RESEARCH PAPER ON ARTIFICIAL INTELLIGENCE-APPLICATIONS FOR COVID-19

Ankit Bansal, Monika Sharma
Assistant Professor, Chandigarh group of colleges, Landran
Assistant Professor, Chandigarh group of colleges, Landran

Abstract:- AI techniques can be used to create new ideas in three ways: by producing novel combinations of familiar ideas; by exploring the potential of conceptual spaces; and by making transformations that enable the generation of previously impossible ideas. For diagnosis of coronavirus disease 2019 (COVID-19), a SARS-CoV-2 virus-specific reverse transcriptase polymerase chain reaction (RT–PCR) test is routinely used. this test can take up to 2 d to complete, serial testing may be required to rule out the possibility of false negative results and there is currently a shortage of RT–PCR test kits, underscoring the urgent need for alternative methods for rapid and accurate diagnosis of patients with COVID-19. Chest computed tomography (CT) is a valuable component in the evaluation of patients with suspected SARS-CoV-2 infection. In this study, we used artificial intelligence (AI) algorithms to integrate chest CT findings with clinical symptoms, exposure history and laboratory testing to rapidly diagnose patients who are positive for COVID-19. The AI system also improved the detection of patients who were positive for COVID-19 via RT–PCR who presented with normal CT scans, correctly identifying 17 of 25 (68%) patients, whereas radiologists classified all of these patients as COVID-19 negative. When CT scans and associated clinical history are available, the proposed AI system can help to rapidly diagnose COVID-19 patients.

Keywords *- Artificial Intelligence (AI), AI Applications, COVID-19, Coronavirus Pandemic*

1. INTRODCUTION

In this worldwide health [18] crisis, the medical industry is looking for new technologies to monitor and controls the spread of COVID-19 (Coronavirus) pandemic. AI is one of such technology which can easily track the spread [17] of this virus, identifies the high-risk patients, and is useful in controlling this infection in real-time. It can also predict mortality risk by adequately analyzing the previous data of the patients. AI can help us to fight this virus by population screening,[15] medical help, notification, and suggestions about the infection control. This technology has the potential to improve the planning, treatment and reported outcomes of the COVID-19 patient, being an evidence-based medical tool.

Healthcare delivery requires the support of new technologies like [5,4]Artificial Intelligence (AI), Internet of Things (IoT), Big Data and Machine Learning to fight and look ahead [3]against the new diseases. We aim to review the role of AI as a decisive technology to analyze, prepare us for prevention and fight with COVID-19 (Coronavirus) and other[12] pandemics. A quick-to-be-identified cure for the disease will be a therapeutic medicine that has prior use experiences in patients in order to resolve the current pandemic situation before it could [16] become worsening. Artificial intelligence (AI) technology is hereby applied to identify the marketed drugs with potential for treating COVID-19.

Fig. 1 shows the general procedure of AI and non-AI based applications that help general physicians to identify the COVID-19 symptoms. The below [13] flow diagram informs and compares the flow of minimal non-AI treatment versus AI-based treatment.

The above flow diagram explains the involvement of AI in the significant[14] steps of treatment of high accuracy and reduces complexity and time taken. The physician is not only focused on the treatment of the patient, but also the control [2]of disease with the AI application. Major symptoms and test analysis are done with the help of AI with the highest of accuracy. It also shows it reduces the total [1] number of steps taken in the whole process, making more procurable in nature.

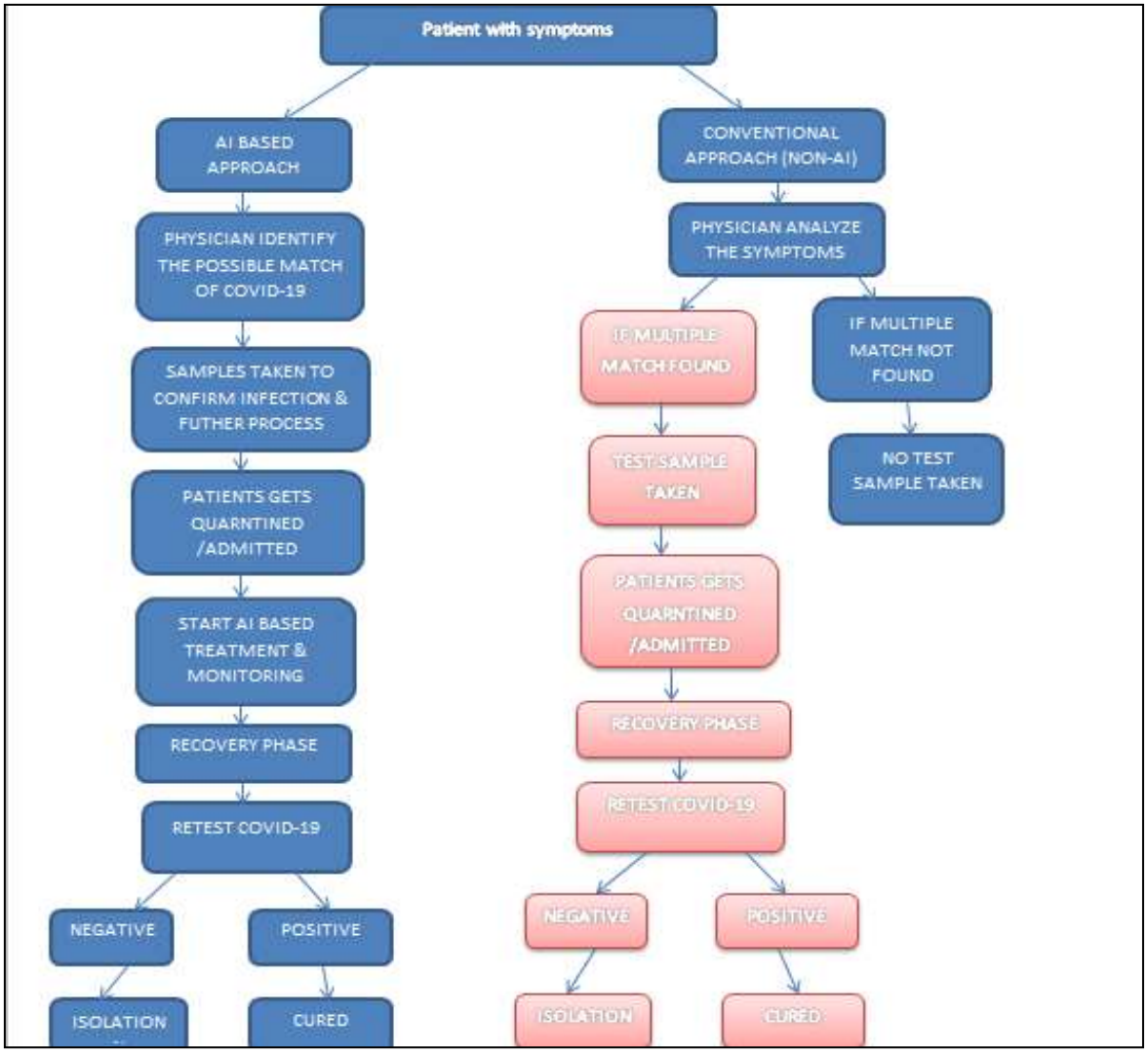

Fig.1. General procedure of AI and non-AI based applications that help general physicians to identify the COVID - 19 symptom

2. HIGHLIGHTS

• Artificial Intelligence (AI) is an[11] innovative technology which is helpful to fight the COVID-19 pandemic.
• This technology is helpful for proper screening, tracking and predicting the current [10,9,8] and future patients.
• The major applications of this AI are for early detection and diagnosis of the infection.
• AI is used for the development [7,6]of drugs and vaccines, and the reduction of workload of healthcare workers.

3. MAIN APPLICATIONS OF AI IN COVID-19 PANDEMIC

1. Early detection and diagnosis of the infection
Can quickly analyze irregular symptom and other 'red flags' and thus alarm the patients and the healthcare authorities. It helps to provide faster decision making, which is cost-effective. It helps to develop a new diagnosis and management system for

the COVID 19 cases, through useful algorithms. AI is helpful in the diagnosis of the infected cases with the help of medical imaging technologies like Computed tomography (CT), Magnetic resonance imaging (MRI) scan of human body parts.

2**. Monitoring the treatment**
AI can build an intelligent platform for automatic monitoring and prediction of the spread of this virus. A neural network can also be developed to extract the visual features of this disease, and this would help in proper monitoring and treatment of the affected individuals. It has the capability of providing day-to-day updates of the patients and also to provide solutions to be followed in COVID-19 pandemic.

3. Contact tracing of the individuals
AI can help analyze the level of infection by this virus identifying the clusters and 'hot spots' and can successfully do the contact tracing of the individuals and also to monitor them. It can predict the future course of this disease and likely reappearance.

4. Projection of cases and mortality
This technology can track and forecast the nature of the virus from the available data, social media and media platforms, about the risks of the infection and its likely spread. Further, it can predict the number of positive cases and death in any region. AI can help identify the most vulnerable regions, people and countries and take measures accordingly.

5. Development of drugs and vaccines:
AI is used for drug research by analyzing the available data on COVID-19. It is useful for drug delivery design and development. This technology is used in speeding up drug testing in real-time, where standard testing takes plenty of time and hence helps to accelerate this process significantly, which may not be possible by a human . It can help to identify useful drugs for the treatment of COVID-19 patients. It has become a powerful tool for diagnostic test designs and vaccination development. AI helps in developing vaccines and treatments at much of faster rate than usual and is also helpful for clinical trials during the development of the vaccine.

6. Reducing the workload of healthcare workers
Due to a sudden and massive increase in the numbers of patients during COVID-19 pandemic, healthcare professionals have a very high workload. Here, AI is used to reduce the workload of healthcare workers. It helps in early diagnosis and providing treatment at an early stage using digital approaches and decision science, offers the best training to students and doctors regarding this new disease. AI can impact future patient care and address more potential challenges which reduce the workload of the doctors.

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4. ARTIFICIAL INTELLIGENCE IS HELPING THE FIGHT AGAINST COVID-19

The Artificial Intelligence (AI) tool has been shown to accurately predict which patients that have been newly infected with the COVID-19 virus would go on to develop severe respiratory disease.

A) Identifying vulnerable patients with AI
The study has revealed the best indicators of future severity and found that they were not as expected. Corresponding author Megan Coffee, clinical assistant professor in the Division of Infectious Disease & Immunology at NYU Grossman School of Medicine, said: "While work remains to further validate our model, it holds promise as another tool to predict the patients most vulnerable to the virus, but only in support of physicians' hard-won clinical experience in treating viral infections". "Our goal was to design and deploy a decision-support tool using AI capabilities – mostly predictive analytics – to flag future clinical coronavirus severity," says co-author Anasse Bari, PhD, a clinical assistant professor in Computer Science at the Courant institute. "We hope that the tool, when fully developed, will be useful to physicians as they assess which moderately ill patients really need beds, and who can safely go home, with hospital resources stretched thin."

B) **Unexpected predictors**
The current study used decision trees that track series of decisions between options and that model the potential consequences of choices at each step in a pathway. The AI tool found that changes in three features – levels of the liver enzyme alanine aminotransferase (ALT), reported myalgia, and hemoglobin levels – were most accurately predictive of subsequent, severe disease. Together with other

factors, the team reported being able to predict risk of ARDS with up to 80% accuracy.ALT levels, which rise dramatically as diseases like hepatitis damage the – liver, were only a bit higher in patients with COVID-19, but still featured prominently in prediction of severity. In addition, deep muscle aches (myalgia) were also more commonplace and have been linked by past research to higher general inflammation in the body.

5. Results

We have identified seven significant applications of AI for COVID-19 pandemic. This technology plays an important role to detect the cluster of cases and to predict where this virus will affect in future by collecting and analyzing all previous data.

6. Conclusion

Artificial Intelligence is an upcoming and useful tool to identify early infections due to coronavirus and also helps in monitoring the condition of the infected patients. It can significantly improve treatment consistency and decision making by developing useful algorithms. AI is not only helpful in the treatment of COVID-19 infected patients but also for their proper health monitoring. It can track the crisis of COVID-19 at different scales such as medical, molecular and epidemiological applications. It is also helpful to facilitate the research on this virus using analyzing the available data. AI can help in developing proper treatment regimens, prevention strategies, and drug and vaccine development.

7. References

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