Fusion of AI techniques to tackle COVID-19 pandemic: models, incidence rates, and future trends

Het Shah[1] · Saiyam Shah[1] · Sudeep Tanwar[1] · Rajesh Gupta[1] · Neeraj Kumar[2,3,4]

Abstract
The COVID-19 pandemic is rapidly spreading across the globe and infected millions of people that take hundreds of thousands of lives. Over the years, the role of Artificial intelligence (AI) has been on the rise as its algorithms are getting more and more accurate and it is thought that its role in strengthening the existing healthcare system will be the most profound. Moreover, the pandemic brought an opportunity to showcase AI and healthcare integration potentials as the current infrastructure worldwide is overwhelmed and crumbling. Due to AI's flexibility and adaptability, it can be used as a tool to tackle COVID-19. Motivated by these facts, in this paper, we surveyed how the AI techniques can handle the COVID-19 pandemic situation and present the merits and demerits of these techniques. This paper presents a comprehensive end-to-end review of all the AI-techniques that can be used to tackle all areas of the pandemic. Further, we systematically discuss the issues of the COVID-19, and based on the literature review, we suggest their potential countermeasures using AI techniques. In the end, we analyze various open research issues and challenges associated with integrating the AI techniques in the COVID-19.

Keywords AI · COVID-19 · Healthcare · Machine learning · Deep learning

1 Introduction

The ongoing worldwide pandemic caused by the coronavirus (also called COVID-19) disease was first observed in December 2019 and has affected over 117 million people

✉ Sudeep Tanwar
sudeep.tanwar@nirmauni.ac.in

✉ Neeraj Kumar
neeraj.kumar@thapar.edu

Het Shah
17bit103@nirmauni.ac.in

Saiyam Shah
17bit104@nirmauni.ac.in

Rajesh Gupta
18ftvphde31@nirmauni.ac.in

1 Department of Computer Science and Engineering, Institute of Technology, Nirma University, Ahmedabad, India

2 Department of Computer Science Engineering, Thapar Institute of Engineering and Technology, Deemed to be University, Patiala, India

3 School of Computer Science, University of Petroleum and Energy Studies, Dehradun, Uttarakhand, India

4 King Abdul Aziz University, Jeddah, Saudi Arabia

and over 2.6 million people have succumbed to it [34]. It is a communicable disease, which spreads from human-to-human as well as animal-to-human transmission via air contact. The World Health Organization (WHO) has declared the virus as a global pandemic and people all over the world have been advised to remain indoors and avoid contact with other people. This has resulted in the closure of businesses across the globe. Governments across the globe have imposed strict measures such as quarantining their citizens, imposing strict lockdowns, and restrictions in international and domestic travels to minimize the spread of coronavirus and ensure their citizens' safety. However, despite all these measures put in place, they are often defied, leading to the virus not being contained and leading to its rampant spread. Many organizations worldwide, including private, semi-government, and government, are working hand-in-hand to develop a vaccine for this virus. Still, until an effective vaccine is developed, the only solution is to adhere to the government norms practice the principles of self-hygiene. COVID-19 poses impacts on three fronts like healthcare, world economy, and supply chain. Traditional methods of combating the pandemic include contact tracing of citizens to trace the origin of infection and their medical diagnosis and treatment by the medical professionals and a team of