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Practical Implications of Artificial Intelligence of Health Care

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Abstract:- Artificial Intelligence (AI) makes use of computer techniques to carry out clinical diagnosis and medical treatments and various healthcare applications such as robotic surgery, diagnosis, precise medicine, drug delivery[11]. It is mainly helps in administrative tasks which consumes most of the healthcare practitioner's times. Artificial intelligence and Robotics become the standard "keep wellbeing" in healthcare management, proven it's no longer science fiction.

Keywords:- *Artificial Neural Network, Deep learning, Medical Imaging, Dental Applications carried out by humans.*

I. INTRODUCTION

Artificial Intelligence (AI) makes use of computer techniques to carry out clinical diagnosis and medical treatments and various healthcare applications such as robotic surgery, diagnosis, precise medicine, drug delivery[11]. It is mainly helps in administrative tasks which consumes most of the healthcare practitioner's times. Artificial intelligence and Robotics become the standard "keep wellbeing" in healthcare management, proven it's no longer science fiction.

II. ARTIFICIAL INTELLIGENCE METHODOLOGIES

Machine learning is part of Al, which is based on algorithms to regulate outcomes based on a dataset. The role of machine learning is to enable machines to learn from the data so they can resolve problems without involving human input. ***Neural networks*** are a group of algorithms that compute signals through artificial neurons. The main motive of neural networks is to create neural networks that can simulate human brain function. ***Deep learning*** is a part of machine learning that makes use of the network with different computational layers in a deep neural network to scrutinize the input data. The purpose of deep learning is to construction of a neural network that automatically identifies patterns, thereby improvising feature detection.[2]

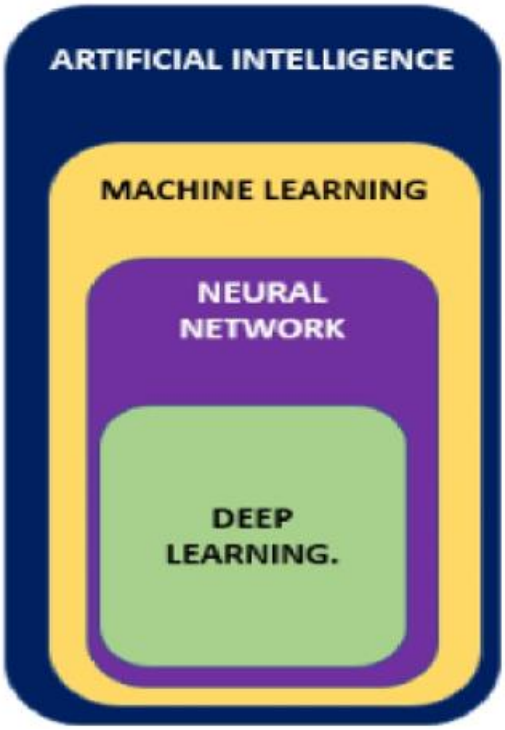

Fig 1: Aspects of AI.

A. Artificial Neural Network

Artificial neural networks are highly complex interconnected network of computer processors that are influenced by the human biological nervous systems.

McCulloch and Pitts (1943) created the first artificial neuron by making use of a simple binary threshold functions. The next important milestone came when ***Frank Rosenblatt***, a psychologist, invented the Perceptron in 1958 it worked on a multilayer feed forward mechanism. Another breakthrough was given by Paul Webs in 1974 when he introduced "backpropagation learning". Today this computer programs ability, is being used to "learn" from newer information to help health care for processing data and representing knowledge. [1]

B. Deep Learning.

Deep learning (DL) is a subset of machine learning in which systems attempt to learn while also building a ladder of recyclable patterns one on top of the other[7]. The blending and piling up of patterns results in a "deep" system that is far more powerful than a simple "shallow" one. The artificial neural network (ANN), a structure made up of many small communicating units known as neurons that have been organised into layers, is a well-known division of DL algorithms. A neural network is made up of an input layer, an output layer, and hidden layers in between. A neural network can have a few hidden layers (shallow neural network) or multiple/many hidden layers (deep neural network. DNN). These layers are referred to as hidden because their values are neither predetermined nor visible to the outside world. Their primary goal is to enable the construction of a hierarchy ladder based on information derived from the visible input layer in order to determine the correct value of the visible output layer. The connections form a pattern between neurons that defines the structure of the specific neural network, and the minute tunable strengths of the connections are referred to as the neural network's weights[2].

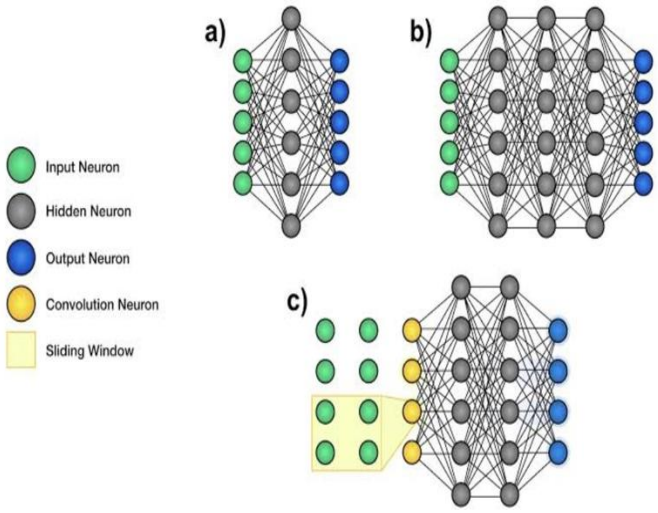

Fig 2: Neural Network

C. Fuzzy Logic:

Fuzzy logic is a branch of AI that identifies and applies the real-world phenomenon that everything is a matter of degree. Rather than assuming that everything is black and white (as conventional logic does), fuzzy logic identifies the majority of the time, in reality, things would be somewhere in the middle. i.e,. different shades of grey[1].

D. Evolutionary Computation:

Evolutionary computation is a general-purpose stochastic global optimization approach based on the universally accepted neo-Darwinian paradigm, which is a combination of classic Darwin's evolutionary theory, Weisman selections, and Mendel genetics[4].

E. Hybrid Intelligent Systems:

This collaborative system aids in the accommodation of common sense, the retrieval of knowledge from new data, and the use of human-like reasoning mechanisms. It handles uncertainty and lack of precision, and learn to adapt to a rapidly changing and unfamiliar environment[1].

F. Clinical Decision Support System (CDSS):

A CDSS is any computer system that is designed to aid in clinical decision making to assist healthcare professionals in making clinical decisions by directing clinical data "most CDSS have four basic components: medical knowledge." **Inference Engine (IE), Knowledge Base (KB) Working Memory and Explanation Module [1].**

G. Scope of Health Care: Medical Diagnosis Steps:

Observations and examination
Devise Diagnosis for the patient.
Physician's Therapeutic Plan

H. In the Achievement of Hemostasis:

Thrombosis can be arterial or deep venous in nature. Al can be a valuable tool in detecting it early on before it worsens. Machine learning has been found to be 86.7 percent accurate when compared to humans, who are 71.3 percent accurate.

III. AI IN DENTISTRY

A. In the Dental Curriculum

With the recent integration of artificial intelligence in intelligent tutoring systems such as the Unified Medical Language System (UMIS), there has been a significant improvement in the quality of feedback provided to the student by the pre clinical virtual patient,

B. In terms of patient care:

Regular appointment synchronisation, reminds the dentist and patients about reviews and check-up appointments. Brings to light any genetic or lifestyle data that indicates an increased susceptibility to dental diseases. Create a database containing any relevant medical history or allergies. Also, patient receives emergency tele-assistance[1].

C. In Radiology:

When used in conjunction with imaging systems such as MRI and CBCT to detect very fine deviations from normalcy, the accuracy rate is approximately 96.6 percent specificity, demonstrating its efficacy. Imaging records from patients can be used to assess and analyse prognosis. Recently. Lee et al. investigated DCNN using a computed assisted diagnosis (CAD) system to detect osteoporosis on panoramic radiographs; accuracy was found to be significantly higher than that of trained radiologists[1]. Personal Identification System Based on Meta Heuristics Using Dental Panoramic Radiographs. The algorithm was discovered to have an identification percentage of around 97.7 percent.[1]

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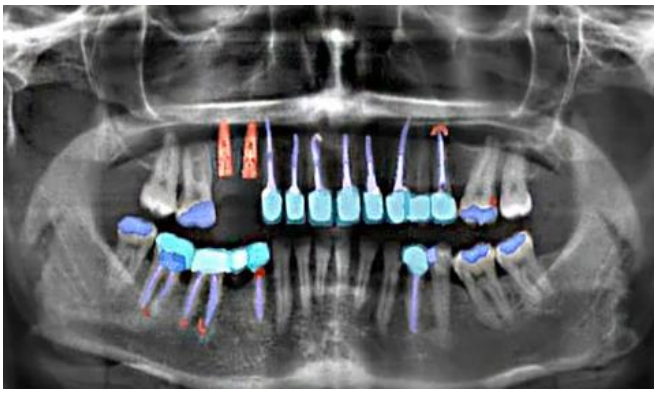

Fig 3

Fig 4

D. In orthodontics:

Planned treatment and diagnosis Customized orthodontic treatment based on Al 3D scans and virtual models are used to detect craniofacial abnormalities. Printed Aligners detect pressure areas, reducing error and providing precise treatment. Cleft lip and palate treatment improves both aesthetics and prognosis. Accuracy of 80-93 percent in determining whether extraction is required or not[1].

E. In Periodontics:

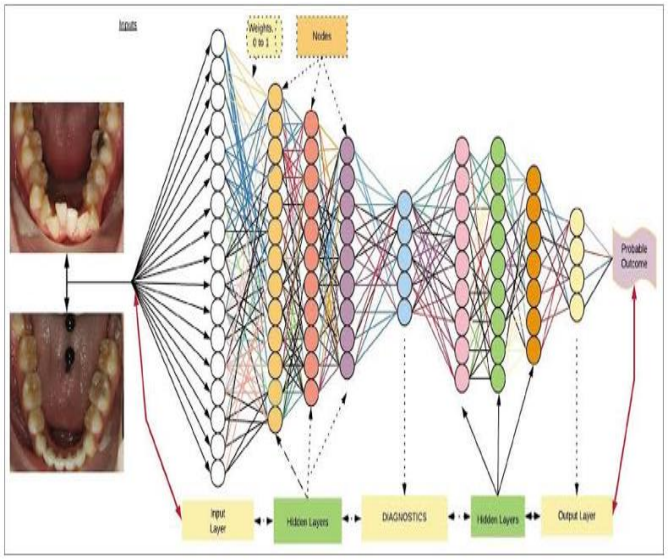

Fig 5

Papantanopoulos and colleagues used an ANN to distinguish between Patients with aggressive periodontitis and chronic periodontitis can be treated with immunology parameters such as leukocytes, interleukins, and IgG antibody titers. In terms of classifying patients as AgP or CP, ANN was 90-98 percent accurate. With 76.6-81 percent accuracy[5]. Multiple non-surgical and surgical methods for treating periodontally compromised teeth (PCT) and their supporting structures have been developed. The decision to extract a periodontitis tooth was made with 73,4-82.8 percent accuracy.[2]

In Endodontics: Cone-beam computed tomography (CBCT) has become the gold standard for reducing treatment failures due to morphological differences and improving clinical outcomes of endodontic therapy. However, because of the higher radiation dose compared to conventional radiographs, CBCT is not widely used. This is something that Al can help with.[2]

F. Advantages

- Improved accessibility.
- More rapid diagnosis Faster and less expensive.
- Effective and one-of-a-kind surgical assistance support.
- Human abilities and mental health have improved.
- Digitization and consolidation of data.
- Renew Regulations.
- Tasks are completed without effort, which saves time.
- Decisions can be made more logically and easily without the involvement of human emotions, which results in a correct diagnosis.
- Procedures are standardised.
- Human intervention is reduced.

G. Disadvantages

- Complex mechanism.
- It is very expensive to set up.
- Because large amounts of data are required for training and precision, it is difficult to obtain accuracy in rare diseases or conditions.

IV. CONCLUSION

Al has advanced dramatically in a variety of clinical applications, including medical and dental imaging, which allows for a wide range of artificial intelligence applications. These systems add significant value to healthcare by improving diagnostic precision, clinical decision-making, and treatment and prognosis prediction, all of which help clinicians provide the best possible care to their patients. The architecture of an intelligent algorithm is critical in allowing Al to perform multiple tasks that require human intelligence. In order to create an efficient algorithm, computer systems are loaded with structured data, which allows for better understanding and performance. Algorithm flaws by clinicians and programmers are the key to triumphant programmes, increasing the efficiency and precision of Al in healthcare practises.

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