



IMPORTANCE OF ARTIFICIAL INTELLIGENCE IN HEALTHCARE SECTOR: A STUDY

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ABSTRACT

Artificial intelligence(AI) is a new technology in a computer science and engineering. AI is defined as making of an object that reveals intelligent behaviour. Technologies like Internet of Things, artificial intelligence, machine learning(ML), big data all are now part of our usual lives. AI and ML have power to disrupt and transform organizations also plays key role in improved human life in many areas. It has been applied in various areas such as education, business, marketing, manufacturing, and also medical field. This paper spotlights the forthcoming advents in the technology of Artificial Intelligence specially medical applications and healthcare sector. AI might consent to better detection and prevention, diagnosis, and treatment of major disease.

KEYWORDS : Artificial Intelligence, Machine Learning, Healthcare, Diseases

1. INTRODUCTION

Artificial Intelligence is a combination of two words in which "Artificial" means objects that are formed by human beings somewhat taking place naturally, and "Intelligence" is an ability of reasoning and learning to achieve goals. Artificial Intelligence is a process of human thinking that can be mechanized.

Artificial intelligence (AI) is a software tool having the capacity to perform operations such as reasoning, learning and decision making and a lot of others computations. AI tool progressively more useful in the pharmaceutical, medical, and healthcare sectors to assist various stages of research, development, as well as handling of patients. Hoong [1] summarized the prospective of AI techniques in medicine as follows:

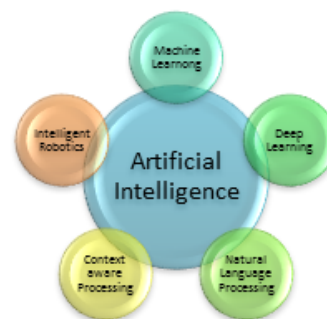
- Facilitate a laboratory for the examination, organization, representation and cataloguing of medical knowledge.
- Generates new tools to support medical decision-making
- incorporate activities in medical, computer, cognitive and other sciences.

Several intelligent system have been developed for the purpose of enrich the health care facilities , reduce cost, simplify the decision making and many more[2]. These system were used to assist users mainly doctors and pharmacist and patients to predict or prevent and provide early diagnosis for serious illness.

Data mining one of the AI technique used to extracting the knowledge from large databases, it might be used to collect hidden information for medical purposes and also be combined with neural network for classification of pattern using supervised or unsupervised learning. Patients status such as life or death was classified as training and testing pattern. Data mining is also used to generate a scatter diagram and a model of rule statements to enhance current rule base system[3]. Neves *et al* [4] developed information system that supports knowledge discovery and mining in medical imaging.

The rest of the article is organized as, in section II contain the classification of artificial intelligence and importance of AI in healthcare sector, Section III explains recent trends in AI finally in IV contain conclusion and discussion.

2. CLASSIFICATION OF ARTIFICIAL INTELLIGENCE



AI technology has been classified as Machine Learning (ML), Deep Learning , Natural Language Processing (NLP), Context aware processing, and Intelligent Robotics. Those technologies are transforming the healthcare sector to strengthen to prevent and predict the diseases.

Figure 1: classification of AI

2.1 MACHINE LEARNING(ML)

Machine Learning is a sub division of AI, it is basically an application of statistical models to data using computer programs or algorithms learn associations of predictive power from models in data. Machine learning uses a broader set of statistical techniques those are typically used in the medical field. New techniques such as Deep Learning are able to handle more complex data and the models with less assumptions about the underlying data.

2.2. DEEP LEARNING(DL)

Deep learning (DL) methods allow a machine to feed with large set of raw data and used to discover the representations for classification. DL methods rely on multiple layers of representation of a data with consecutive transformations that enlarge features of the inputs that are important for discrimination and suppress irrelevant variations. Deep learning may be supervised, unsupervised or reinforced. Deep learning models have been responsible to move forward of initial advances in machine learning [5].

2.2.1. SUPERVISED LEARNING

Training the computer programs to learn with the support of

teacher or supervisor Once it have been learned based on existing data they can be used to predict future patterns. This is one of the most conventional method used in ML.

2.2.2. UNSUPERVISED LEARNING

Unsupervised learning is the training of the computer machine that uses information without supervisor guidance or a teacher. Unsupervised learning is neither classified nor labeled.

2.3.3. REINFORCEMENT LEARNING

Computer programs that learn actions based on their ability to maximize a defined reward. This approach is influenced by behavioral psychology and has been applied with considerable success in gaming where there is perfect information, many possible options and no real world cost of failure.

The diagnosis and treatment of diseases is likely to progressive with the implementation of AI in the healthcare sector. DL a component of AI, can be used medical data and scanned images to evaluate and enhance the ability of physicians to treat diseases. IBM Watson is being trained to help doctors with medical diagnosis using cognitive computing and a deep learning approach is the best example.

2.4 NATURAL LANGUAGE PROCESSING (NLP)

AI plays an key role to convert complex data into simple meaningful. NLP mainly used to act like human, by using algorithms or programs to respond and hold conversations of queries. NLP in healthcare sector can be used to summarize long narrative text like clinical reports or notes by pointing out the key concepts or phrases in the reference document. To improve clinical decision making NLP maps data elements in EHRs which are present as unstructured text into structured meaningful data.

2.5 CONTEXT AWARE PROCESSING (CAP)

Assistant applications like Apple's Siri, Google Assistant okgoogle, Amazon Alexa and Microsoft Cortana are uses AI . These services can be utilized in the healthcare sector which can perform tasks as directed by the programmer. AI chatbots when used in healthcare, can amazingly reduce the burden on medical experts to coordinating care and detecting issues or diagnosable health concerns. However, chatbots would be supplementary to the duties of an experience doctor.

2.6 AI IN HEALTHCARE SECTOR

AI has been breaking grounds in the healthcare sector by assisting clinical technicians, doctors , pharma companies and others who are facing practical challenges. A growing population across the world, the healthcare sector facing the shortage of healthcare takers. Day by day the number of companies focusing on implementing AI in the healthcare sector is rapidly increasing. As per the World Health Organization (WHO), the world will be short of about 13 million healthcare workers by 2035.

Economically strong, advanced and developed countries like US, Germany, Canada, Australia and the UK expend a huge amount of their Gross Domestic Product (GDP) on healthcare sector. On other side the adoption of emerging technologies like AI is yet to gain importance in their health systems. In most of these countries irrespective of the stages of development, the cost and demand for care is rising, thereby increasing the need for emerging technologies like AI.

3.RECENT TRENDS IN ARTIFICIAL INTELLIGENCE

The rapid transformation are happened in the healthcare sector with implementation of AI. The recent trends of AI in healthcare are as follows.

3.1 AI IN STROKE

More than 500 million people across the world suffer some form of stroke each year. Stroke leads the list of causes of death in China. It is the fifth leading cause of death in North America[7].85% of stroke is caused by cerebral infarction, which is caused by a thrombus in the vessel. But only few of the patients are receive treatment on time the reason behind this is the lack of detecting early stroke symptoms. A movement detecting device for early stroke prediction has been developed[8].The model build with the implementation of two ML algorithms and deployed into the device to building solution. The implemented two algorithms namely PCA and genetic fuzzy finite state machine. MRI and CT scan are important for disease evaluation and diagnosis of stroke.

3.2 AI IN PROGNOSIS OF ASTHMA

Asthma disease which can be found in all the countries of this world. This is most common chronic disease among children. It is growing faster rate than any other major chronic disease. The reason may be an increase in pollution in day to day. Even though it has a low mortality rate when compared with other chronic diseases, but it cause a serious risk of sudden death in just five minutes. If diagnosed early, patients can be prepared to handle rapid breathless conditions with appropriate medication. The prognosis of the disease evaluates the complexity and risk of asthmatic morbidity, and equips the patient with appropriate knowledge and technology[9].

To diagnose a person's asthmatic symptom of disease at an early stage Artificial Intelligence application Machine Learning algorithms are applied.[9] Due to frequent updating of a disease characteristic database, these algorithms can also produce an automated prognosis, so that the doctor or health care workers can understand the seriousness of his/her disease.

3.3 AI IN DIAGNOSES OF CANCER

AI has deployed in a few hospitals to diagnose critical diseases, such as cancer. Cancer is one of the major health disease for the death of men and women. Usual cancer category that affects the persons is lung cancer. Identification of lung cancer at earliest stage is required to protect human lives and also useful to provide the proper treatment to the patients[10].

Computer Aided Detection (CAD) in radiology can deliver a purposeful and helpful to the doctors in identification of cancer at initial stage that saves time and expenditure incurred in various levels of screening process of investigating different cancer[11]. One of the application of Artificial Neural Network Back Propagation Network is very much helpful in deciding the nature and depth of treatment provided to lung cancers are ideal in recognizing lung cancer and there is no requirement involvement by expert doctors BPN strategies are the significant ways in supporting expert doctors for examining the stage of the cancer.

3.4 ARTIFICIAL INTELLIGENCE FOR MANAGING MEDICAL RECORDS AND DATA

The most predominant use of artificial intelligence in healthcare is data management. Gathering the data, storing the data and normalizing the data. AI is used in data mining of medical records, it is most important in revolutionizing the healthcare systems [12]. In healthcare industry, patient information, diagnosis information, new research findings, and many more data is generated in every day [13]. The combination of available data analytical tools are helps organizations achieve the insights essential to collaborate much more efficiently with patients and take admirable decisions, and this dependence on large data and storing it to reducing wastage. IBM Watson Health is helping healthcare organizations to apply cognitive technology to unlock huge

amounts of health data to power diagnosis.

3.5 AI BASE ROBOTS

AI based chatbots are being used in health care industries as health assistants and personal trainers. Some of the use cases of chatbots works like healthcare assistant applications in healthcare which includes scheduling doctor appointments, providing medication reminders, and identifying the condition based on symptoms, also helps physicians, patients.

Computer assisted surgery are often termed as robotic surgery is a technological improvements that utilizes the robotic systems to aid in surgical procedures[14]. Robotically assisted surgery was created to conquer the limitations of preexisting minimally-invasive surgical procedures and to improve the capacity of surgeons performing open surgery [15].

Researchers from the University of OXFORD successfully implemented AI technology and completed the first robot-assisted retinal surgery successfully. To perform the analysis retina of 12 patients were assigned randomly to either undergo robot assisted or manual surgery under general anesthesia. Half of the 12 patients are allocated to standard manual surgery and the other half allocated to robot assisted surgery to remove a membrane from the back of the eye. With the support of robot the surgeon was able to perform the process with equal or better efficacy than in the traditional manual approach. In the second experiment in phase two, considered three patients who had age-related macular degeneration were assigned to robot to insert a fine needle under the retina to melt blood in. All are identified as an improvement in their vision as a result[16].

AI based surgical robots are currently being conceptualized by many technology companies like Google DeepMind, IBM Watson and others. Robots with AI capabilities that can increase accuracy, less damage, and speedy recovery.

3.6 AI IN DESIGN OF DRUG

Using AI techniques specifically ML algorithms possible to automate drug design. Machine learning algorithms have been used to reduce drug invention times. Using AI to restore measurement of the drug discovery process can be much quicker, cheaper, and safer. AI cannot completely take away all the stages concerned in drug design, it can assist in various levels such as discovering new compounds that could be possible drugs. It can also assist to find new applications for previously tested compounds[17].

AI is also extensively used in process of clinical examination like GNS Healthcare that implements AI applications to transform various streams of biomedical and healthcare data into computer models. The models enable doctors to identify patients responses to give treatments based on their characteristics therefore it is simple to deliver personalized medicine and treatment at scale.

4. CONCLUSION

Artificial intelligence and machine learning both will play major role on various fields includes healthcare medical pharmaceuticals services, data management and drug discovery in 2020. WHO recommendation of the minimum threshold of 22.8 skilled health professionals per 10 000 population[18]. Globally per 1000 people there is a shortage of 17.4 million healthcare workers with the availability of 4.45 skilled health professionals[19]. This is an indication that shows the demand of healthcare professionals. AI based platforms will be able to improve the entire process of diagnosis by examining historical medical records and patients' data. These systems can collect the test reports of

patients and provide guidance on treatment based on previous patient records with the comparison of similar symptoms. AI platform would enhance the doctors efficiency deliver better results and minimize errors. With the power of advanced machine learning models health care workers they can prescribe more personalized treatment, however they can predict and prevent issues from diseases .

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