AI and it is importance in health and preventive field

Youssef Hossam Abdelmoniem Metwali
Youssefhossam1904@gmail.com
01159681440

A brief history of artificial intelligence and its applications in medicine

- The field originated in the mid-1950s largely within computer science but with important influences from philosophy, mathematics, economics, cognitive science, and neuroscience. Researchers' early focus was on symbolic reasoning: building high-level representations of problems to mimic, to some extent, human thinking. These systems rely largely on hard-coded rules designed by human experts to address a defined, circumscribed problem. An example of a very popular expert system widely used today is electronic tax preparation software. The designers of these systems have hardcoded countries' or states' entire Tax Laws into their software. The program asks users a series of simple questions and follows a long list of if-then statements to calculate how much tax is owed

Health data sources and types

- What features that is types of data are useful for AI in medicine? All health-related data are potentially useful. This includes demographic data, past medical history, family history , social history, clinical examination, laboratory tests, genomic data, imaging, and histopathology, along with lifestyle information, such as nutrition and exercise. Increasingly, mobile, and wearable technology is proving to be a rich and valuable source of health data Crucially, connected devices such as smartphones and watches can be used both to monitor health (e.g., heart rate and rhythm) and to promote healthy behavior, for example, by setting exercise goals

. Patient harm due to AI errors

• Despite continuous advances in data availability and machine learning, AI-guided clinical solutions in healthcare may be associated with failures that could potentially result in safety concerns for the end-users of healthcare services (Challen et al., 2019; Ellahham et al., 2020). These AI algorithm errors can lead, for example, to (1) false negatives in the form of missed diagnoses of life-threatening diseases, (2) unnecessary treatments due to false positives (healthy persons incorrectly classified as diseased by the AI algorithm), (3) unsuitable interventions due to imprecise diagnosis, or incorrect prioritization of interventions in emergency departments

Risk prediction

- Risk prediction focuses on assessing the likelihood of individuals experiencing a specific health condition or outcome. It typically generates probabilities for various outcomes ranging from death to adverse disease events (e.g. stroke, myocardial infarction, bone fracture). The process involves identifying individuals with certain diseases or conditions and their classification according to stage, severity, and other characteristics.). Risk prediction models have long been available in healthcare. However, these are based on regression analysis and subsets of available clinical data, resulting in limited prediction accuracy, rendering them less valuable in the clinical setting.

Artificial Intelligence in COVID-19: Medical Imaging

- At present, the nucleic acid test is a widely used diagnostic method, and due to the exponential increase in cases, there is a shortage of testing kits. To overcome the shortage of reagents, it is required to execute a possible alternative to classify infected people. Clinical examinations showed that the majority of the COVID-19-infected people are suffering from lung infection. The most effective way to determine lung infections is either by CT scan or X-ray. As the total number of infections is increasing exponentially, physical severity evaluation is getting laborious and leading toward delayed diagnosis.

Textual Analysis and Virtual Assistants:

- In the globalization era, misinformation is considered a similar threat to viruses can intervene in health strategies, and can cause dangerous consequences. al. used ML models to quantify the online discussions of antivaccination groups and the spread of misinformation. A latent dialect allocation (LDA) is used to identify the conversations around vaccines and provide a solid foundation to trace out online misinformation without human intervention. As the current pandemic progresses day by day, several countries have started dedicated hotline numbers to pre-screen COVID-19 infections.

Drug Discovery

- Several researchers are now attempting to find a new mixture targeting COVID-19. In, different models were developed to compile protein structures, ligands, and the nature of protein molecules as model inputs. Each input feature is further processed through advanced deep learning (DL) algorithms like generative autoencoders

AI for Cancer Research

- Since the field's inception, experts have predicted the potential of highly tailored oncology care employing AI technologies. This promise is being realized due to cumulative advancements in the sciences, including the improvement of ML and deeplearning (DL) algorithms, the expansion of the breadth and variety of databases, including multi-omics, and the decline in the price of massively parallelized computing power. Fuzzy logic and neural networks are the two main methods used by AI to mimic human intelligence. In contrast to fuzzy-logic models, the results of neural network models are very difficult to interpret and are referred to as "black box" models. While the data-driven AI (DAI) paradigm is guided by data, the symbolic AI (SAI) paradigm is guided by human-domain expertise.

AI for Cancer Diagnosis

- The NYU Langone's Perlmutter Cancer Center started using its AI classifier for cancer diagnosis in October 2019. This classifier can help pathologists in diagnosing cancer more accurately, reducing hospital error rates. The AI-based cancer classifiers, in general, can recognize patterns that are too subtle for the human eyes to detect. This will help physicians to perform targeted cancer therapies for patients with improved outcomes. The classifiers are normally trained using thousands of cancer samples, which could be much more than a single pathologist can see in a lifetime. Moreover, the machines will be consistent and will not be affected by inter-reader variability.

Thanks and appreciation to the organizing committee of the conference in Beni Suef