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APPLICATIONS/ USE AND OVERVIEW OF ARTIFICIAL INTELLIGENCE IN HEALTHCARE

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ABSTRACT

When artificial intelligence is used to forecast, understand, learn, and act on novel relationships between genetic codes or to control surgery-assisting robots, it transforms and strengthens current healthcare. It can recognize small patterns that humans would utterly overlook. Artificial intelligence (AI) in healthcare is the subject of a new study. These three developing areas of AI-powered healthcare receive particular attention in this study. These are: AI-led drug development; clinical trials; and patient care. There is evidence to show that pharmaceutical companies are benefiting from AI in healthcare through the acceleration and automation of drug discovery processes. Time-consuming data monitoring methods could be replaced by AI, as well. This suggests that AI-assisted clinical trials are capable of managing large volumes of data and providing extremely accurate outcomes. All patients can benefit from AI technologies that support them at every level. Using clinical intelligence, doctors can help patients improve their quality of life by analyzing medical data.

Keywords: Artificial intelligence, AI-assisted clinical trials, patient care.

INTRODUCTION:

In contrast to human intelligence or that of any other living species, artificial intelligence (AI) refers to the intelligence possessed by computers [1]. "Intelligent agents" can be described as any agent or technology that is able to sense and understand its environment and take appropriate action in order to maximize its chances of attaining its goals, which is also known as AI. Machines that can mimic human minds in learning and analysis, and so solve problems, fall under the umbrella of artificial intelligence (AI) [2]. Machine learning is another name for this type of intelligence (ML).

Software and hardware are typically part of an AI system. Algorithms are at the heart of AI from a technical standpoint. Conceptually, an artificial neural network (ANN) can be used to implement AI algorithms. Neural networks with weighted communication channels replicate the structure of the human brain in this way. One neuron can respond to many stimuli from its Neighbours, and the entire network can change its state based on different environmental inputs [3]. This allows the neural network (NN) to respond to external inputs in the same way that the human brain responds to a variety of stimuli. It is common for NNs to be layered structures of many types. Researchers have developed NNs that can perform both supervised and unsupervised learning, where the task is to learn from test data that has not been labelled, classified, or categorized, in order to identify common features in the data and, rather than responding to system feedback, to react based on the existence or absence of these common features identified in the data. For NNs to function like the human brain and learn, more layers of neurons have been added to the network as computing power has increased [4]. Aside from that, the NN can contain additional functions, such as integrating feature extraction and classification algorithms into a single "deep learning" network.

Due to advances in AI software and technology, AI is now being used in a wide range of technical domains, including the Internet of Things (IoT), machine vision (MachV), autonomous driving (ADAS), natural language processing (NLP), and robotics [5]. Researchers in the biomedical areas have been aggressively applying AI to aid enhance analysis and treatment outcomes and, as a result, raise the overall efficiency of the healthcare business. The increase in interest is clear, especially in the past five years, and it is expected to continue in the future. AI's potential to improve biomedical research was predicted a few decades ago. Indeed, a number of studies have been done on the use of artificial intelligence (AI) in biomedical engineering. AI and its biomedical applications have made recent strides forward [6].

AI FOR DRUG DISCOVERY:

In the pharmaceutical industry, artificial intelligence (AI) has helped speed up the discovery of new drugs. Automated target identification is the opposite of this. The analysis of off-target chemicals using AI in healthcare 2021 also helps in the repurposing of medications. As a result, AI drug discovery streamlines and reduces repetitive work in the AI and healthcare industries.

Leading biopharmaceutical companies have developed a number of treatments that are now available. Immuno-oncology medicines are being discovered with the aid of IBM Watson, a machine learning system. Pharma giant Sanofi has decided to use an artificial intelligence (AI) system developed by Ex Scientia, while Roche subsidiary Genentech is using an AI system developed by GNS Healthcare in Massachusetts to hunt for cancer medicines [7, 8]. Every large biopharmaceutical business has similar partnerships or programmes on its own, whether they are external or internal.

A new era of medication discovery that is faster, cheaper, and more effective could be brought about by the use of AI and machine learning. The majority of professionals believe these technologies will become even more important in the future, however others remain suspicious. Because of this shift, scientists now confront both challenges and opportunities, especially when new methodologies are used in conjunction with automation [9].

AI FOR CLINICAL TRIAL:

In order to ensure the efficacy and safety of new treatments, "linear and sequential" clinical trials remain the gold standard in clinical research. Randomized controlled trials (RCTs) are a long-established approach for evaluating mass-produced medications that has remained mostly unaltered for decades [10].

Shortening clinical trial cycle times and increasing productivity and clinical development outcomes can be achieved through the use of artificial intelligence (AI). Third in a series of publications on the impact of artificial intelligence on the biopharmaceutical supply chain.

Increasing volumes of scientific and research information have been able to be obtained from a variety of sources in recent years, which is known as real-world data (RWD). While this data has been useful, they have often lacked the necessary skills and tools to make it work. To unlock RWD, predictive AI models and advanced analytics can help researchers better understand diseases, identify patients and essential researchers, and plan breakthrough clinical studies [11].

Other than the sharing of data, there are currently very few projects that include the trading of trained AI models for any of the potential applications. There are a number of challenges that must be surmounted, including the following: constraints imposed by one-of-a-kind computational, design, and infrastructural requirements; a lack of documenting; problems with verification and interpretability; and legal concerns regarding confidentiality and intellectual property. The sharing of artificial intelligence models that have already been trained and validated could help solutions adapt more quickly to varying circumstances. Examples of algorithms that could be broadly useful include those that can diagnose illnesses based on pictures, forecast patient results, filter misinformation and misinformation based on patterns that are propagated through social media, and distil knowledge graphs from massive collections of scholarly papers.

PATIENT CARE AS HEALTHCARE ROBOTICS:

Patients can receive assistance from both human medical professionals and specific types of medical robots. Robot exoskeletons, for instance, can help paralyzed individuals regain their mobility and independence by enabling them to walk again. Another application of technology is a "smart prosthesis," which can replace missing body parts. These bionic limbs have the option of being covered in bionic skin and having a connection made to the user's muscles. As a result of the sensors that are attached to them, they are able to be more responsive and accurate than natural body parts. Both

rehabilitation and surgery can benefit from the assistance of robots. For instance, Cyberdyne's Hybrid Assistive Limb (HAL) exoskeleton is intended to assist patients in rehabilitating from conditions that lead to lower limb disorders. These conditions include spinal cord injuries and strokes [12]. The HAL exoskeleton uses sensors that are placed on the skin to detect electrical signals in the patient's body in an efficient manner and then responds with movement at the joint.

AI BASED GENETICS DRIVEN MEDICATION:

The modern healthcare consumer is becoming increasingly active in their own individual medical treatment, which can range from the sequencing of genomes to the creation of a personalized health status based on the data collected through fitness and activity trackers. This massive amount of data is currently being collated and linked in order to generate a more accurate picture of our current medical or health status. Data-driven medicine has the ability to not only increase the accuracy and speed with which genetic diseases may be identified, but it also has the potential to pave the way for more individualized approaches to medical treatment.

AI FOR DIAGNOSIS AND TREATMENT DESIGN:

There has been a recent uptick in the healthcare industry's adoption of AI for use in the formulation of treatment strategies for individual patients [13]. AI can create superior strategies for treating patients and monitoring treatment plans by studying data from prior patients. This can be done by analyzing patient data. AI has the ability to spot indicators of a disease more accurately and more quickly than ever before with the assistance of medical imagery such as CT scans, MRI scans, X-rays, and ultrasounds. Patients benefit from a quicker and more accurate diagnosis of their condition, as well as from more targeted therapy options. Recently, the ability of IBM's Watson to concentrate on precision medicine, in particular the diagnosis and treatment of cancer, has received a lot of positive attention in the media. Neural networks, support vector machines, and decision trees, among other forms of AI technology, are currently being employed for the diagnosis of a variety of diseases. However, an artificial neural network (ANN) exhibited more accuracy in identifying diabetes and cardiovascular disease (CVD).

CONCLUSION:

As technology becomes more prominent in modern business and in everyday life, artificial intelligence (AI) is gradually being applied to several aspects of the healthcare industry. It is possible that artificial intelligence may be able to assist medical professionals in a range of settings, including the treatment of patients and the performance of administrative duties. The vast majority of AI and healthcare technologies are helpful in the healthcare market; nonetheless, the methods they assist can vary quite a bit depending on the innovation. Although there are some publications on artificial intelligence in health that claim AI can perform just as well as or better than humans at specific processes, such as diagnosing sickness, it will be a very long time before AI in healthcare is able to replace people for a wide range of medical jobs.

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