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Review Paper on Artificial Intelligence in Medical & Healthcare

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Abstract:- The use of sophisticated algorithms and software to simulate human cognition for the study of complicated medical data is Artificial Intelligence (AI) in healthcare. The primary objective of AI applications related to health is to examine the relationships between methods of prevention or care and patient outcomes.AI programs have been developed and extended to procedures such as processes of diagnosis, development of treatment protocols, development of medications, personalized medicine, and supervision and care for patients. Various medical specialties have shown an increase in AI science, such as radiology, imaging, disease detection, telehealth, electronic health records, etc.

***Keywords*:-** *Protocol, Radiology, Telehealth, Diagnosis.*

I. INTRODUCTION

A branch of computer science capable of analyzing complex medical data is artificial intelligence. AI is not new, but in recent years there have been rapid developments in the area. Artificial intelligence (AI) research is increasing rapidly in medicine. In 2016, AI projects received more investment within any other sector of the global economy than AI projects. In many clinical contexts, their ability to manipulate meaningful relationships within a data set can be used in diagnosis, care, and prediction of outcomes.

❖ *WHAT IS ARTIFICIAL MEDICAL INTELLIGENCE?*

Artificial Intelligence in Medicine deals primarily with clinical decision-making by observations from previous data through characterizing data trends as equations of mathematics. Machine Learning (ML),

AI offers methods that reveal complex techniques, associations that can't be reduced to an equation easily. Neural networks, for example, similarly represent data to the human brain through a large number of interconnected neurons. This would make an ML machine to think like a clinician might think and draw a conclusion, unlike a single clinician, an almost infinite number of inputs can be observed and interpreted rapidly at the same time. From each incremental case, AI systems will learn and can be exposed to more cases within minutes than a clinician would see in many lives.

➢ ***AI excels at well-described tasks***

An analysis has been carried out on the tasks in which AI can efficiently demonstrate its efficiency compared to a human physician. In general, these tasks have clearly defined inputs and an easily validated binary output. In the classification of suspicious skin lesions, the input is a digital photograph and the output is a simple binary classification: benign or malignant. Under these conditions, researchers simply had to show that AI had a higher sensitivity and precision than dermatologists when classifying previously unseen images of biopsy-validated lesions.

➢ ***AI is helping physicians, not replacing them***

Machines lack human qualities, such as empathy and compassion, and so patients need to be informed that consultations are led by human physicians. In addition, as a technology shrouded in mistrust, patients cannot automatically trust AI. As a result, AI usually conducts functions that are important but limited enough in scope to leave a human physician with primary responsibility for patient management.There is an ongoing clinical trial using AI to measure target zones for head and neck radiotherapy more precisely and much faster than humans. The interventional radiologist is still solely responsible for the procedure, but AI has a key role to play in protecting the patient from harmful radiation.

❖ *CLINICAL CARE*

AI can help disease diagnosis and is currently being evaluated in some UK hospitals for this purpose. The use of AI to evaluate clinical knowledge, scientific publications, and professional guidance may also help influence treatment decisions. Possible uses of AI in clinical care include:

• **Medical imaging** – Medical scans have been obtained and processed routinely for some time and are readily available

for AI systems training. The cost and time involved in interpreting scans could be minimized by AI, potentially encouraging more scans to be taken to better target care. In the identification of conditions such as pneumonia, breast and skin cancers, and eye diseases, AI has shown promising results.

• **Echocardiography** - The echocardiogram device, tested at Oxford, uses AI to interpret echocardiography scans that track pulse patterns and diagnose coronary heart disease.

• **Screening of psychiatric disorders-** AI tools are being developed for screening for neurological disorders that examine speech patterns to predict psychotic events and recognize and track symptoms of neurological conditions such as Parkinson's disease.

• **Surgery**- AI-controlled robotic tools have been used in research to conduct basic keyhole surgery tasks, such as binding knots to close wounds.

❖ *GENERAL HEALTH*

AI has the ability to be used to help early detection of outbreaks of infectious diseases and epidemic causes, such as water pollution. In predicting adverse drug reactions, AI has also been used.

II. FUZZY EXPERT SYSTEM

Fuzzy logic is the reasoning, thought and inference science that identifies and utilizes the phenomenon of the natural world-that everything is a matter of degree. Instead of thinking that everything is black and white (conventional logic), fuzzy logic understands that most things are simply going to be somewhere in between, that is, different shades of gray.

Hybrid Smart Systems: Each AI system has its strengths and limitations. Neural networks are primarily concerned with learning, imprecision in fuzzy logic, and search and optimization in evolutionary computation. To create hybrid intelligent systems that can operate in a complementary way, the benefits of these technologies can be mixed. Their synergy makes it possible for a hybrid system to accommodate common sense, derive information from raw data, use processes of human reasoning, cope with ambiguity and imprecision, and learn to adapt to a world that is rapidly evolving and unknown. Many different hybrid systems are available and the common ones are ANNs for the design of fuzzy systems, ANNs for the design of fuzzy systems, and Genetic Algorithms for the automatic training and generation of architectures of neural networks.

III. MACHINE LEARNING ALGORITHMS USED FOR DETECTION OF DISEASE

- **Random Forest Algorithm** :

Random Forest is a common algorithm for machine learning that belongs to the system of supervised learning. It can be used for ML classification and regression problems. It is based on the principle of ensemble learning, which is a method of combining multiple classifiers to solve a complex problem and improve the output of the model.

- **Decision Tree Algorithm :**

The algorithm for the Decision Tree is part of the family of algorithms for supervised learning. As compared to other supervised learning algorithms, the decision tree algorithm can also be used for solving regression and classification problems.

The goal of using a decision tree is to create a training model that will be used to predict the category or value of the target variable by learning specific decision rules derived from previous data (training data).

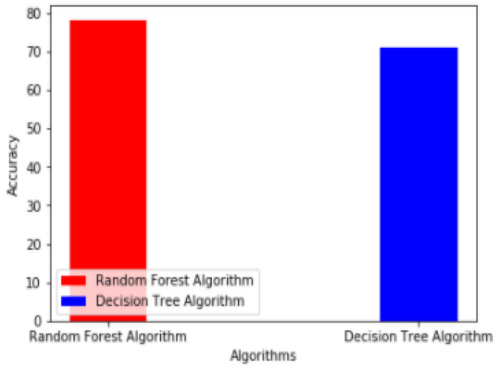
➢ *COMPARISION OF ALGORITHMS*

- Using all the characteristics of interest, a decision tree is constructed on an entire dataset, while a random forest randomly selects observations/rows and unique features/variables on which to create several decision trees and then averages the results.
- Decision trees are often simpler to understand and identify. It becomes more difficult to interpret because a random forest incorporates multiple decision trees. Random Forest also has a greater time for training than a single decision tree.

➢ *CASE STUDY FOR COMPARING ALGORITHMS*

For comparing both the algorithms, a case study on the diabetes disease prediction model using Random Forest as well as Decision tree was done. For this a random collection of data (consisting of 768 rows and 8 attributes) was used for the training of the model. A result in form of efficiency was considered for finding the more efficient algorithm among them. It was discovered that the Random forest algorithm was more efficient or accurate in compared with Decision tree algorithm.

Accuracy Comparison Graph :



IV. BOUNDS OF AI

- AI relies on digital data, but AI's potential is restricted by inconsistencies in data availability and quality. Significant computing power is also required for the analysis of large and complex data sets.
- Medical records and the lack of interoperability and standardization of AI systems are not regularly digitized.
- Concerns exist as to the degree to which patients and physicians are comfortable with digital disclosure of personal health information.

- The use of AI poses principled concerns, including the capacity of AI to make incorrect choices, the question of who is accountable when AI is used to facilitate decision-making; challenges in validating AI systems' outputs.

V. RECENT TRENDS IN AI RESEARCH

- **Deep learning AI discovers unexpected new antibiotics:** new antibiotics have not been revealed by the conventional way of discovering antibiotics-from soil or plant extracts. Some scientists have recently attempted to tackle it by looking for new antibiotic-producing genes in the DNA of bacteria.
- **Detection of disease:** A few weeks after the outbreak of Coronavirus and a full-blown pandemic of the disease. Face masks and laboratory coats can be diagnosed with infectious diseases, but computer programmers sitting thousands of miles away can spot warning signs of an outbreak. Blue Dot, a Canadian company specializing in infectious disease monitoring, was the first to announce an impending biohazard. On December 31, they predicted an imminent coronavirus epidemic utilizing an artificial-powered device that combats animal and plant disease networks, news stories on vernacular blogs, government records, and other online outlets to alert their customers about traveling to dangerous areas such as Wuhan, long before foreign governments began issuing travel advisories.In order to correctly predict that the virus will spread to Seoul, Bangkok, and Tokyo, they further used global airline ticketing data. To build models that process large quantities of data in real-time, machine learning and natural language processing techniques have also been used.

VI. THE FUTURE OF AI

In the future, AI systems are expected to become more sophisticated and gain the potential to perform a broader range of tasks without human intervention or feedback. Some have indicated that AI systems would have to learn to be ethical' and to make ethical decisions if this happens. This is the topic of much philosophical discussion, raising questions about whether and how a machine can ever codify or acquire ethical values or principles; who if anyone, should decide on these values; and whether duties applicable to humans may or should apply to machines, or whether new ethical principles might be required.

VII. CONCLUSION

In the area of health and medicine, AI technologies are used or researched for a variety of purposes, including detection of illnesses, chronic disease management, delivery of health services and discovery of medicines. AI systems have the ability to help solve significant health issues, but they may be limited by the consistency of available health data and the inability of AI to possess certain human attributes, such as compassion. The use of AI poses a range of ethical and social concerns, many of which more generally overlap with issues posed by the use of data and healthcare technology. Ensuring that AI is built and used in a way that is open and consistent with the public interest, while fostering and driving innovation in the field, will be a challenge for the future governance of AI technologies.

REFERENCES

[1]. *Varun H Buch, Clinical Technology Lead, Irfan Ahmed, GP Lead, and Mahiben Maruthappu, CEO, Artificial intelligence in medicine.*
[2]. *Shapiro SC. Artificial intelligence. In: Shapiro SC. (ed) Encyclopedia of Artificial Intelligence, vol. 1, 2nd edition, New York: Wiley, 1992.*
[3]. Turing AM. Computing machinery and intelligence. Mind1950; 59: 433–60.
[4]. Medicine and the rise of the robots: a qualitative review of recent advances of artificial intelligence in health by Erwin Loh.
[5]. Article in Annals of The Royal College of Surgeons of England · October 2004.
[6]. Article by: AN Ramesh, C. Kambhampati, JRT Monson, PJ Drew,
[7]. The University of Hull Academic Surgical Unit, Castle Hill Hospital, Cottingham & UK Department of Computer Science, University of Hull, UK: Artificial intelligence in medicine.