

# Innovative Artificial Intelligence: Current And Emerging Applications In Technology And Medicine

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## ABSTRACT:

In contrast to the natural intelligence exhibited by people and other animals, artificial intelligence is intelligence demonstrated by robots. The application of algorithms and software to simulate human cognition when analysing intricate medical data is known as artificial intelligence in the healthcare industry. The important thing is to base medical judgments on the features of each patient rather than the group. Their ability to reveal significant relationships in a data set can be applied in various therapeutic applications, including diagnosis, treatment, drug development, managing medical records, designing treatments, and outcome prediction. Researchers have created software to aid doctors in making decisions without directly consulting specialists as a result of advancements in computer technology.

## Keywords:

Artificial Intelligence, Machine Learning, Personalized Medicine, Biomarkers, Medical Education, Medical Informatics, Wearable Technology, Digital Health, Self-Tracking, Self-Care, Personal Medical Devices

## INTRODUCTION:

Machines can learn and mimic human intelligence thanks to artificial intelligence (AI). AI is a subfield of computer science that can analyse complicated medical data and apply it to patient care, diagnosis, and treatment, as well as predict outcomes in a variety of clinical circumstances. Artificial intelligence, which is rapidly expanding in many areas directly related to health, is used in everything from Siri to self-driving cars to face recognition. The physician struggles to keep up with the most recent advancements in his area and lacks appropriate time to

dedicate to each patient due to our rising expectations for the best quality healthcare and the rapid rise of ever more precise medical knowledge. Most medical choices must be made quickly, using the doctor's unaided judgement because of time constraints.

The creation of AI technologies like the Apple Watch aims to further motivate customers to lead healthier lives. Patients have more control over their health because to wearable AI. You are still receiving the same level of treatment if your wearable alerts you to your diabetes risk and you visit the doctor to have the condition officially diagnosed. In these situations, doctors will be able to make more deliberate decisions more quickly and learn new information from the medical records. Computer tools can assist in retrieving, organising, and restoring medical knowledge that is required by doctor's ability to make decisions, in addition to giving a better, quicker, and more accurate prognosis. For their diagnosis process, monitoring, therapy, and patient care, the Mayo Clinic, Massachusetts General Hospital, Memorial Sloan Kettering Cancer Center, and National Health Service have developed AI algorithms.

Although artificial intelligence is still in its infancy, it cannot yet equal a doctor's level of intelligence and most definitely cannot take the place of a doctor who is physically there. Electronic medical records may be fully utilised with the help of AI, going from being electronic filing cabinets to full-fledged doctors' assistants that can give clinically pertinent, high-quality data in real time. How could this benefit doctors? Doctors can cross-reference the data with the most recent clinical studies using Watson, IBM's artificially intelligent supercomputer. To underscore, clinicians at St. Jude's Medical Center and Vanderbilt University Medical Center in Nashville receive pop-up notifications within certain patients' computerised medical records (EMR). This warning will let clinicians know if a patient has particular genetic characteristics that may make a medicine ineffective for them. Using the With only one click of that pop-up message, the doctor can recommend a different drug that would be better for the patient. Although AI has come a long way, it still can't fully function on its own or think like a person would.

This may be the case, but artificial intelligence has a lot to offer medical professionals and facilities all over the world. To name a few, AI incorporates virtual presence, decreases cost, eliminates human mistake, and offers quick and precise diagnoses. Many infections spread quickly, necessitating prompt treatment to prevent them from getting worse. Systems equipped with artificial intelligence are able to retrieve knowledge that has been stored anywhere in the globe and learn from prior cases.

After years of study, it has been established scientifically that AI diagnoses quickly and accurately. In many cases, doctors have a tendency

to make diagnoses based on their own personal experiences with trauma or on their own feelings. Humans are sensitive and emotional creatures. Additionally, due of these emotional concerns, any stress experienced by the clinician may endanger the patient having the procedure. Despite the fact that people deal with a variety of emotions and scenarios on a daily basis, AI may be the best option for monitoring doctors' judgments and significantly reducing stressful situations.

**Cost minimization is a crucial factor that was also highlighted previously:**

We are all aware that going to the doctor may be highly expensive. AI makes it possible for patients to consult with doctors without physically going to a hospital or clinic, saving both time and money. It has a close relationship with the previous virtual presence, also known as telemedicine. Remote patients can receive assistance from specialists thanks to telemedicine.

Using presence robot, doctors may interact with their team members and patients while they are at work and answer their questions. Computers are becoming more adept at understanding unstructured data, as was previously mentioned. One of the most well-known benefits of personalised medicine is 1) greater pharmaceutical effectiveness because therapies are adapted to each patient's unique characteristics, such as genetic profile. 2) lowering the probability of adverse events by avoiding treatments that have (partially unavoidable) unfavourable side effects but no discernible positive impact on the condition. 3) reduced healthcare expenses as a result of the optimal and successful use of therapies 4) using both molecular and non-molecular indicators for early detection and prevention better illness management with wearable sensors and mobile health apps and 6) More intelligent clinical trial design as a result of the baseline selection of potential responders.

Doctors can use equipment to find things that are simple to miss. The term "wearable technology" refers to these gadgets. These tools aid in monitoring, analysing, and directing their behaviour. Body sensors are incredibly useful for helping patients with posture and rehabilitation, and head-mounted wearable screens can give surgeons information while ensuring sterility during operations. Apple Watches are a significant example of "wearable devices." Apple Watches can detect a wide range of alerts, from an increased heart rate to a decrease in blood oxygenation. The Stanford University Heart Study Project and Apple started working together with the goal of evaluating the efficacy of 6) More intelligent clinical trial design thanks to the choice of likely responders at automated cardiac monitoring utilising the Apple Watch's sensors to detect arrhythmias. The watch's non-invasive nature and lack of the need for a second professional, such as an actual ECG, make a difference (electrocardiogram). The watch can recognise all irregularities and, as a result, determine the likelihood of having a heart abnormality by being worn for a set period of time. The sensors built within the Apple Watch are used to determine heart rate, while photosensitive photodiodes measure blood flow volume.

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## APPLICATIONS IN MEDICINE:

medicine. It has had a big impact on how doctors and other medical professionals are able to treat, communicate with, and evaluate patients. In the sphere of medicine, artificial intelligence has advanced significantly. Currently, diagnostic medical imaging, including radiology, pathology, retinal imaging, dermatology inspection, and endoscopic diagnosis, is the topic of most conversation. There are, of course, more ways to combine these two in order to benefit healthcare. For surgical simulation and computer-based monitoring, one example would be real-time 3D hand tracking utilising a GAN (Generative Adversarial Networks) and convolution neural network (CNN) [1]. According to studies, machine learning is capable of outperforming risk calculators. When estimating the risk of atherosclerotic cardiovascular disease, the typical risk calculator might not be as reliable. The calculator may overestimate the danger in low risk patients, leading to inappropriate therapy, hence it is critical to catch it at the proper moment. By taking this into consideration, they input the data and calculate the outcomes to determine what would be a fantastic result. They first ran it through machine learning (ML) to check how it compared to the calculator before starting the experiment. The final product demonstrated that ML was superior since it could draw from the data that was already there in the system.

Even if the ML suggested less medication therapy even if fewer events were missing [2]. It would also be very helpful to be able to base medical judgments on a person's traits, habits, and other factors. It would enable us to link specific individuals' and their lifestyles to individualised medicine. People are entitled to the means to meet their basic requirements under human rights. This was a topic of discussion in the National Consultative Ethics Committee's conclusion [3].

We are here for the digital innovation in healthcare, where artificial intelligence marks a significant milestone. With the help of technology and health care, we could advance much further. You won't only be able to play games on a tablet. For any rare diseases or potential future issues, you will be able to look further into the health history of your family. In fact, computers will offer a safer method of treatment than the ones we now use. We advance technologically every year in terms of performance, speed, and adaptation. Technology is not performing well in medicine right now since there is still a shortage of clinical practise. Poor predictive models, a lack of comprehension of complex model projections, and a lack of clinical trial validation only serve to highlight the advantages of conventional medical care [4]. One discussion focused

on the advantages of more advanced technologies for individualised medicine.

primarily to show how we might meet our issues in the future. It was argued that in order to improve clinical practise, doctors, patient advocates, regulatory bodies, data scientists, and health insurance organisations must progress computational methodologies. Since we base people on their disease subtype, risk, prognosis, or treatment [4], this is the best course of action.

## The new paradigm for data integration in drug discovery may be provided by developments in AI.

Data integration for drug discovery seeks to facilitate cross-data information to close or enhance knowledge gaps in the medical industry. Through the development programmes for drug discovery, a lot of data about genes/proteins, chemicals, genomes, and other things can be generated. In comparison to how they are currently, pharmaceuticals and clinical phenomena will be able to have a bit more of a clear picture. We can give machines with human-like intelligence and the capacity to learn how to accomplish all of these objectives by utilising AI [5]. Artificial neural networks (ANN) are mathematical models for data processing that can resemble the human brain's neurons in some ways.

The end effect of utilising this would be for the AI to learn how to analyse sensory inputs and make judgments. The quality of medical care and workflow have enormous possibilities. Even some proposals exist to apply AI in cloud-based technologies. This technique will be employed in telemedicine, which is similar to the setting used by GAN and CNN [1]. The difference is that when using the electronic interface, they might be located far away. This might offer assistance to those who may require immediate assistance but are unable to go to a certain location. The AI outperformed a human by 90% and was clearly superior [6]. It is possible to enhance the standard of the examination even for a colonoscopy. At the end of a thin pole-like object was a basic camera. That resulted in the discovery of a polyp and an instantaneous polyp characterization. By having this little black pole in the best position for colonoscopy surveillance.

## DISCUSSION:

Despite the fact that artificial intelligence is still a relatively new idea, there are countless potential applications. Artificial evidence provides medical professionals and patients with a fresh and maybe lifesaving experience unlike any other because of its continued integration into the area of medicine and its constant advancement. Electronic health records are one aspect of modern medicine that artificial intelligence appears to advance (EHRs). A team of researchers and medical students at the Icahn School of Medicine at Mount Sinai worked on the "Deep Patient" project, which aims to push the boundaries of medicine by fusing artificial intelligence with electronic health information. The EHRs they developed had the

potential to give doctors and other medical professionals the capability to detect, diagnose, and unearth fresh insights in connections with suspected patient ailments through its integration with artificial intelligence.

"Deep Patient" was able to remember information, find patterns and connections, and learn new things without being instructed to do so by using deep learning, which simulates neural brain networks [13]. "Deep Patient" provides a quick peek into the medical industry's future, which is still being created but has the potential to save countless lives and support medical professionals in their continued fight to treat patients and combat illness.

The swift development and adoption of artificial intelligence in the dynamic adaptability and simple application of AI software across a variety of medical sectors are primarily responsible for the advancement of the medical community. Artificial intelligence (AI) has the capacity to store, organise, and accurately access knowledge from huge amounts of data and information, which is what makes its application so revolutionary. Since AI systems have virtually infinite memory, they may access a virtually infinite amount of data, including patient histories, medical textbooks, and journals, to create and assist in patient assessments. Although AI systems' memory capabilities are a remarkable and beneficial notion on their own, the truly revolutionary breakthroughs in the use of AIs occur when AI systems' memory capabilities are combined with their capacity for cognitive and intellectual thought. Systems are so proficient at automating data detection and processing that occasionally they transcend the effectiveness of humans, as evidenced in several areas of radiology where AI techniques are highly effective at automatically finding complex patterns in imaging data and creating quantitative evaluations of the radiographic qualities. A revolutionary idea that has the potential to alter the way medicine is done and enable doctors to treat patients more effectively and efficiently, artificial intelligence in the medical field is not only a promising idea.

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