Journal of Advanced Research in Embedded System
Volume 7, Issue 3&4 - 2020, Pg. No. 7-14
Peer Reviewed Journal

Article

A Study on Role of A.I. and Robotics in Health Care Sector: Its Impact and Contribution

Devnath Jayaswal[1], Pankaj Mudholkar[2]

[1]Research Scholar, [2]Assistant Professor, MCA, Thakur Institute of Management Studies, Career Development and Research, Mumbai, Maharashtra, India.
DOI: https://doi.org/10.24321/2395.3802.202006

I N F O

Corresponding Author:
Devnath Jayaswal, MCA, Thakur Institute of Management Studies, Career Development and Research, Mumbai, Maharashtra, India.
E-mail Id:
devnathjaiswal96@gmail.com
Orcid Id:
https://orcid.org/0000-0003-1639-0704
How to cite this article:
Jayaswal D, Mudholkar P. A Study on Role of A.I. and Robotics in Health Care Sector: Its Impact and Contribution. *J Adv Res Embed Sys* 2020; 7(3&4): 7-14.

Date of Submission: 2020-03-14
Date of Acceptance: 2020-07-26

A B S T R A C T

Health Care is one of the major domain sectors of our country. As this domain has many different aspect of implementation, as per the current scenario of Diseases and health complications. This paper will discuss about how, the Artificial Intelligence (A.I.) and robotics can be beneficial and plays a major role on, health care domain with respect to the Efficiently Diagnose, Developing New Medicines, Earlier Detection of Diseases, Advance Treatment Care, A.I-Deep learning For the Critical Decision's. As this Information will help to give more clarity on what, A.I. & Robotics contributes for the major Diseases Treatment by the advancement of Technology. This can be beneficial for not only Doctors, Patients, or Firm but can also be helpful for citizen people as well. The objective of this paper is to study the role of AI and Robotics in Healthcare Sector and its impact.

Keywords: Artificial Intelligence, Clinical Decision Support, EHR (Electronic Health Record) Systems, A.I. to Efficiently Diagnose, Developing New Medicines with A.I., Report Analysis with A.I. Deep Learning, Sophisticated Treatments, Earlier Cancer Detection with A.I.

Introduction[1]

Healthcare Domain

The health care industry is one of the largest industries in the world, and it has a direct effect on the quality of life of people in each country. Health care (or healthcare) is the diagnosis, treatment, and prevention of disease, illness, injury, and other physical and mental impairments in humans.[1]

What is an A.I.?

The term A.I. is stands for Artificial Intelligence which is broadly refers to computing technologies that resemble processes associated with human intelligence, such as reasoning, learning and adaptation, sensory understanding, and interaction. Currently, most applications of A.I. are narrow, in that they are only able to carry out specific tasks or solve pre-defined problems.[2]

In the major Domain of Health care, the current scenario of Diseases and health complications which can be treated by implementing Artificial Intelligence (A.I.) In Healthcare the Artificial Intelligence In Healthcare is revolutionizing the medical industry by providing a helping hand.[3] A.I. is getting increasingly sophisticated at doing what humans do, but more efficiently, more quickly and at a lower cost. The potential for both A.I. and robotics in healthcare is vast. Just like in our every-day lives, A.I. and robotics are increasingly a part of our healthcare eco-system.[4]

[1]For the remainder of the paper, we use masculine pronouns to refer to patients, and feminine pronouns to refer to doctors.

Health Services

The Health services consist of medical professionals, organizations and ancillary health care workers who provide medical care to those in need. Health services serve patients, families, communities, and populations. They cover emergency, preventative, rehabilitative, long-term, hospital, diagnostic, primary, palliative, and home care. These services are centered around making health care accessible, high quality, and patient-centered. As many different types of care and providers are necessary in order to offer successful health services.[5]

Types of Services

Health services cover many different types of medical issues. Many people think of primary care, outpatient care, and emergency care, when they need an illness managed or is generally not feeling well. However, there are more health services that are dedicated to certain illnesses or issues.[6]

These health services include:

- Mental health care
- Dental care
- Laboratory and diagnostic care
- Substance abuse treatment
- Preventative care
- Physical and occupational therapy
- Nutritional support
- Pharmaceutical care
- Transportation
- Prenatal care
- Blood & Organ Banks
- Medical and diagnostic laboratories[6]

Healthcare Transformation by Implementing A.I. and Robotics

Inter-Connecting among Users

A.I. increases the ability for healthcare professionals to better understand the day-to-day patterns and needs of the people they care for, and with that understanding they are able to provide better feedback, guidance and support for staying healthy.

Technology applications and apps encourage healthier behavior in individuals and help with the proactive management of a healthy lifestyle. It puts consumers in control of health and well-being. Additionally, One of A.I.'s biggest potential benefits is to help people stay healthy so they don't need a doctor, or at least not as often. The use of A.I. and the Internet of Medical Things (IoMT) in consumer health applications is already helping people.[4]

Advance Diagnosis and Analyses

IBM's Watson for Health is helping healthcare organizations apply cognitive technology to unlock vast amounts of health data and power diagnosis. Watson can review and store far more medical information – every medical journal, symptom, and case study of treatment and response around the world – exponentially faster than any human. Google's Deep Mind Health is working in partnership with clinicians, researchers and patients to solve real-world healthcare problems. The technology combines machine learning and systems neuroscience to build powerful general-purpose learning algorithms into neural networks that mimic the human brain.[4]

Early Detection

A.I. is already being used to detect diseases, such as cancer, more accurately and in their early stages. According to the American Cancer Society, a high proportion of mammograms yield false results, leading to 1 in 2 healthy women being told they have cancer. The use of A.I. is enabling review and translation of mammograms 30 times faster with 99% accuracy, reducing the need for unnecessary biopsies.

The proliferation of consumer wearable's and other medical devices combined with A.I. is also being applied to oversee early-stage heart disease, enabling doctors and other caregivers to better monitor and detect potentially life-threatening episodes at earlier, more treatable stages.[4]

Sophisticated Treatments

Beyond scanning health records to help providers identify chronically ill individuals who may be at risk of an adverse episode, A.I. can help clinicians take a more comprehensive approach for disease management, better coordinate care plans and help patients to better manage and comply with their long-term treatment programmers. Robots have been used in medicine for more than 30 years. They range from simple laboratory robots to highly complex surgical robots that can either aid a human surgeon or execute operations by themselves. In addition to surgery, they're used in hospitals and labs for repetitive tasks, in rehabilitation, physical therapy and in support of those with long-term conditions.[4]

Critical Decision Making

Improving care requires the alignment of big health data with appropriate and timely decisions, and predictive analytics can support clinical decision-making and actions as well as

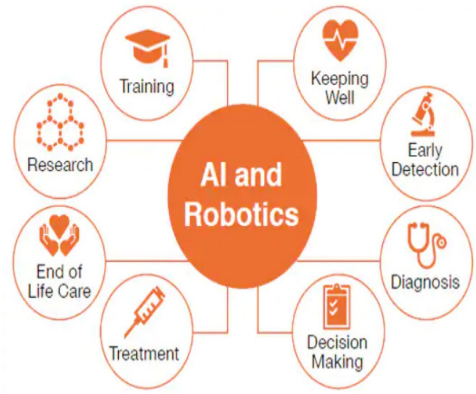
ISSN: 2395-3802
DOI: https://doi.org/10.24321/2395.3802.202006

priorities administrative tasks. Using pattern recognition to identify patients at risk of developing a condition – or seeing it deteriorate due to lifestyle, environmental, genomic, or other factors – is another area where A.I. is beginning to take hold in healthcare.[4]

Research and Development

Drug research and discovery is one of the more recent applications for A.I. in healthcare. By directing the latest advances in A.I. to streamline the drug discovery and drug repurposing processes there is the potential to significantly cut both the time to market for new drugs and their costs.

The path from research lab to patient is a long and costly one. According to the California Biomedical Research Association, it takes an average of 12 years for a drug to travel from the research lab to the patient. Only five in 5,000 of the drugs that begin preclinical testing ever make it to human testing and just one of these five is ever approved for human usage.[4]



Aims and Objectives

The aims and objectives of the study on the role of A.I. and Robotics and its impact on the Healthcare sector are:

- To study usability level of A.I. in HealthCare amongst Doctors.
- To know the growing level implementation of A.I. from Technology Development.
- To give the Applications of A.I. and Robotics in Health Care Domain.
- To understand, how effectively the IT Technologies can solve HealthCare Issues.

Review of Literature

A study was conducted by Zrinjka DOLIC, Rosa CASTRO and Andrei MOARCAS in "Robots in healthcare: a solution or a problem? "state that, current uses and potential applications of robotics and A.I. in healthcare – including clinical practice, non-clinical activities in healthcare establishments and other healthcare activities such as rehabilitation or long-term care.[7]

It has found by Nuffield Council on Bioethics on "Artificial Intelligence (A.I.) in healthcare and research" state that, The use of A.I. raises a number of ethical and social issues, many of which overlap with issues raised by the use of data and healthcare technologies more broadly.[2]

Base on the study of, Emily LaRosa & David Danks in "Impacts on Trust of Healthcare A.I." implies that, As current A.I. and robotic technologies unfold and permeate aspects of healthcare, the nature of the patient-doctor relationship and its foundational trust will be challenged, and likely changed.[8]

It has found by Sandeep Reddy & John Fox from" Artificial intelligence-enabled healthcare delivery" state that, A.I. techniques are now actively being applied in healthcare with many of the health service activities currently being delivered by clinicians and administrators predicted to be taken over by A.I. in the coming years.[9]

Dr. Eric Topol on their study "Preparing the healthcare workforce to deliver the digital future" state that, Digital healthcare technologies offer the potential to reshape the patient-National Health Service (NHS) relationship, empowering both staff and patients who are willing and able to become more actively engaged.[10]

As per the review on "How Artificial Intelligence and Robotics is Transforming Healthcare?" by Amit Patel states that, Artificial intelligence services have transformed the healthcare industry, which has resulted in significant improvements in patient care. Healthcare providers are now using A.I.-powered mobile applications to improve their care delivery process.[11]

Also, Dr. Farzan Majidfar in his research work "Automation of Knowledge Work in Medicine and Health care: Future and Challenges" state that, Combine the A.I. with biological data of patients to define the differences between healthy and respectful environments with the disease and helps in the discovery and development of drugs, diagnostics, and healthcare applications.[12]

As Fei Jiang, Yong Jiang, Hui Zhi & Yi Dong conducted a study on, "Artificial intelligence in healthcare: past, present and future" stated that, although the A.I. technologies are attracting substantial attentions in medical research, the real-life implementations is still facing obstacles. The first hurdle comes from the regulations. The second hurdle is data exchange. Once an A.I. system gets deployed after initial training with historical data, continuation of the data supply becomes a crucial issue for further development and improvement of the system.[13]

Methodology

This research work is used to evaluate and understand different A.I. technologies and I.T. Equipments, which

ISSN: 2395-3802
DOI: https://doi.org/10.24321/2395.3802.202006

will give a greater impact on how the HealthCare Issues will be managed in much efficient manner. Survey based methodology is used to collect the opinion and views of verities of HealthCare domain's in order to collect the quality value information for the presented research paper.

This literature review does not support sufficient data to understand the usage and implementation of A.I. amongst every domain of a HealthCare sector. Hence, Quantitative approach was implemented to understand the same. This survey method was used to get data. Where a, Questionnaire and Face-to-face Interviews were conducted to get appropriate information from the respondents along with the dataset from a renown site's. The specific requirements and their importance on that sector were selected to do the survey on the allotted Area in order to collect the up-to-date status review in the HealthCare Domain.

An initial consent was acquired from various research domains and affiliated content centers to carry out the well-designed survey. A written communication was sent to various supporting teams so as to carry out the survey department wise. Before the start of the survey the respondents were made aware about the study and its relevance to them in their respective domains. A proper research centers and affiliated website was decided to collect the valuable survey data so as to get the desired and relevant information for the proposed research paper. The respondents comprised of local Hospitals, Research Center, Manufacturing Industry, and many HealthCare bodies to get how they are contributing for Disease cure and human health wellness.

A.I. Applications in Healthcare

A.I. has countless applications in healthcare. Whether it's being used to discover links between genetic codes, to power surgical robots or even to maximize hospital efficiency, A.I. has been a boon to the healthcare industry.[14]

A.I. to Efficiently Diagnose and Reduce Error

In 2015, misdiagnosing illness and medical error accounted for 10% of all US deaths. In light of that, the promise of improving the diagnostic process is one of A.I.'s most exciting healthcare applications.

Incomplete medical histories and large case loads can lead to deadly human errors. Immune to those variables, A.I. can predict and diagnose disease at a faster rate than most medical professionals. In one study, for example, an A.I. model using algorithms and deep learning diagnosed breast cancer at a higher rate than 11 pathologists.[14]

More Accurate Cancer Diagnosis with A.I.

How it's using A.I. in healthcare: Path A.I. is developing machine learning technology to assist pathologists in making more accurate diagnoses. The company's current goals include reducing error in cancer diagnosis and developing methods for individualized medical treatment.

Path A.I. has worked with drug developers like Bristol-Myers Squibb and organizations like the Bill & Melinda Gates Foundation to expand its A.I. technology into other healthcare industries.[14]

Health an Intelligent Symptom Checker

How it's using A.I. in healthcare: Buoy Health is an A.I.-based symptom and cure checker that uses algorithms to diagnose and treat illness. Here's how it works: a Chabot listens to a patient's symptoms and health concerns, then guides that patient to the correct care based on its diagnosis. Harvard Medical School is just one of the many hospitals and healthcare providers that use Buoy's A.I. to help diagnose and treat patients more quickly.[14]

A.I. Deep Learning for Actionable Insights

How it's using A.I. in healthcare: Enclitic develops deep learning medical tools to streamline radiology diagnoses. The company's deep learning platform analyzes unstructured medical data (radiology images, blood tests, EKGs, genomics, patient medical history) to give doctors better insight into a patient's real-time needs. MIT named Enclitic the 5th smartest artificial intelligence company in the world, ranking above Face book and Microsoft.[14]

Earlier Cancer Detection with A.I.

How it's using A.I. in healthcare: Freenome uses A.I. in screenings, diagnostic tests and blood work to test for cancer. By deploying A.I. at general screenings, Freenome aims to detect cancer in its earliest stages and subsequently develop new treatments.[3]

Diagnosing Deadly Blood Diseases Faster

How it's using A.I. in healthcare: Harvard University's teaching hospital, Beth Israel Deaconess Medical Center, is using artificial intelligence to diagnose potentially deadly blood diseases at a very early stage. Doctors are using A.I.-enhanced microscopes to scan for harmful bacteria's (like E. coli and staphylococcus) in blood samples at a faster rate than is possible using manual scanning. The scientists used

ISSN: 2395-3802
DOI: https://doi.org/10.24321/2395.3802.202006

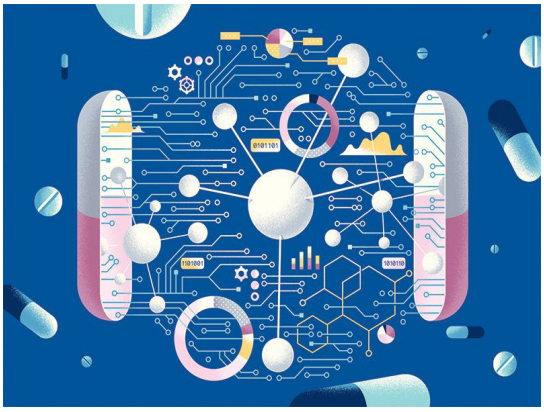
25,000 images of blood samples to teach the machines how to search for bacteria. The machines then learned how to identify and predict harmful bacteria in blood with 95% accuracy.[14]

Treating Rare Disease with A.I.

How it's using A.I. in healthcare: BERG is a clinical-stage, AI-based biotech platform that maps diseases to accelerate the discovery and development of breakthrough medicines. By combining its "Interrogative Biology" approach with traditional R&D, BERG can develop more robust product candidates that fight rare diseases. BERG recently presented its findings on Parkinson's disease treatment; they used A.I. to find links between chemicals in the human body that were previously unknown at the Neuroscience 2018 conference.[14]

Developing New Medicines with A.I.

The drug development industry is bogged down by skyrocketing development costs and research that takes thousands of human hours. It costs about $2.6 billion to put each drug through clinical trials, and only 10% of those drugs are successfully brought to market. Due to breakthroughs in technology, biopharmaceutical companies are quickly taking notice of the efficiency, accuracy and knowledge that A.I. can provide.



One of the biggest A.I. breakthroughs in drug development came in 2007 when researchers tasked a robot named Adam with researching functions of yeast. Adam scoured billions of data points in public databases to hypothesize about the functions of 19 genes within yeast, predicting 9 new and accurate hypotheses. Adam's robot friend, Eve, discovered that triclosan, a common ingredient in toothpaste, can combat malaria-based parasites.[14]

The Future of A.I. in Healthcare

We believe that A.I. has an important role to play in the healthcare offerings of the future. In the form of machine learning, it is the primary capability behind the development of precision medicine, widely agreed to be a sorely needed advance in care. Although early efforts at providing diagnosis and treatment recommendations have proven challenging, we expect that A.I. will ultimately master that domain as well. Given the rapid advances in A.I. for imaging analysis, it seems likely that most radiology and pathology images will be examined at some point by a machine. Speech and text recognition are already employed for tasks like patient communication and capture of clinical notes, and their usage will increase.[15]

The greatest challenge to A.I. in these healthcare domains is not whether the technologies will be capable enough to be useful, but rather ensuring their adoption in daily clinical practice. For widespread adoption to take place, A.I. systems must be approved by regulators, integrated with EHR systems, standardized to a sufficient degree that similar products work in a similar fashion, taught to clinicians, paid for by public or private payer organizations and updated over time in the field. These challenges will ultimately be overcome, but they will take much longer to do so than it will take for the technologies themselves to mature. As a result, we expect to see limited use of A.I. in clinical practice within 5 years and more extensive use within 10. Perhaps the only healthcare providers who will lose their jobs over time may be those who refuse to work alongside artificial intelligence.[15]

Result and Discussion

A study was conducted in the various research center, Hospitals, medical bodies along with a people's at general for ground level scenarios. A view of several medical doctors and their patients were taken, to conduct this study of "A Study on Role of A.I. and Robotics in Health Care Sector: Its Impact and Contribution " through questionnaire.

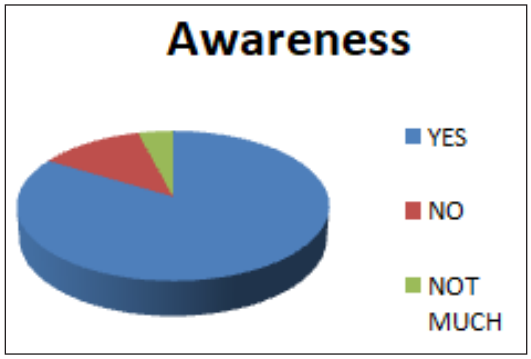
To understand, the Applications outcome and growth of A.I. and Robotics in Health Care Domain as how effectively the IT Technologies can solve Health Care Issues. The Study used Descriptive methodology which involved survey of 120 participants from Research and Medical centers. Where a well designed pretested Questionnaires was administrated amongst the respondents, so as to gather knowledge, role of A.I. in the HealthCare Domain.

Awareness of A.I. based Technology used in Healthcare Processes

As the graph shows the rate of healthcare center's as have implanted technologies for handling the healthcare issues for their patients, get the better result in it, as per now a day's health complications. A view of 210 health care experts & trainee was also taken in order to see A.I. based current tools awareness amongst them through questionnaire and it was found that 82% experts & trainee, know the use of A.I. Machines for their patient's better healthcare and treatment process. Of which 68% experts

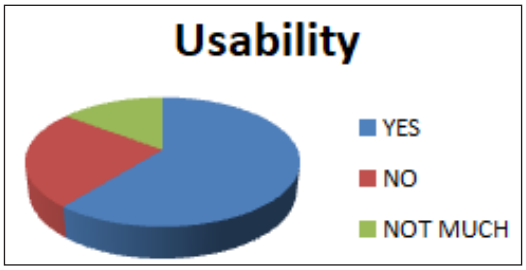
ISSN: 2395-3802
DOI: https://doi.org/10.24321/2395.3802.202006

are using the same A.I. tool & machines for improving their productivity.



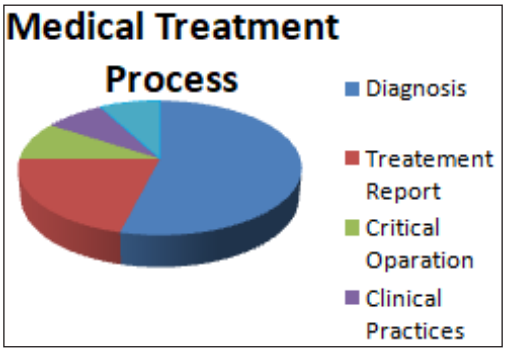
Usability of A.I. Technology in Treatment Process

This study shows due to the use of A.I. tool amongst the healthcare experts & trainee for their patients assessment is surly improved & after using it, the results are indicate as it is more efficient approach, which inter increase's their productivity. Based on the current study, it is true that with help of A.I. tool & machines, the healthcare experts & trainee can manage their treatment process effectively, which will lead them to positive grow on human healthcare.



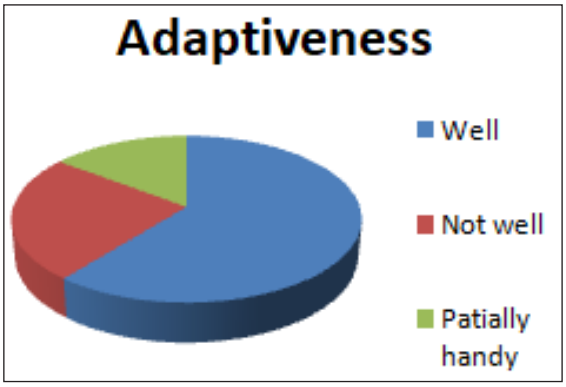
Medical Area's to Implement A.I.

Based on the current survey information, it is stated that 68% of the people are tends to follow A.I. machine & tool usage, Approach for their treatment process in the healthcare sector. As of 12 % of them are go for the Treatment Report and Critical Operation for that domain, approximate 25 % of them follow both Diagnose & Clinical Practices type of approaches in order to handle their patients health. A 19% of them use's it, on the Record Assessment part of it.



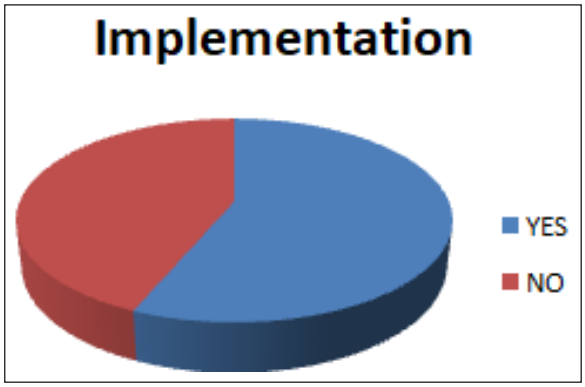
Adaptiveness of new Technologies for Daily Clinical Practice

After this study, it is show that about 55% of them are very much convenient to use & easily adapted to new technology treatment process. As approximately 35.77% of them are not convenient to use those, A.I. tools & machines to handle their patients health. Also there are about of 14.33% of them are not much sure whether A.I. is convent and handful for their work.



Implementation of A.I. Tool and System for patient's Treatment

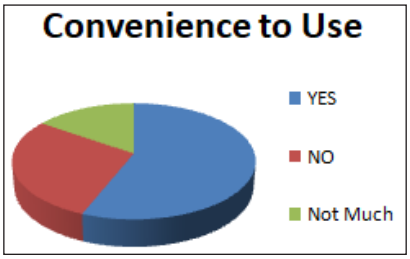
This study shows, the usability of a A.I. Tools and System's for patient's treatment and medical practices. The usability surely increase over a period of time but there are certain critical that slower this process, as the awareness among them for new technology in that domain, in convenient to use them, training & practice sessions are require for using it effectively.



Convenience on the usage of A.I. Based System

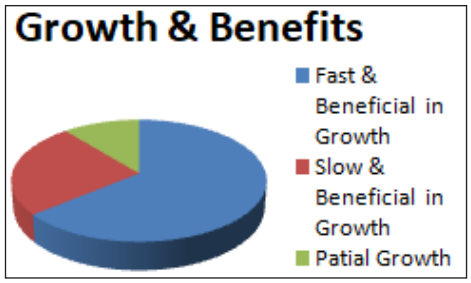
After this study, it is show that about 55% of the people are very much convenient to use & easily adapted to new technology for their agricultural waste. As approximately 35.77% of the people are Not convenient to use those new tools & techniques of ICT to handle their agricultural waste. Also there are about of 14.33% of the people are not much sure whether ICT is convent and handful for their work.

ISSN: 2395-3802
DOI: https://doi.org/10.24321/2395.3802.202006



Future Growth of A.I. in the Field of Healthcare

This study shows, over the period of time as the advancement of the technology is increase, which results in better and more efficient A.I. tools & technology, which came into existence. Due to this significant growth, it will allow local Hospitals, Research Center, Manufacturing Industry, and many Health Care bodies for a better treatments process.



Conclusion and Suggestion

Based on the research results it is clear that, A.I. and Robotics has an important role to play in the healthcare offerings of the future. In the form of machine learning, it is the primary capability behind the development of precision medicine, widely agreed to be a sorely needed advance in care. Although early efforts at providing diagnosis and treatment recommendations have proven challenging, It's expect that A.I. will ultimately master that domain as well. Speech and text recognition are already employed for tasks like patient communication and capture of clinical notes, and their usage will increase. The greatest challenge to A.I. in these healthcare domains is not whether the technologies will be capable enough to be useful, but rather ensuring their adoption in daily clinical practice. For widespread adoption to take place, A.I. systems must be approved by regulators, integrated with EHR(electronic health record) systems, standardized to a sufficient degree that similar products work in a similar fashion, taught to clinicians, paid for the public or private payer organizations and updated over time in the field.

These challenges will ultimately be overcome, as the growth of modern technology, but to apply on the domain specific like HealthCare, is an require to consider many factors such as, risk of patients life, report accuracy, effective diagnoses, usability, Medical Treatment Process, adaptiveness , domain awareness.

References

1. Tunikova O. What You Need To Know About Artificial Intelligence. 2018. https://stopad.io /blog/artificial-intelligence-facts
2. From Nuffield Council on Bioethics. Artificial intelligence (A.I.) in healthcare and research. 2018. https://nuffieldbioethics.org/assets/pdfs/Artificial-Intelligence-AI-in-healthcare-and-research.pdf
3. Lateef Z. Implementing Artificial Intelligence In Healthcare. 2019. https://www.edureka.co/blog/artificial-intelligence-in-healthcare/
4. Wilson T. A.I. and robotics are transforming healthcare. 2017. https://www.pwc.com/gx/en/industries / healthcare/publications/ai-robotics-newhealth/transforming-healthcare.html
5. By Study.com. Health Services: Definition, Types & Providers. 2019. https://study.com/ academy/ lesson/ health-services-definition-types-providers.html
6. By Technofunc. Sectors of Healthcare Industry. 2013. http://www.technofunc.com/index.php /domain-knowledge/healthcare-industry/item/sectors-of-healthcare-industry
7. Dolic Z, Castro R, Moarcas A. Robots in healthcare: a solution or a problem? 2019. https://www.europarl.europa.eu/RegData/etudes/IDAN/2019/638391/IPOL_IDA(2019)638391_EN.pdf
8. La Rosa E, Danks D. Impacts on Trust of Healthcare A.I. 2018. https://www.aies-conference.com/2018/contents/papers/main/AIES_2018_paper_132.pdf
9. Reddy S, Fox J. Artificial intelligence-enabled healthcare delivery. 2018. https://www.researchgate.net/publication/329380705_Artificial_intelligence-enabled_healthcare_delivery
10. Topol E. Preparing the healthcare workforce to deliver the digital future. 2019. https://topol.hee.nhs.uk/wp-content/uploads/HEE-Topol-Review-2019.pdf
11. Patel A. How Artificial Intelligence and Robotics is Transforming Healthcare? 2019. https://www.botreetechnologies.com/blog/how-artificial-intelligence-and-robotics-is-transforming-healthcare
12. Majidfar F. Automation of Knowledge Work in Medicine and Health care: Future and Challenges. 2017. https://pdfs.semanticscholar.org/341c/bdb3827ae8004cf1d80ae8df401f62541edb.pdf
13. Jiang F, Jiang Y, Zhi H et al. Artificial intelligence in healthcare: past, present and future. 2017. https://www.researchgate.net/publication/317880442_Artificial_intelligence_in_healthcare_past_present_and_future
14. Daley S. Surgical Robots, New Medicines And Better Care. 2019. https://builtin.com/artificial-intelligence/artificial-intelligence-healthcare
15. Thomas Davenport and Ravi Kalakota. The potential for

ISSN: 2395-3802
DOI: https://doi.org/10.24321/2395.3802.202006

artificial intelligence in healthcare. 2019. https://www.rcpjournals.org/content/futurehosp/6/2/94.full.pdf
16. Tractica Artificial Intelligence for Healthcare Applications. 2018. https://www.tractica.com/research/artificial-intelligence-for-healthcare-applications/
17. From Wikipedia, Rammor. Artificial intelligence in healthcare. 2018. https://en.wikipedia.org/wiki/Artificial_intelligence_in_healthcare
18. Prof. Thomas Davenport. The potential for artificial intelligence in healthcare. 2019. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6616181/
19. Rahman F. Artificial Intelligence in Healthcare. 2019. https://www.aomrc.org.uk/wp-content/uploads/2019/01/Artificial_intelligence_in_healthcare_0119.pdf
20. Func FT. Healthcare Domain. 2018. https://www.technofunc.com/index.php/domain-knowledge-2/healthcare-industry
21. Jens Malmodin Åsa Moberg Dag Lundén Göran Finnveden Nina Lövehagen. Greenhouse Gas Emissions and Operational Electricity Use in the ICT and Entertainment & Media Sectors. 2010. https://onlinelibrary.wiley.com/doi/abs/10.1111/j.1530-9290.2010.00278.x
22. ITC Corp Com. ITC: A Better Tomorrow for All. 2015. https://www.itcportal.com/about-itc/profile/ index.aspx
23. Kulkarni PG, Khan RA. *International Journal of Soft Computing and Engineering (TM)*. 2017. http://www.ijsce.org/wpcontent/uploads/papers/v2i4/D0951082412.pdf. // https://www.ijsce.org/issue-6-janu ary-2017/
24. From GK Today. National Rainfed Area Authority. 2017. https://www.gktoday.in/gk/national-rainfed-area-authority-nraa/

ISSN: 2395-3802
DOI: https://doi.org/10.24321/2395.3802.202006