Artificial Intelligence: A boon or a Bane for Medicine?

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I. INTRODUCITON

An intelligent behavior and critical thinking which is being comparable to human beings and simulated by the computers and technology is called Artificial Intelligence(AI). Currently this AI is being used a lot in our daily medical practices and medical centers for records maintaining, check ins, follow up calls and reminders. This is being used in radiology in computer assisted diagnosis which is well known. AI helps us to check and get information on the patients as by their records and how to treat them and how much time we should be devoting to them as by this factor the AI is growing too much in public health sector and impacting a great effect on public health care. As is this time we are trying to discover new drugs in pharmaceuticals industries which consumes a huge time which can be reduced by uses of AI [1].

Other than medical practices AI is also helpful in medical research purposes like it is very useful in - genome analysis, epigenome analysis, proteome analysis, multi-omics analysis, radiology reports analysis, pathology report analysis, literature search system, skin image analysis, pathological image analysis, fundus image analysis etc. [2]

So, let's discuss the whole scene needs and advantages and disadvantages everything in an elaborated manner.

II. WHAT IS AI

AI is a field of computer science that can conduct and execute analysis on complicated medical data. It is defined as an area of science and engineering concerned with the computational understanding of what is often referred to as intelligent activity, as well as the construction of entities that exhibit such behaviour. It is truly intelligent activity in a computer as the capacity to accomplish cognitive activities at a human level. It has the ability to exploit important relationships within a data collection for use in diagnosis, treatment, and outcome prediction in a variety of clinical contexts. AI's capacity to learn from previous precedents, analyse nonlinear data, and handle imprecise information has made it a particularly appealing analytical tool in the area of medicine.[3]

III. REQUIRMENTS OF TECHNOLOGY IN MEDICAL FIELD

We are seeing a change in smart healthcare, which combines a new generation of information technology, as technology advances. The notion of smart healthcare is combining a new generation of information technology as technology advances. We are seeing a revolution in smart healthcare as technology advances, which includes a new generation of information technology. [14]

Machine-based technology has acquired a lot of traction in the recent age of the Corona Virus Disease – 19 (COVID-19)epidemic. We have lately seen a surge in interest in computer-based, internet web-dependent processes and the rise of artificial intelligence (AI)-dependent techniques in our daily lives. The range of ways in which AI technology may alter our views towards screening and diagnosis. Currently, truly autonomous surgery by robots does not exist, and no use is feasible in the near future. Taking an interest in modern AI technology, with its capabilities and advancement in linked medical specialties, will help us to better patient treatment in a variety of clinical settings, as well as future research prospects.[15]

IV. ROLE OF AI IN MEDICAL

In the past two decades, artificial intelligence has played a huge role in the medical industry. Gunn initially researched its use in the realm of surgery in 1976, when he investigated the possibilities of identifying acute pain in the abdomen using computer analysis. AI-enabled programs have aided physicians in the formulation of diagnoses, treatment decision making, and outcome prediction. They are intended to assist healthcare staff in their daily jobs by assisting with data and knowledge manipulation tasks.[3]

AI applications in medical science include matching patient symptoms to appropriate physicians, making diagnoses, prognosis, drug discovery, a bot assistant that can translate languages, organise images and files, transcribing notes, instantly determining which physicians are on call, scheduling the next available appointment, and many more. It may also search several scheduling systems across different hospitals, answer prescription-related inquiries such as medicine availability, and assist clinicians in searching for hospital protocols, a list of accessible tools, and pharmaceuticals through a mobile application. As a result, it aids with the entire workflow of a hospital.[4]

Parallel to medical monuments, AI is also being used effectively for image analysis in radiology, dermatology, and pathology with great diagnostic speed and accuracy. Combining machines with medical expertise consistently improves performance. Thus, AI

may enhance the treatment trajectory of chronic illness patients, minimize medical mistakes, extend scientific literature, identify precision therapeutics for complicated diseases, and boost subject enrolment in clinical trials, among other things.[5]

V. IS AI NEEDED IN MEDICAL FIELD?

In the Fourth Industrial Revolution Era, AI is making life simpler in every industry, and the medical profession is no exception. It has made significant progress in the medical profession and is widely appreciated since it reduces effort and improves the effectiveness of hospital nursing and management personnel. Major hospitals are already adopting AI-enabled systems and making considerable progress in treating and caring for patients. Because AI has a big database, it may help physicians make better decisions by incorporating all of the most current research and studies on the subject. AI is the key instrument for societal improvement in our age. AI can not only aid in medical care, but it may also provide patients with a new life or a higher standard of living. Thus, AI is not an option, but rather a trend that an organisation should embrace in order to stay competitive and in this race of growth. [7]

VI. IS AI TRUSTWORTHY?

In today's world, artificial intelligence (AI) has achieved remarkable success in the area of medical sciences. AI has aided in patient diagnosis and has reduced health risks. But the subject of whether AI is trustworthy is a hot topic these days.[8,9] There is still much to be done in the realm of artificial intelligence. According to studies, AI in the healthcare industry has a poor methodological quality and a significant bias risk.[9] It is deficient in cybersecurity, data ownership, data integrity, and privacy issues.[7] It was shown that AI can produce high-quality content that can trick anybody but can only be recognised with sufficient training and research.[8] There is still a need to concentrate on characteristics such as morality, legitimacy, and robustness, and AI has a long way to go to improve trustworthiness and reduce the development of bogus medical papers.[9]

VII. APPLICATIONS OF AI

It includes Artificial neural networks, fuzzy expert systems, evolutionary computation and hybrid intelligent systems. [3]

Artificial Neural Networks(ANN):- The most widely used AI technology in medicine is ANN. These are computational analytical tools modelled after the biological nervous system. They are made up of linked computer processors known as "neurons" that may do parallel calculations for data processing, knowledge representation, and other purposes. Recognising that diagnosis, treatment, and outcome prediction in various clinical situations are all dependent on a complex interaction of clinical, biological, and pathological variables, there is a growing demand for analytical tools like ANN that can exploit the intricate relationships between these variables. They've been employed in clinical diagnosis, image analysis in radiology and histology, waveform analysis, data interpretation, and other applications. Abdominal pain and appendicitis, bile duct stones, glaucoma, and back pain are among more medically associated diagnostic uses of ANN. They are also used to interpret plain radiographs, ultrasound, Computer Tomography (CT), Magnetic Resonance Imaging (MRI), and prognosis, as well as to diagnose cytological and histological specimens. They may also help predict the fate of lung and prostate malignancies. [3]

Fuzzy Expert Systems:- Fuzzy logic is a branch of logic that acknowledges and applies real-world phenomena in reasoning, thinking, and inference. It outperforms multiple logistic regression technique in detecting lung cancer using tumour characteristics. It also aids in the diagnosis of acute leukaemia's, breast cancer, and pancreatic cancer. They also help to characterise breast ultrasound pictures, liver ultrasound and CT scan images, and MRI images of brain tumours. They can also predict survival in breast cancer patients. These are also intended for the administration of vasodilators to lower blood pressure prior to surgery and anaesthesia in the operating theatre. [3]

Evolutionary computation:- It is a catch-all phrase for a variety of computer strategies based on the natural evolution process that apply the principle of natural selection and survival of the fittest to real-world challenges. They are used for a variety of activities such as diagnosis, prognosis, signal processing, medical imaging, planning, and scheduling. [3]

Hybrid intelligent systems:- The benefits of neural networks for learning, fuzzy logic, and evolutionary computation may be coupled to create hybrid intelligent systems that can function in tandem. Their combination enables hybrid systems to handle raw data, apply human-like reasoning procedures, cope with uncertainty and imprecision, and so on. ANNs for constructing fuzzy systems, fuzzy systems for designing ANNs, and genetic Algorithms for autonomously training and developing neural network designs are some examples of these hybrid systems. It is used to diagnose breast cancer, coronary artery stenosis, analyse microcalcification on digital mammograms, measure myocardial viability, and manage the depth of anaesthesia, among other things. [3]

VIII. DISADVANTAGES OF ARTIFICIAL INTELLIGENCE

The most serious difficulty with AI from an environmental standpoint is that it is not environmentally friendly. It creates e-waves that are not biodegradable and, if discharged, will release hazardous heavy metals and reduce soil fertility.[7]

1. High cost and the risk of breakdown: AI costs a lot of money since extremely sophisticated software and hardware equipment is utilised to create it, which is pricey. AI upkeep is likewise quite expensive. The most serious fear concerning AI is the potential of failure. It's like spending a million dollars on a vehicle to drive from point A to point B only to have it break down the next day. Similarly, Artificial Intelligence is all about easy work, but the possibility of failure casts a shadow over the whole image. [6,7]

2. No ethics: Humans understand their ethics and moral principles, but when it comes to AI, the first issue for its application is its ethics and morals. is it morally OK to manufacture human replicas? Do our moral ideals enable us to do so? After all, intelligence is a natural talent. It may not be appropriate to put it into a machine or robot for our benefit.[7]

3. Unemployment: Because machines can operate like people and achieve greater results. If robots begin to replace humans in all fields, it is likely that many people would lose their jobs. People will be out of work. Because there was no AI in ancient times, all labour was done by people, but this is no longer the case. Previously, people were utilised to handle issues at the help centre, but in the present day, AI has replaced our employment, and problems are now addressed through chat box.[7]

4. Lack of creativity: Being creative is a quality shared by all humans. Every human being has some level of creativity, as a result of which job is completed efficiently. However, when it comes to AI, the programmer's ingenuity is crucial. It operates on the basis of programme configuration; it cannot generate anything on its own. Do you believe robots will flourish in this field? Is it acceptable to have a robot do surgery? As machines function by gathering information from individuals who have similar symptoms. If there is a data shortage, AI may produce an inaccurate diagnosis. If we want to boost performance, we must tweak the command. [6,7]

5. Makes human lazy: Men in the present period are fully reliant on technology and utilise them for everything, which makes them sluggish. As a result, one should not rely only on these solutions. Because of these contemporary procedures, we are more prone to lifestyle disorders, which may be dangerous.[7]

6. Emotionless: To complete a job in a systematic manner, collaboration and emotional value are required. The robot, on the other hand, is emotionless. Machines can only accomplish the tasks that they are intended to do; anything else causes them to produce irrelevant results or to crash, which may be disastrous. Aside from all of these difficulties, there is a worry of robots taking our place! Humans should ideally be the masters of machines. If things go the other way, the globe will be in disarray. AI may be beneficial, but what if the order provided to the machine is negative? This might be harmful to the society. Artificial intelligence may eventually outperform mankind. The day when machines will govern humans is not far away; they may enslave us and begin dominating the globe. As a result, the moment is approaching when all effort done with these technologies will result in the extermination of mankind. Man's selfish ingenuity might threaten humanity.[6,7]

IX. AI IN HEALTH CARE AND HUMAN DOCTORS

Artificial intelligence is a field that involves computational stimulation of human intelligence;[11] imparting intelligence and human feelings into machines has been a fascinating concept since old times. Al is mainly based on analyzing databases, recognizing interactions, developing algorithms to resolve problems, etc; [12]. Al has potential for integration across surgical services, from diagnosis to treatment, and helping surgeon in main decision making for risk per patient. Fully automated surgery may be the future but at present Al needs human supervision. [11] Motivation of using Al in health care is to enhance the efficiency of human clinicians. Its use has resulted in several advantages such as improved diagnostic and treatment accuracy, increased efficiency and reduced costs.[13] As the efficacy of Al in improving aspects of health care delivery is increasingly becoming evident. Al will be incorporated in routine clinical care in the near future.

These ideas have les to growing focus and investment in Al medical applications both from governmental organizations and technological companies.[13] Technological singularity is a hypothetical future point in time at which Al is expected to surpass human intelligence. TS in health care will indicate the replacement of medical practice personnel with the Al enabled robots. In the current pace of technological advances in the field of Al the debate on the possibility the possibility of whether Al will replace humans has shifted from a fictional landscape to a real one. Driving an analogy from biological neural networks, ANN is a computer program that simulates human thinking, such as with learning and retrieving data from previous experiences. An ANN observes examples of solutions to previous problems, collects information from those examples, processes this information through learning algorithms, and develops a response. Unlike a pre-program, an ANN learns, reasons, and responds as humans do. The quality of results depends on the amount of data it processes. A large amount of data enables better learning processes [13].

Al models can also be used to predict the risk of postoperative complications. The accuracy of such systems is generally better than that which is typically observed in conventional approaches. For example, supervised algorithms, which learn from data labelled by humans, classify or make predictions based on new, unseen data; they have been reported to predict sepsis about one day before its onset with an impressive receiver operating characteristic curve. Al can be used to improve health management systems. NLP can be used to analyze clinical text and reports. It can be utilized to conduct a finer analysis of an extensive amount of previous health records of a patient and get a history of previous infections, side effects, their family history, and other details relevant to their current condition. Nanorobots, which can be used for targeted drug delivery or softbots, which are autonomous programs acting on behalf of a user, have been proposed as psychotherapeutic avatars to detect early emotional disturbances in youngsters.

Computer vision (CV) is another emerging application of Al which involves image processing, pattern recognition, and response. CV is being explored to reduce colorectal cancer-related mortality by using a standard, fully convolutional network to yield a better diagnosis than the conventional approach of the visual assessment of polyp malignancy. There is the possibility that Al could be a substitute for human doctors for many medical activities; however, such a replacement will not be absolute. Human doctors will continue serving patients with capabilities augmented by Al. As it evolves, clearer guidelines will emerge on its integration with medical practice. [13] Al enabled services or devices in health care, no matter how advanced, will always be guided by the core principles of humanity and patient centred care.[13]

X. CONCLUSION

There are several AI approaches that can help with a wide range of healthcare concerns. Evidence suggests that medical AI may help clinicians offer health care more effectively in the twenty-first century. Despite previous anticipation, AI technology has not been completely used in medical sciences. As a result, there is an urgent need to conduct more randomised controlled experiments to demonstrate the usefulness of AI systems in medicine. [3]

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