Sustainability and Reachability of Healthcare through Artificial Intelligence

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Sustainability and Reachability of Healthcare through Artificial Intelligence

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Abstract: Artificial Intelligence (AI) enables machines and computers to develop human capabilities to learn from past data, experience, human behaviour & language to solve issues and make decisions. The combination of different capabilities makes machines perform complex functions such as operating a patient or driving a car. In this article, we propose the study of applications of Artificial Intelligence to achieve sustainability and its usage, especially in the healthcare field. The article facilitates researchers to find usage and research area for the advancement of human life along with environmental conditions.

Keywords: Artificial, Sustainability, Intelligence, Medicare, Healthcare, AI

1. Introduction

Machines and Computers are inventions to reduce human efforts and ease their life. AI is used to make machines smart and intelligent to take decisions based on the data available, the behaviour of humans, and language. Researchers and engineers are continuously working with machines to make them more efficient, and reliable and adding knowledge-gaining capabilities using AI and Machine Learning (ML) for sustainable Transformation is inevitable for any industry. Ever-increasing health issues and a lack of healthcare expertise are the significant causes demanding new strategies to keep up. To cope, the medical industry is advancing to achieve feasible solutions to these problems backed up by information technology. Various breakthroughs have been made throughout the course of history in the medical sector too, and the use of AI remains one of the latest.

Healthcare authorities globally face vast issues, such as shortages of access, increased expenses, scraps, and overpopulation. The most recent example is an outburst like the coronavirus, which challenged the whole medical system and showed us how incompetent and unprepared we are for times like these. Some major drawbacks are lack of sufficient equipment, inaccurate diagnosis, helpless doctors, and an absence of communication. The evolution of viruses like the HIV and pandemics like the coronavirus shows us the incompetence of our medical systems. As medical crises heighten current ordeals, one must reinvent Healthcare and back office medical systems, such as

Heavy prices and complex and irregular charges complicate the clarity of costs. Scientists and doctors worldwide welcome all sorts of technological breakthroughs. Due to the overwhelming amount of information, medical experts become exhausted because they are unable to keep up with the most outrageous medical advancements. While emphasizing on this, we should retain the reason for them to be kept in touch with one another, supplying the guise that Healthcare is complex, whereas the only thing intricate is our systems. It doesn't mean that accessing exceptional healthcare is easy; for better upkeep, we shall come up with strategies less intricate.

Healthcare development and simplification of intelligent care systems must be facilitated by artificial intelligence. Recent pandemic situations illustrate how AI is useful in various pursuits, including remedy decision-

making and even the deployment of AI-driven technologies. Before evolving into part of the benchmark of upkeep, every physician's achievements and losses must be analyzed. An expert's experience can be studied by other experts through analysis. Errors by doctors and physicians can be amended, but it often costs the patient's life. Human frailty is the reason behind this practice of training, and even experts are not immune to these frailties. Even if investigations and evidence state otherwise, the doctors misguide themselves into finding their most successful strategies, which contradicts proven theories.

Many times there already are better ways to a cure and many effective strategies to approach an illness, but due to doctors not being able to keep up with the updates, they are unable to avail those. To maximize restitution, doctors must experience as many operations as possible to add up to their experience, and their experience gradually leads to a source for research by others. This causes doctors to have no time to concentrate on supervision, let alone be updated with the latest medical advancements. Physicians nowadays enjoy a primary approach to the unclouded and superlative experiences of thousands of colleagues. Gone are the days when you had to wait for the foremost methods to be formalized into norms set by their nation's government to practice them.

The use of AI can alter and upgrade it to a much greater extent. Already harboring the experience of a variety of medical studies, studies of various courses and the incremental expertise of several doctors, the use of technology, particularly artificial intelligence (AI), is necessary. As humans, doctors are also open to mental and artistic biases, but introducing technological advancements such as AI could help us reduce, if not get rid of, such biases.

The paper discusses the application of artificial intelligence in Healthcare. The article is divided into different sections, Sec-II presents various Healthcare application of AI. Sec-III discusses future scope of artificial intelligence in Healthcare. Finally, we conclude our article in Sec-IV.

2. Healthcare Applications of AI

The applications of AI in Healthcare are shown in figure 1. Ratio of AI Application in healthcare is shown in figure 2. The health sector currently has the following AI applications in Healthcare:

2.1 Pharmaceutical Research with AI

Artificial intelligence in the medical sector aids drug companies in accelerating pharmaceutical investigation. It also automates target identification. Furthermore, AI in healthcare 2021 aids remodeling by evaluating drug off-target drugs. AI in pharma discovery eliminates recurring effort and hence increases the efficiency of the process. Many treatments produced by top pharmaceutical companies are now available. a machine learning-based system IBM Watson to aid the discovery of immuno-oncology medicines is used by Pfizer.

Sanofi is relying on Exscientia's artificial intelligence (AI), whereas Roche subsidiary Genentech uses an AI based system to aid it in finding cancer diagnosis developed by GNS Healthcare.

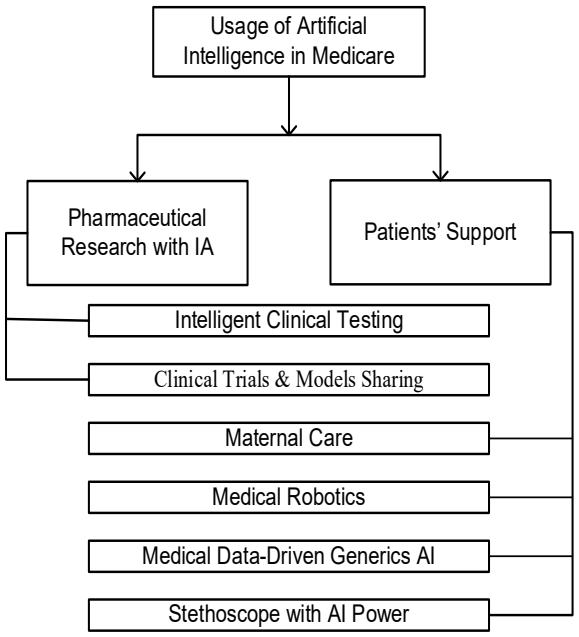

Fig.1: Usage of AI in Medicate

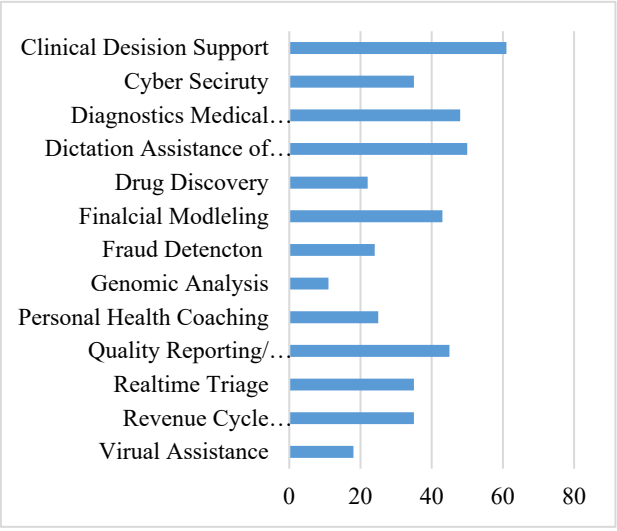

Fig.2: AI Applications in Various Healthcare Fields

If supports of these approaches are correct, AI and ML will assist in a new era, feasible, and more successful & faster medicine detection. Despite some having trouble placing their faith, most experts believe these tools will play a vital role in this. Combining these techniques with automation results in scientists encountering complexities as well as possibilities.

2.1.1 Intelligent Clinical Testing:

Traditional medical practices remain the premium standard for confirming new drug efficiency and well-being. Another time-taking, tested and correct method of different and explained steps of randomized control trials(RCTs) was established to test bulk drugs and hasn't been changed much in these past decades.

Artificial intelligence can enhance the effectiveness of medical outcomes and minimize the time for clinical testing cycles . In the past few years, biopharma companies have conducted huge amounts of medical research producing loads of data, which is mentioned to as Real-World-Data(RWD).

However, they might not be able to efficiently use this data optimally due to a lack of correct tools and knowledge. To help researchers better understand diseases, find appropriate experimenters, advanced and predictive artificial intelligence models must be used to unlock RWD [28]. Clinical testing information could be coded, aggregated, cleansed, saved, and keep going to utilize AI methods in conjunction with an efficient cyber infrastructure. Furthermore, advanced electronic-data-capture (EDC) may reduce the impact of human incorrectness in collection of data as long as allowing for seamless system merger[16].

2.1.2Cooperation in Clinical Trials & Sharing of Models:

In a remarkable display of scientific cooperation, scientists excelling in various fields are competing to help with COVID-19. AI tool adoption around the globe would require scalable code, model and data sharing mechanisms; adaptation of usages to local circumstances; and international coordination.

Data is the primary requirement for the application of artificial intelligence. There are presently numerous data-communication and exchange operations concentrating on COVID-19 at the international, national, and regional level, encompassing the three application sizes. Among the resources provided are genetic sequences, genomic analyses, protein structures, patient medical images, date of event, clinical, epidemiological movement, comments of social media, newspaper, and scholarly literature. The concern with deeply-fragmentation of data-sharing actions is that it could deeply impact in developments that are only accessible to few communities and sections. By developing scalable methods for data, model, and code exchange, new application development and adoption could be sped up. Actions for data sharing that are open, comprehensive, testable and comparable on an international scale will be useful at this point in fostering connections and cooperation between various communities and regions.

Open science can hasten the transmission of information and capacity building in state health systems through many stakeholder, cross-border AI collaborations [22]. For instance, the “Epidemic Intelligence from Open Sources (EIOS)” network leverages freely available source of information to facilitate the early discovery, confirmation, and evaluation of citizens health threats and hazards. Governments, international organizations, and research institutions make up the network of practice for Healthcare intelligence. They work together to judge and share data about outbreak happenings in actual time on the basis of participation rather than contest in quick investigation. According to epidemiologists, database interoperability and international standards may help unify response and deciding at various layers like local, national, and global. As the pandemic spreads, understanding the epidemiologic traits and threat factors of various demographics will need taking into account the capability of the medical structure's resource allocation, citizens health initiatives, considerations of local surroundings, and COVID-19's societal repercussions.

In the present, there are hardly any programmes that trade trained Al models for any of the mentioned uses, save from data sharing. The challenges include overcoming restrictions brought on by particular computational, design, and infrastructure needs; a lack of proper record maintenance; problems with verification and interpretability; and lawful considerations including confidentiality and conceptual commodity. Sharing AI models that have already been trained and validated might make solutions more responsive to changing conditions. Examples of algorithms that may be broadly useful include those that forecast patient outcomes, identify disease from images, weed out misinformation based on how it spreads using social media, and extract informative graphs from sizable sets of research papers.

2.2 Patients' Support

AI has an impression on patient outcomes in medical care. Medical AI firms and institutions outline a structure that benefits the patient on all layers. Moreover, clinical intelligence tests patients' medical data and gives awareness to assist in enhancing their standard of life. Several major clinical intelligence systems that enhance patient care include the ones listed below:

2.2.1 Maternal Care:

A possible method for detecting high-risk mothers and lowering maternal impermanence and postpartum complications is as follows:

a) Determining, with the use of artificial intelligence and electronic health data, if expectant mothers are remarkably at a chance of experiencing difficulties during delivery (AI).

b) Enhancing patient’s reach to both common and high-acuity care (i.e., more complex and recurring care) during their Gestation through the use of digital technologies.

Great-risk to women in delivery who births their babies at low-acuity health centers have a greater threat of experiencing sufficient maternal death rate compared to

women who gives birth to child at higher-acuity clinics with great accurate & robust medical tools and experienced staff.

2.2.2 Medical Robotics:

Some medical robots help patients in addition to medical staff. For instance, exoskeleton robots may assist paralysed persons recover their walking abilities and become self-reliant [23]. Another illustration of application of technology is a smart artificial body parts. These sensor-fitted bionic limbs could be hidden with bionic skin and linked to the appropriator's brawn, building them much accurate and responsive than normal parts of body. Robots may be helpful in surgery and rehabilitation. For instance, Cyberdyne's Hybrid Assistive Limb (HAL) exoskeleton applies sensors fixed on the surface of patient body for effectively detection of electrically generated signals in the patient's body and then responds with motion at the joint to help patients recovering from situations that cause lower limb disorders, such as strokes and spinal cord injuries.

2.2.3 Medical Data-Driven Genetics AI:

From the series of genomes to producing a customized medical level from the information in our competence/activity trackers, at present healthcare user is becoming more active in their own medical care. We are compiling and connecting all of this huge data to create a more accurate sketch of our medical condition. Medicines powered by data offer the potential to increase the speed and accuracy of genetic illness as well as pave the way for more customized medical care.

2.2.4 Stethoscope with AI Power:

One distinguishing benefit is that, in contrast to conventional stethoscopes, recording can be taken further in loudly environment, enabling additional precise identification. There is no necessity or tutoring to use the digital device, therefore anyone can obtain the records and telefax them to the doctor [19]. Additionally, this lessens theirs risks of catching COVID-19 and makes it easier to convey superior healthcare in inhospitable locations and to patients with chronic illnesses. Through the use of artificial intelligence(AI) and machine learning(ML), computers are now able to identify patterns and irregularities in clinical data that relate to disease. The same logic holds true here since blood fluxing via ordinary arteries differs from blood fluxing near a blood clot in the blood vessels[1) 2)].

3. Future Scope of AI in Healthcare

The estimated share of AI in the healthcare is shown figure 3. It reveals that there is a very huge scope for the usage of AI in the health sector in the coming years.

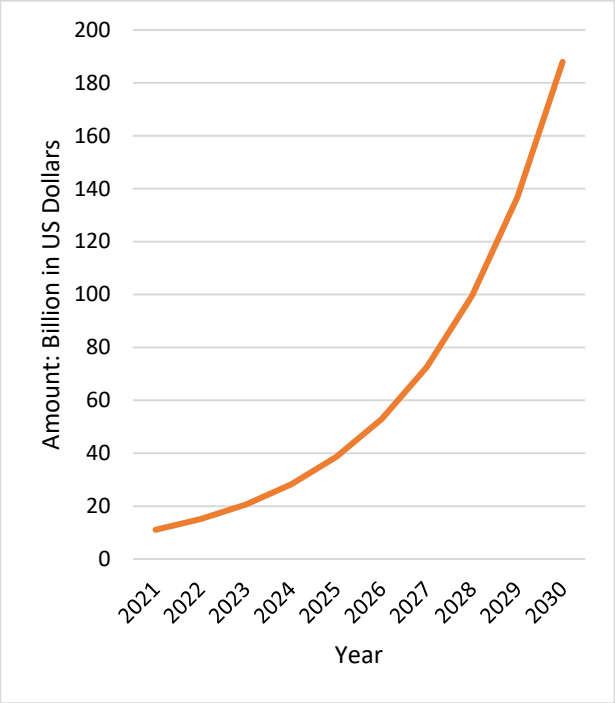

Fig.3: AI Application in Healthcare

3.1 Development of radiology next generation tools:

There are risks of infection during or after the collection of physical tissue samples using biopsies for investigative procedures. There is scope for tool development of next generation radiology using Artificial intelligence, which will be accurate and descriptive enough and in some cases, take away the requirement of tissue sample collection.

3.2 Machine and Human Mind Unification using Brain Computer Interfaces (BCIs):

Several patients may not be able to interact & speed with individuals, move in environment properly due to trauma and illnesses related to our nerve system. BCIs with the help of Artificial Intelligence will be able to reinstate those fundamental capabilities to such patients.

3.3 Make accessible healthcare in developing areas:

In developing nations, access to live saving-health care is significantly not available to the most of population due to the scarcity of skilled healthcare workers, radiologists and ultrasound operators. AI and mobile app-based imaging analysis tools by examining the chest x-rays for symptoms of known diseases can achieve diagnostic results with a level of accuracy similar to persons. Such tools will reduce the need for skilled healthcare workers, radiologists and ultrasound operators in remote areas.

3.4 Containing the risks of antibiotic resistance:

The world is facing a threat of antibiotic resistance in humans due to overuse of antibiotic drugs and such patient no longer responds to the treatments. The doctors can

identify infection patterns using electronic health record data and alert the patient of any damage to their health. The doctors can take the help of AI and ML tools to analyse and take correct and fast decisions on the effects of such drugs.

3.4 Intelligence/Smart Healthcare Machines & Devices:

The world is full of smart devices and these are providing whole things in real-time. Implementing intelligence into these machines and tools may remove the burden on physicians while ensuring that patients get care at the right time.

3.5 Making selfies into a diagnostic tool:

Every year, the cell phone features and quality of cameras are enhancing and generating good quality images. Through a cell phone, one can collect images of infections, wounds, skin lesions, eyes or other body parts. Such images may be used for analysis using AI algorithms to produce the results.

4. Conclusion

As artificial intelligence is increasingly employed in profession and day to day life, it is being utilized in Healthcare. Healthcare professionals could benefit from artificial intelligence in a number of areas, including patient care and office work. Most AI and Healthcare advancements are beneficial to the health sector, although the approaches they allow may differ significantly. It will be a while before artificial intelligence in Healthcare takes the places of people for a variety of medical vocations, despite claims made in some publications on the subject that AI is capable of doing just as well as or better than humans at some tasks, like diagnosing illness.

Despite these notable advancements, the use of AI in healthcare is still very much in its infancy. Continuous research keeps enhancing the technology's capabilities, leading to more breakthroughs in the upcoming years across a range of industries. The vital healthcare industry, which is undergoing one of the fastest digital transitions right now, has a lot to gain from combination of Machine Learning and AI, and facilities have the potential to raise the patient quality of life significantly.

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