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EDITORIAL

RISE OF ARTIFICIAL INTELLIGENCE IN LABORATORY MEDICINE

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Artificial Intelligence (AI) is a science dealing with machines to find a solution to complex problems in a more human like fashion. It utilizes knowledge of human intelligence and applying them as algorithms in a set of information technology.

The present-day emerging concept of medical Artificial Intelligence (AI) is linked to the system of information technology intended to help clinicians formulate diagnosis, that have been aided by the increasing availability of healthcare data and rapid progress in optimally upgraded analytical techniques in the diagnostics. AI techniques employs machine learning methods for structured data, that includes classical support vector machines and neural networks, fuzzy expert systems, hybrid intelligent systems, evolutionary computation, modern deep learning (DL), and natural language processing for unstructured data.[1] The installments of the upgraded and intelligent medical technologies have marked the emergence of augmented medicine. The digital modalities such as surgical navigation systems for computer-assisted surgery, and virtuality-reality continuum tools for surgery, pain management, and psychotic diseases, are also enabling augmented medicine.

AI mimics human cognitive functions that tend to bring a paradigm shift to healthcare, augmented by the increasing availability of healthcare data and rapid progression of analytical techniques. AI incorporates machine learning methods for the structured data, that is applicable in various sector of healthcare management.[2] The point AI focuses is on the disease diagnosis and the therapy. AI is a process of acquiring structure data followed by its interpretation and learning to achieve the desired outcomes.[3]

In laboratory medicine, AI bears the ability to transform present diagnostic, disease preventive and control techniques, that helps improve patient safety and treatment quality. To gain an optimum workflow and personnel utilization, laboratories now employ software to automate sample, operate and the final outcome management. Predetermined rule-bases auto verification, for instance, compares patient outcomes to many factors in order to validate and expedite reporting or reactive actions. The recent COVID-19 has served as a catalyst for AI and innovation. The use of AI was crucial in infectious disease management as well as its current deployment in the COVID-19 pandemic, that helped in reducing time, cost and human effort, together with providing efficient and dependable solutions in the pandemic.[4]

There has been the data of AI implementation in COVID-19 pandemics for treatment surveillance, that automatically predicted virus spread, information regarding diseased individuals and keeping public informed about the situation. Another implementation of AI in the COVID-19 pandemic is treatment surveillance, which allows for automatic prediction of virus spread, diseased individuals and alarm the public about the pandemic situation as well as contact tracing of individuals by identifying “hot spots” to trace the infection and predict the future course and chances of remission.[5] AL have also been utilized in the creation of vaccines and medications by speeding up drug development methodologies, diagnosing processes and clinical trial management.[6] The building of Real World Data into Real World Evidence is important in the frameworks of Digital Health and Personalized medicine, especially with the wide availability of modern algorithms of AI high computing power and large storage capacity.[7]

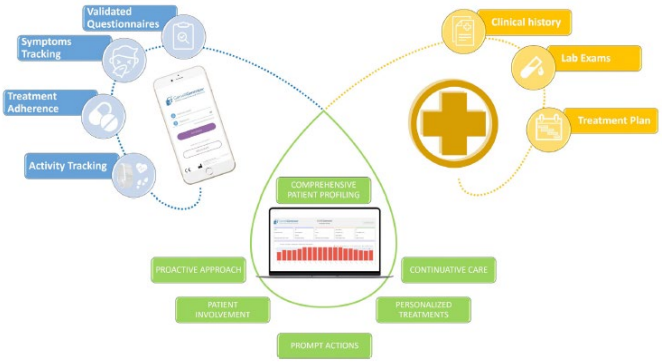

Figure 1: Example of the integration of heterogeneous data with the aim of offering innovative and more efficient patient services through the use of digital tools.[7]

The auto-machine learning, reinforcement learning, and synthetic data creation and usage of the data science are starting to complement the traditional approaches of healthcare and will help expediting the adoption process of the various machine learning tasks within our healthcare space. However, this framework has unique challenges, such as data drift (input data changes over time), eventually becoming significantly different from the model's original training and validation data. Thus, it requires the active or continuous learning approaches and update which will allow the model to continue to adapt and improve over time.[8] A new concept of clinical laboratory omics (Clinlabomics)have been proposed by combining clinical laboratory medicine and AI. Clinlabomics uses high-throughput methods to extract large amounts of feature data from blood, body fluids, secretions, excreta, and cast clinical laboratory test data and using them in the data statistics, machine learning, and other methods to read more undiscovered information.[9]

We can emphasize on the point that technical innovation in healthcare is tremendously accelerating and has become increasingly inter-related into both the daily lives and medical practice, such as diagnostic algorithms. The use of AI will help the ability to increase not only the sensitivity and accuracy of diagnoses, but also the turn around time and outcome projection of the health issues.

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