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ARTIFICIAL INTELLIGENCE TECHNOLOGY ROLE IN THE PATHOLOGY (AP, CP) INDUSTRY

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ABSTRACT

To combat and anticipate the emergence of new diseases, healthcare delivery needs to be supported by cutting-edge technologies like artificial intelligence (AI), the internet of things (IoT), big data, and machine learning. We want to examine how AI can be a key technology in the analysis, prevention, and combat of COVID-19 (the coronavirus) and other pandemics. The literature is quickly reviewed using the keywords COVID-19 or Coronavirus and Artificial Intelligence or AI in the databases of Pubmed, Scopus, and Google Scholar. gathered the most recent data on AI for COVID-19, examined it, and determined how it might be used to treat this illness. For the COVID-19 pandemic, we have identified seven important applications of AI. By gathering and analyzing all prior data, this technology is crucial in identifying the cluster of cases and predicting the future spread of the virus. Decision-making technologies are urgently needed by healthcare organizations to manage this virus and assist them in receiving appropriate recommendations in real-time to stop its spread. Artificial intelligence (AI) effectively imitates human intelligence. Additionally, it might be extremely important for comprehending and recommending the creation of a COVID-19 vaccine. In order to properly screen, analyze, predict, and track both current patients and likely future patients, result-driven technology is used. The important applications track data on confirmed, recovered, and death cases.

INTRODUCTION

The medical sector is searching for new technologies to monitor and control the COVID-19 (Coronavirus) pandemic's spread during this current global health crisis. One such piece of technology that makes it simple to monitor the spread of a virus, identify patients at high risk, and use real-time infection control is artificial intelligence (AI). By carefully examining the patients' prior data, it can also predict the likelihood of mortality. AI can aid in the fight against this virus by providing population screening, medical assistance, alerts, and infection control advice.[1], [2], [3] Being an evidence-based medical tool, this technology has the potential to enhance the COVID-19 patient's planning, treatment, and reported outcomes. The general process of AI- and non-AI-based applications that assist general practitioners in recognizing the COVID-19 symptoms is shown in Fig. 1.

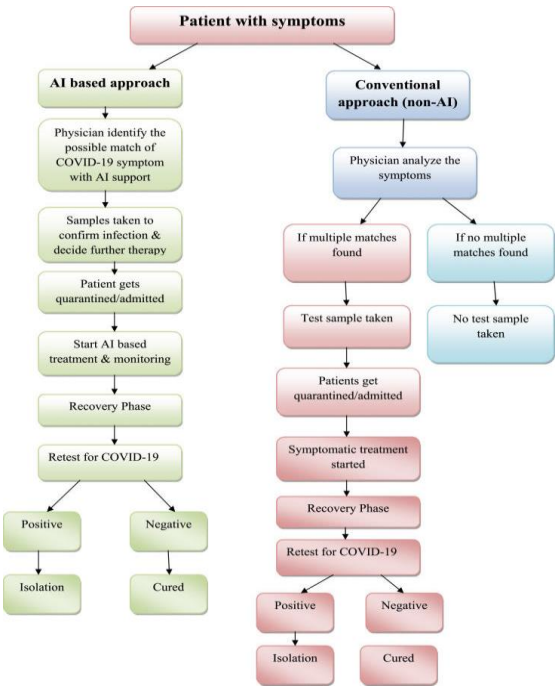

Fig. 1: General procedure of AI and non-AI based applications that help general physicians to identify the COVID-19 symptoms.

The flow of minimal non-AI treatment and AI-based treatment is explained and contrasted in the flow diagram above. The flow diagram above explains how AI is used in key treatment steps to increase accuracy, decrease complexity, and shorten treatment times. The doctor is not only concerned with treating the patient, but also with using AI to control disease. The highest level of accuracy is achieved with the aid of AI when analyzing major symptoms and test results. Additionally, it demonstrates that fewer steps are taken overall, making the process more naturally attainable.

APPLICATIONS OF AI IN COVID-19 PANDEMIC

Early detection and diagnosis of the infection

AI is able to quickly identify unusual symptoms and other "red flags," alarming both patients and healthcare authorities.[4,5] Faster, more economical decision-making is facilitated by it. Through practical algorithms, it aids in the development of a new diagnosis and management system for the COVID 19 cases. Medical imaging technologies such as computed tomography (CT) and magnetic resonance imaging (MRI) scans of human body parts are useful in using AI to diagnose infected cases.

Monitoring of treatment

AI can create a smart platform for the automatic tracking and foreseeing of this virus's spread. The visual characteristics of this disease can also be extracted using a neural network, which will aid in the proper monitoring and care of those who are afflicted.[6], [7], [8] It is able to provide daily updates on the patients' conditions as well as guidelines for dealing with the COVID-19 pandemic.

Contract tracing of the individuals

By locating clusters and "hot spots" and analyzing the virus's level of infection, artificial intelligence (AI) can successfully track down contacts for individuals and keep an eye on them. It is able to predict the progression of this illness and its likelihood of recurrence.

Projection of cases and mortality

Utilizing data from social media and other media platforms about the dangers of infection and the likelihood of its spread, this technology can monitor and predict the characteristics of the virus. It can also forecast the number of positive cases and fatalities in any area. AI can assist in identifying the most vulnerable nations, populations, and regions so that appropriate measures can be taken.

Development of drugs and vaccines

By examining the COVID-19 data that is currently available, AI is used for drug research. Designing and developing drug delivery systems can benefit from it. When compared to standard testing, which takes a long time, this technology helps to significantly speed up the process, which may not be possible for a human to do.[6,7] It can aid in the discovery of effective medications for the treatment of COVID-19 patients. It has developed into a potent tool for designing diagnostic tests and developing vaccines.[9], [10], [11] AI is helpful for clinical trials during the development of the vaccine and speeds up the process of developing vaccines and treatments.

Reducing the workload of healthcare workers

Healthcare workers have a very heavy workload as a result of a sudden and significant increase in the number of patients during the COVID-19 pandemic. AI is used in this instance to lighten the workload of healthcare workers.[12], [13], [14], [15], [16], [17] It provides the best training to students and doctors regarding this new disease and aids in early diagnosis and early treatment using digital approaches and decision science.[18,19] AI can improve patient care in the future and address more potential problems, which will lighten the load on doctors.

Prevention of the disease

AI can provide up-to-date information that is useful in the prevention of this disease with the aid of real-time data analysis. During this crisis, it can be used to forecast the likely sites of infection, the spread of the virus, and the demand for beds and medical personnel. With the aid of older mentored data over more recent data, AI is useful for preventing future viruses and diseases. It pinpoints characteristics, root causes, and mechanisms underlying infection spread. This technology will be crucial in the future to combating other pandemics and epidemics. It can fight many other diseases and act as a preventive measure. Future healthcare will be more predictive and preventive thanks in large part to artificial intelligence (AI).

AL APPLICATION IN CLINICAL CHEMISTRY(AP)

Benefits

Eliminating managerial guesswork in staffing resource adjustments is one of embedded AI's main operational benefits. Real-time patterns can be revealed by computational analysis of monthly, quarterly, or annual test volume down to the literal second. A predictive and prescriptive staffing model can then be made easier with the help of this data. By comparing past purchases and stock levels to usage patterns over time, artificial intelligence (AI) can also aid in the optimization of reagent material inventory. AI might also take into account trends in supplier reagent availability, customer feedback, technical bulletins, and recalls.

Predictive modeling and equipment monitoring are two more operational uses of AI that can save time and money by lowering the likelihood of equipment failure and downtime. The use of artificial intelligence (AI) in biohazardous material waste management is currently underway. Smart waste bins that combine robotics, computer vision, and machine learning are designed to precisely and efficiently sort waste at the point of disposal.[20] Observing success in these external markets makes sense; the industry partners of the clinical laboratory will likely take notice and try to profit.

Challenges to Implementation

In general, the heaviest lifting for clinical chemistry and immunology practitioners originates within the areas of quality control, specimen integrity, and result interpretation. And heretofore, ethical concerns have been raised that AI may only serve to automate inaccuracy in these modalities due to their underlying complexities.[21] As such, creating AI applications that satisfy rigorous methodological scrutiny in these areas would necessitate deep-learning systems, such as deep neural networks (DNNs), which are capable of weighing decision making variables. However, this technology remains in a growth state requiring esoteric knowledge and training, and it often incorporates proprietary "black box" algorithms.

CONCLUSION

As external AI applications continue to improve, it is imperative for laboratory professionals to gain transparency when enterprise AI tools are being considered and actively participate in the validation process. Soon, the clinical laboratory may be the entity informing stakeholders of built-in AI technology on instrumentation instead of the current ad-hoc environment. Regardless, laboratory subject matter expertise is necessary for safe and ethical AI integration. Thus, laboratory leaders should make every effort to learn about AI advancements involving their division.

Furthermore, artificial intelligence (AI) is a new and effective tool for detecting early coronavirus infections and for keeping track of the condition of patients who have been exposed to the virus. By creating useful algorithms, AI can significantly enhance treatment consistency and decision-making. AI is useful for both the proper health monitoring of COVID-19-infected patients as well as their treatment. It can monitor the COVID-19 crisis at various scales, including those used in medical, molecular, and epidemiological applications. Utilizing data analysis to speed up the research on this virus is also beneficial, as AI can aid in the creation of effective treatment plans, prevention measures, and pharmaceuticals and vaccines. The examples listed in this article present a subset of those with clinical chemistry and immunology impacts to encourage readers to explore the literature.

KEYWORDS

- **Artificial Intelligence (AI):** the development of computer systems and software to be able to perform tasks that normally would require human intelligence, such as speech recognition, decision-making and translating between languages.
- **AI Applications: i**nclude speech recognition, language processing, vision and other cognitive skills.
- **COVID-19:** an infectious disease caused by the SARS-CoV-2 virus.
- **Coronavirus:** a type of virus. There are many kinds, and some may cause disease. COVID-19 (a coronavirus identified in 2019) is an example.
- **Pandemic:** a widespread occurrence of an infectious disease over a certain region, country or the world, occurring at a particular time.

DECLARATION OF COMPETEING INTEREST

None.

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