LETTER TO THE EDITOR

Impact of Metaheuristic Techniques in Pandemic of COVID-19

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Abstract: The early detection and diagnosis of novel coronavirus disease 2019 (COVID-19) are required to cure the disease. Metaheuristic techniques can be used to develop an automated tool for detecting the symptoms of an infected person and provide appropriate precautionary measures. The metaheuristic-based software can be designed to analyze the radiographic patterns of infected individuals and determine the severity of COVID-19 infection. The genome structure of coronavirus can be easily understood through metaheuristic techniques. Based on the genome structure, an effective drug combination can be explored by using metaheuristics for the treatment of COVID-19.

Keywords: COVID-19, metaheuristic, diagnosis, drug design, social implication, epidemic.

To the Editor

In December 2019, the first novel coronavirus infected person was identified in Wuhan, China. Thereafter, coronavirus disease 2019 (COVID-19) has spread across the world. The World Health Organization (WHO) declared this disease a global pandemic in January 2020 [1]. As of September 16, 2020, there are 29,816,433 confirmed infected cases with 940,957 deaths and 21,615,109 recovered cases. This virus belongs to the Coronavirinae family [2] and is also known as acute pneumonia. It affects the respiratory system of human beings. The common symptoms of COVID-19 are fever, dry cough, and fatigue. Some patients may also suffer from headaches, diarrhea, and nausea [2]. The virus is transmitted in humans through respiratory droplets and interaction with virus carriers. The evolution period of this virus is 1-14 days or even longer [3]. Due to the unavailability of effective drugs, social distancing and isolation are the effective measures to stop the outbreak of this disease. Recently, metaheuristic techniques are being widely used in solving real-life problems. Metaheuristic techniques can be an effective tool to tackle this epidemic situation. These techniques can be used in four different fields, namely prediction, diagnosis, drug design, and social implication.

Age, frequency of human interactions, preexisting medical conditions, and immunity are the main factors to predict the threat of infection. These factors are utilized in the formulation of the vulnerability index [4]. This index can be used as a fitness function for metaheuristic techniques, which can be used to predict the dissemination of infection. Based on the value of fitness function, precautionary measures may also be suggested.

Diagnosis of COVID-19 infected patients is a very challenging task in this pandemic situation. Testing of each and every patient is a very difficult and time-consuming task. Hence, metaheuristic techniques can be used to detect COVID-19 in the patients, using a chest X-Ray or chest CT scan. Three well-known methods, namely face scanning, wearable devices, and imaging, can be utilized to diagnose COVID-19 patients. The former scans the face of patient and facial features are extracted. The extracted features are applied to the metaheuristic techniques to determine whether the patient is infected from COVID-19 or viral pneumonia. The wearable devices can detect the pulse rate and body temperature. These features are utilized in metaheuristic techniques for determining the recovery of patients [5]. The latter approach is medical imaging. Medical imaging, such as chest X-rays and Computed Tomography (CT), are used for the diagnosis of the COVID-19 patients [6]. However, these imaging techniques require radiologists to study and analyze X-rays and CT scans. An automatic analysis tool can be designed by using metaheuristic techniques. These automated tools not only reduce the radiologists’ time, but also provide a quicker diagnosis as compared to the regular COVID-19 tests. Metaheuristic techniques can be used to discriminate the lung conditions of a healthy person and a COVID-19 infected person.

Metaheuristic techniques were widely used to identify the novel drug discovery before the outbreak of COVID-19. These techniques can be utilized to find out the effective synergistic drug combination for the treatment of coronavirus. The gene structure of novel coronavirus can also be predicted through metaheuristics [7]. The development of novel drugs and antibodies is time-consuming and expensive as the approval of new drugs may take a long time [8]. Another way is to repurpose the existing drugs that can be used for the treatment of COVID-19 disease. The existing drug and coronavirus interaction can be predicted through metaheuristics.

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Nowadays, there is a big breach between diminishing COVID-19, identifying symptoms, and testing. Metaheuristic techniques can be used to interpret and analyze the social media contents for accessing the contamination of this virus. Recently, the Aarogya Setu application has been developed, which is based on question-answer trails. The same things can be developed using social networks to stop the spread of COVID-19. Metaheuristic techniques can be efficiently and effectively used for developing such applications and dashboards.

CONCLUSION

Metaheuristic techniques are efficient in handling the pandemic situation. These techniques can be utilized to develop the automated detection and severity of COVID-19 in patients from radiographic imaging. These can be used to develop the dashboard and mobile apps for contact tracing of COVID-19. The genome structure of coronavirus can be determined through metaheuristics. The effective synergistic drug combination for COVID-19 can be explored through metaheuristics. In short, metaheuristic techniques can be an effective tool in the detection, diagnosis, and drug design.

CONFLICT OF INTEREST

The authors declare no conflict of interest, financial or otherwise.

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