▪ **ISSN-p:** 2791-0245 ▪ **ISSN-e:** 2791-0229 ▪ **DOI:** 10.55737/qjssh.919673681
▪ **Pages:** 1 – 8 ▪ **Vol.** 1, **No.** 1 (2020)

Artificial Intelligence and its Role in Advancement of Health Informatics

QLANTIC JOURNAL OF SOCIAL SCIENCES AND HUMANITIES

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***Abstract*:** *Artificial intelligence overall is an emerging phenomenon. With every evolving age of technology, its use and requirement will change accordingly. Artificial Intelligence, as the name indicates, is two different entities that, in literal meaning, describe the artificially added intelligence. How can we determine if AI systems are biased as a consequence of test datasets or hidden algorithms? Artificial intelligence (AI) in medicine became popular in the 1970s. Norwig and Russell write focusing on the rational agent that acts to get the best outcome." (Russel and Norwig 4) Intelligent robots are simple robots that have been programmed with artificial intelligence software, and this software will someday do surgery without the use of humans.*

Key Words: Artificial Intelligence, Machine Learning, Health Informatics, Health Information Technology

Introduction

Artificial intelligence is the simulation of human intelligence processes by machines, particularly computer systems. AI applications include knowledge-based systems, natural language production, speech synthesis, and computer vision.It is a newly developed program that is widely introduced in the field of computer science that deals with building intelligent machines that can perform tasks that often require human ingenuity. At first it was a great concern if technology was more intelligent than the human mind? They are fast and efficient. But on the other hand there was also the concern that technology requires its operator in order to function properly. AI is different from normal computer. A designer normally builds a computer programme that instructs a computer on how to solve a problem. On the other side, an AI designer designs software that allows a computer to learn to solve problems on its own. Machine learning is a type of artificial intelligence programme. The rising amount of data available for use in sophisticated computer programmes has made AI implementation possible in recent years. By using Machine Learning, we present the machine with a large amount of data that demonstrates what we want it to perform so that it may figure out how to accomplish the goal on its own. To attain this goal, the machine learns and adapts its strategy.

Artificial Neural Networks are stimulated by the activity of brain biological networks (ANNs, some of which are referred to as Deep Learning). ANNs can learn to recognise patterns through the feedback loop, allowing them to learn from their failures and improve their outcomes.

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One of the ways AI is used is through machine learning. The tremendous amount of data available for use on complex computer systems has made AI conceivable in recent years. We give the machine a large number of data samples that illustrate what we want done so it can figure out how to fulfil the goal through Computer Learning. To attain this goal, the machine learns and adapts its strategy. Artificial Neural Networks (ANNs, also known as Deep Learning) are based on the sensory networks of the organic brain. AI solutions are now related to specialised applications like as chess, go, self-driving automobiles, and facial recognition.At the time, AI solutions do not have the same flexibility as humans. They can, however, beat even the most elite player of the day at chess or go. While AI has significant advantages, its use poses some issues. Consider the case below: Who is to blame when something goes wrong with a sophisticated AI system? How can we tell if artificial intelligence systems are skewed by experimental databases or hidden algorithms? What happens if artificial intelligence surpasses human intelligence? 2019 (Hollis et al.)

Practical advice is also provided in the field of health issues. Technology required human involvement. Over time these concerns were addressed in making this technology more sophisticated. Norwig and Russell look at the four main AI methods that have shaped discipline in the past:

1. Human thinking
2. Common sense
3. Human behavior
4. Making good decisions

The first two notions deal with thinking and cognitive processes, whereas the third and fourth concepts deal with behaviour. “All the skills required in the Turing test also allow the agent to work properly. Norwig and Russell wrote focusing on an intelligent agent working to achieve the best result. ” (Russel and Norwig 4)

The Role of Artificial Intelligence in the Medical Field

In the 1970s, artificial intelligence (AI) in medicine became popular. Information-based decision-making systems were among the first AI programmes. Tagged data sets may be the source of the first machine learning algorithms, in which partition rules may be determined. These initial system tasks were successfully completed. However, they have not always been used in real patients. One reason for this was that these programs were not linked to patient health records (EHRs). Another reason was that the systems developed here were rejected because of professional submission as they were represented on the knowledge base of various professional programs. There were many, and a great deal of them appeared to be more than what they seemed to be.

Artificial intelligence as a whole is still a relatively new phenomenon, and its application and demand will alter as technology advances. Medical educators will need a fundamental grasp of AI in terms of learning and teaching, as well as the extent to which it will effect medical education, in order to successfully prepare for AI. The impact of AI on medicine is next explored, as well as the implications for teachers who want to train future doctors and the diligence required while developing AI systems. Although many present EMR systems do not, effective disruptive technologies frequently provide simplification (Christensen and Armstrong, 1998). Physicians must join prominent groups and participate directly in the creation and testing of EMR and AI technology in order to strike a balance between change and continuity in health care.

Changes in the Situation, New Strategies, and Physician Training

Physicians should be educated on at least basic medical information and have a basic understanding of EMR and Artificial Intelligence (AI) design concepts so that they can work closely with designers

to ensure that systems in the health care industry collaborating with artificial intelligence (AI) diagnostic programmes are ethical, medical, and functional. Physicians must learn how to communicate constructively with diagnostic AI and other technologies in order to better fulfil the needs of their patients, and training should begin immediately. Waiting until these programmes are fully operational before beginning training is risky because the learning curve will be severe. Broad concerns such as ethics, duties, agreements, and debt should be addressed in addition to technical instruction.

Communicating with Artificial Intelligence (AI) programs, Physicians should be taught how to provide relevant information in AI programs so that EMRs can compare new data with data within and outside EMR and warn physicians to request additional information in uncertain areas. This is a step-by-step process. Physicians also need to become accustomed to verbal, written, and audio communication, as well as to translate tangible information, suspicions, and intuitions into digital data and how to use data mining technology in clinical settings.

Figure 1: (Dua, 2020)

Providers should also be taught how to interface with AI algorithms that increase "personal" encounters with patients by gathering and storing data, detecting trends and abnormalities, and triggering appropriate organisational responses, all while allowing patients to switch physicians easily. (Master's in 2019)

Counseling sessions should be in-depth, and appropriate exercises should be carried out. Doctors must be better educated. Physicians should be taught how to provide meaningful information to AI algorithms so that EMRs can compare new data to data inside and outside the EMR and urge physicians to request more information in questionable areas. This is a step-by-step procedure. Physicians must also learn to communicate verbally, in writing, and audibly, as well as translate physical data, suspicions, and intuitions into digital data and use data mining technology in clinical settings. er counselling abilities, which are linked to communication abilities. This will become even more significant as AI opens up new medical recommendations, such as advanced medicine.

Robotics

Surgical robots are already looking promising in the evolution of surgery, despite the fact that technology is still in its infancy and is largely man-made. The positive direct impact on health care will be enormous. Smart robots are simple robots designed with artificial intelligence software, and this software will one day operate without the use of humans. These surgical techniques will be

standardised in the near future, and medical schools that do not offer robotic surgery will be left behind.

E-patients

Although this Guide does not cover the idea of e patients (Masters 2017; Masters 2018b), it is crucial to emphasise that AI will have a substantial impact on e patients. Patients will become accustomed to and expect to see doctors who use artificial intelligence, and those who do not will be judged harshly.. Patients will gradually surpass physicians as AI progresses, preferring to communicate with AI programs through speech, portable computers, and computers installed in their homes or in remote areas.

Contribution of Practical Intelligence in the Medical Field

As new AI methods emerge, one is naturally concerned about the level of control we give when considering the level at which new AI approaches are introduced and the need for immediate adoption. In-depth study models of lung cancer diagnoses can improve accuracy, according to a study published in May 2019 by Google and the University of New York, and the discovery immediately made headlines in many newspapers and publications. News about Nature Medicine research seemed to exaggerate the effectiveness of the method in a number of areas (for example, a New York Times article entitled "AI Takes Examination for Lung Cancer. As there are many articles promoting the use of AI to increase understanding of biological processes and therapies) there are also articles that warn about the use of AI methods and unreasonable expectations. Because of these factors, the editors of the International Medical Informatics Association (IMIA) Yearbook have determined that the special theme for 2019 would be "Artificial Intelligence Health: New Opportunities, Challenges, and Real Results," an active group in IMIA. The purpose is to highlight novel capabilities, issues, and existing uses of AI in medicine, including medical services, health care quality, and price.

Artificial Intelligence Used in Health Care

Figure 2: Artificial Intelligence making Healthcare, “Intelligent” | by Vansha Mahajan | NHCT-NanoHealthCare Token | Medium (Mahajan, 2018)

AI has the ability to redesign and improve health care in a variety of ways. It can, for example, assist physicians in developing treatment plans and determining the most appropriate treatment option for a given patient. It can assist physicians in completing repetitive tasks to focus on their important responsibilities. (Team et al., 2019)

Search Through Medical Records

One of the most promising AI healthcare applications is data management. Collecting, storing, customizing, and tracking data is the first step in transforming existing health care systems. It involves creating a natural language processing tool to extract data from automated medical narrative records.

Assist with Repetitive Tasks

AI can help eliminate repetitive tasks that take time away from the important responsibilities of medical professionals. Robots can perform tasks such as x-ray scans, CT scans, test analysis and data entry quickly and accurately. Radiology and cardiology are two areas where examining large amounts of data can be time-consuming, shocking, and stressful.

Therapeutic Design

AI systems are designed to evaluate data, including reports and notes from a patient file, clinical technology, and external research, to help select the best, most personalized treatment for that patient. IBM Watson can help doctors find evidence-based therapy alternatives. Watson Oncology has a sophisticated ability to decipher the meaning and context of organised and unstructured data in clinical notes and reports, which could be critical in choosing the appropriate treatment approach.After capturing notes on patient health, research, and clinical expertise, the algorithm finally finds the most possible treatment options for the patient.

Drug Development

Clinical studies can take more than a decade and cost a lot of money to make drugs. As a result, one of the main purposes of AI implementation is to make the process faster and less expensive.

There is a lot of buzz right now about how artificial intelligence (AI) will change health care. A range of AI technologies are also emerging to assist individuals in streamlining administration and clinics.

Advanced AI Applications

Between 2011 and 2017, 121 health AI and machine learning businesses raised $ 2.7 billion in 206 acquisitions, according to Rock Health. While AI appears to be a vast issue that encompasses everything from health to diagnosis to performance to technology, it is actually fairly narrow, as many health AI solutions specialise in a single task. We calculated the value of ten promising AI applications and discovered that by 2026, they might save the US health-care system $150 billion each year.

We have selected these specific AI applications based on discovery opportunities and annual savings capabilities. We found that AI adds a great deal of value in terms of helping frontline staff to be more productive and simplifying background processes — but not in terms of clinical decisions or improving clinical outcomes. Clinical trials are rare in comparison.

There are a few examples of AI playing a proactive role in health care. AI has proved its ability to improve image analysis efficiency by reporting promptly and accurately on certain perplexing radiologist studies.This type of automatic scan can detect and compare specific lung tumors (chest CT images) between 62 percent and 97 percent faster than a panel of radiologists, according to a 2011 NYU Langone Health researchers. According to the findings, AI-driven picture analysis might save $3 billion each year by allowing radiologists to focus on tests that require more explanation or judgement. In orthopaedic surgery, AI-assisted robots can scan data from early medical records to

physically guide a surgeon's tool in real time during surgery. It could potentially be used to improve infant surgical techniques by analysing data from real-world surgeries. When compared to solo surgeons, the (Mazor Robotics') AI-assisted robotic approach resulted in a fivefold reduction in surgical problems in a study of 379 orthopaedic patients at nine surgical sites. According to a study, when used properly in orthopaedic surgery, AI-assisted robot surgery can reduce hospital stays by 21% due to fewer problems and errors, resulting in a $ 40 billion yearly savings. AI is also being utilised to handle the costly problem of volume errors, which is estimated to save $ 16 billion according to research. A thorough trial in California in 2016 demonstrated that an AI-developed statistical algorithm accurately determined the exact dose of immunosuppressive medications to be administered to organ patients. Dosage errors account for around 37% of all preventable medical errors, and dose determination is typically based on a combination of recommendations and informed assumptions. Although this form of AI technology is still in its early stages, the model is appealing because the precise dosage is critical in ensuring that connectivity is not harmed during organ transplantation. While the use of AI to aid clinical judgement or diagnosis is still in its infancy, some encouraging results are beginning to emerge. A group of Stanford University researchers put an AI algorithm to the test against 21 dermatologists in 2017 to see how well it could diagnose skin problems. According to a research published in Nature last year, clinical findings "reach similar performance with all tested specialists, proving artificial intelligence that can diagnose skin cancer at the level of skill compared to dermatologists." Our findings demonstrate that employing artificial intelligence to make an initial diagnosis before a patient visits the emergency room can save $5 billion per year. Visible AI-assisted nurse aides are also promising in terms of assisting patients. UCSF and the NHS in the United Kingdom, for example, use Sensely's "Molly," an AI nurse avatar, to connect with patients, ask questions about their health, assess their symptoms, and send them to the best medical facility. According to our research, nurses who utilise AI to reduce the amount of time they spend on patient maintenance chores by 20% can save $ 20 billion each year.

Artificial intelligence (AI) has the potential to help the healthcare industry solve costly back issues and inefficiencies. Nonprofit chores account for more than half of a nurse's work (51%) and roughly one-fifth (16%) of a doctor's responsibilities. According to our estimations, these apps might save the industry $ 18 billion each year.

While the AI-enabled cancer screen at Beth Israel Deaconess Medical Center recently garnered headlines, the hospital's first foray into AI was to reduce hospital admission rates and possible screening shows. Machine learning was utilised by Beth Israel Medical Center specialists to design an app that predicts when patients will likely not show up or fall behind in their therapy, allowing them to intervene early. Mistakes and fraud are costly hazards in both health institutions and insurance brokers. Historically, medical application fraud has been discovered by a combination of computer (legal) and manual reviews. It's a time-consuming procedure that relies on the capacity to spot ambiguous facts fast enough after an incident to intervene. Health insurers are experimenting with AI-supported data mining combined with AI-based sensory networks to evaluate Medicare claims for patterns associated to medical payment fraud (duplicating human brain function but much faster). AI might save $ 17 billion a year by merely boosting the speed and accuracy of fraud detection claims in Medicare, according to one estimate. Numerous data breaches, such as WannaCry and Petya, have made cyber security a priority for health-care organisations in recent years, in addition to fraudulent operations. Leaking health-care information is projected to cost $ 380 per patient record. Using AI to monitor and detect suspicious interactions with private data might save $ 2 billion per year by reducing health records infractions (Kalis, Collier, and Fu, 2020)

As AI technology is more common, health care providers will need to invest in those that offer a higher value. The application of AI in clinical decision making is still in its infancy, and it will take

some time for us to catch up. However, AI applications that can provide the most benefits right now (AI-assisted surgery, visual nurses, and management procedures) should be prioritized.

Conclusion

A programmer in AI creates software that allows a machine to learn how to solve a problem on its o wn. Artificial Neural Networks (ANNs, also known as Deep Learning) are modelled after the neura l networks found in the biological brain. ANNs may learn to recognise patterns by employing a fee dback loop to learn from their failures and improve their results. Artificial intelligence has the poten tial to influence the future of public health, community health, and health care delivery on both a hu man and system level. Understanding the options and concerns can help developers and policymake rs plan better and educate themselves, as well as benefit the overall welfare of health care consumer s and the broader public.

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