Since January 2020 Elsevier has created a COVID-19 resource centre with free information in English and Mandarin on the novel coronavirus COVID-19. The COVID-19 resource centre is hosted on Elsevier Connect, the company's public news and information website.

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Artificial Intelligence (AI) applications for COVID-19 pandemic

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ABSTRACT

Background and aims: Healthcare delivery requires the support of new technologies like Artificial Intelligence (AI), Internet of Things (IoT), Big Data and Machine Learning to fight and look ahead 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 pandemics.
Methods: The rapid review of the literature is done on the database of Pubmed, Scopus and Google Scholar using the keyword of COVID-19 or Coronavirus and Artificial Intelligence or AI. Collected the latest information regarding AI for COVID-19, then analyzed the same to identify its possible application for this disease.
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.
Conclusions: Healthcare organizations are in an urgent need for decision-making technologies to handle this virus and help them in getting proper suggestions in real-time to avoid its spread. AI works in a proficient way to mimic like human intelligence. It may also play a vital role in understanding and suggesting the development of a vaccine for COVID-19. This result-driven technology is used for proper screening, analyzing, prediction and tracking of current patients and likely future patients. The significant applications are applied to tracks data of confirmed, recovered and death cases.

1. Background

In this worldwide health 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 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, medical help, notification, and suggestions about the infection control [1–3]. This technology has the potential to improve the planning, treatment and reported outcomes of the COVID-19 patient, being an evidence-based medical tool. Fig. 1 shows the general procedure of AI and non-AI based applications that help general physicians to identify the COVID-19 symptoms.

The above 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 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 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 number of steps taken in the whole process, making more procurable in nature.

2. Main applications of AI in COVID-19 pandemic

I) Early detection and diagnosis of the infection

AI can quickly analyze irregular symptom and other 'red flags'

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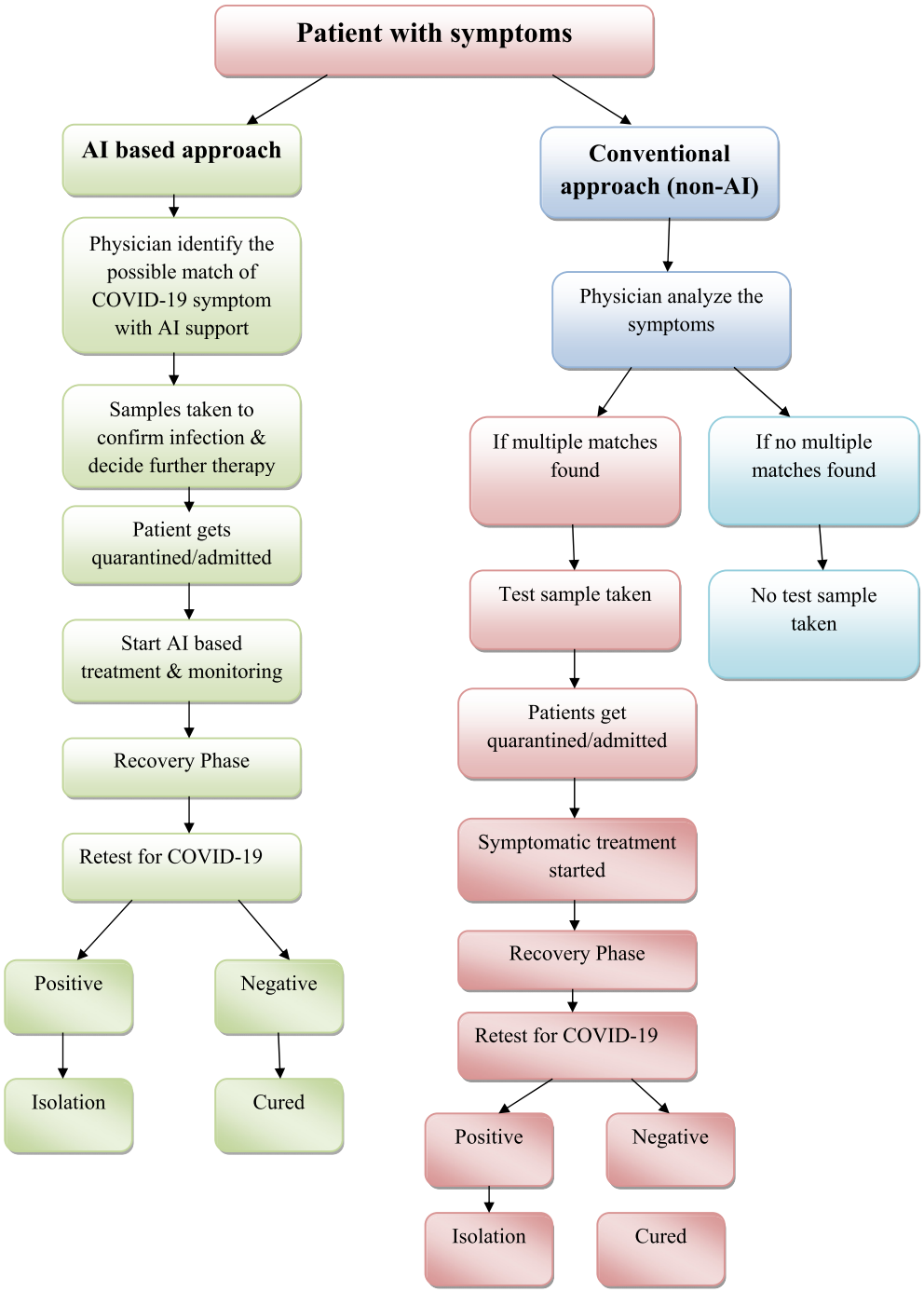

Fig. 1. General procedure of AI and non-AI based applications that help general physicians to identify the COVID-19 symptoms.

and thus alarm the patients and the healthcare authorities [4,5]. 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.

II) 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 [6–8]. 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.

III) 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.

IV) 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.

V) 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 [6,7]. 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 [9–11]. 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.

VI) 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 [12–17]. 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 [18,19]. AI can impact future patient care and address more potential challenges which reduce the workload of the doctors.

VII) Prevention of the disease

With the help of real-time data analysis, AI can provide updated information which is helpful in the prevention of this disease. It can be used to predict the probable sites of infection, the influx of the virus, need for beds and healthcare professionals during this crisis. AI is helpful for the future virus and diseases prevention, with the help of previous mentored data over data prevalent at different time. It identifies traits, causes and reasons for the spread of infection. In future, this will become an important technology to fight against the other epidemics and pandemics. It can provide a preventive measure and fight against many other diseases. In future, AI will play a vital role in providing more predictive and preventive healthcare.

3. 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, drug and vaccine development.

Declaration of competing interest

None.

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