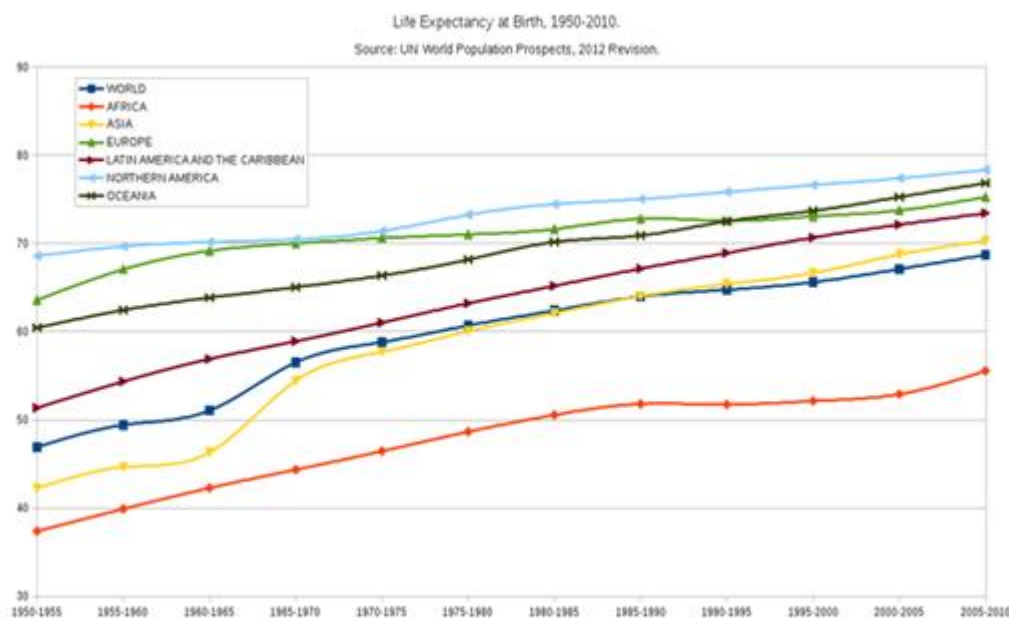


Figure 7

From Fig:7 it is being clearly depicted that the life-expectancy of the people is in the increasing trend and thus if AI embedded robots having the humanoid design comes up then it will be able to assist the elderly population too.

**Research:** The path that stretches from the research lab to patient is very long and costly too. An average time of 12 years is taken in-order for the travel of the drug from a research lab to the patient according to the California Biomedical Research Association. It is being estimated that only 5 in every 5000 of the drugs moves for the pre-clinical

testing that will further make it to human testing and among that 5 drugs only 1 is being approved for the human usage. So, in an average it will account for US\$359 million for a company to develop a new drug from the research lab to the patient. The recent applications of AI in healthcare is the drug research and development. With the latest development in AI a streamline is being taking place in drug discovery and drug repurposing processes; which will lead to a significant cut in the time to market for the new drugs as well as their costs.

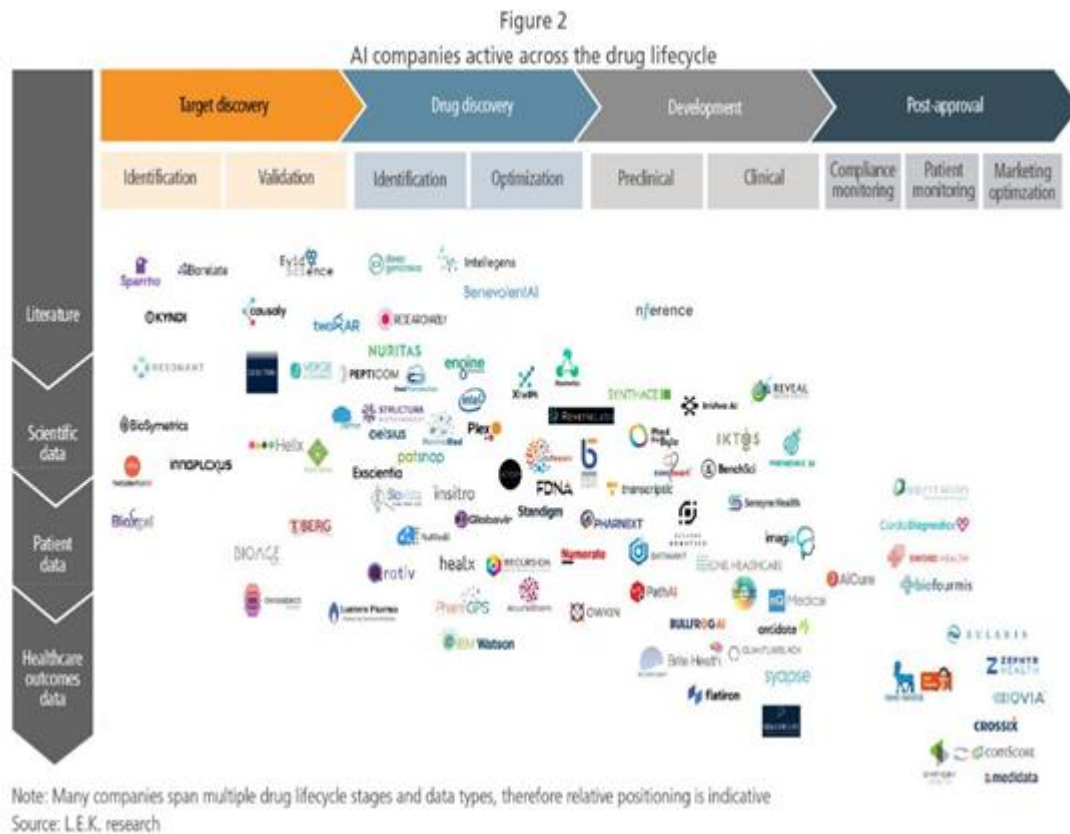


Figure 8

The fig:8 depicts and shows the no of companies i.e. the AI companies that are active across the drug life-cycle.

**Training**

Naturalistic simulation exercises is being provided by AI to those who undergo training in a way that simple computer-driven algorithms cannot. With the advent of natural speech and the ability of AI computer that draws instantly a large data-base scenario corresponds to the response to questions, decision or advice a trainee can challenge that a human cannot. And the most important of all is that an AI based training can be done anywhere i.e. on smart-watches etc.

**4. Conclusion**

We already know the fact that AI market is growing across the globe. Not only in IT sectors but with the advancement in technology and with the expansion potential AI is eve entering into the market of Health-care too. With the advent of AI in health sector the work for the people has become much easier and the services being provided have also enhanced their quality. With the drug development to end of life-care AI is making things easier and convenient too by benefiting to the people. As discussed above the advent of AI is increasing and people are also trying to be habituated to it. Although at nascent stage, but AI is assisting world in all the probable sectors and in upcoming years it will be growing too.

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