

Chapter 7

Pandemic Management Using Artificial Intelligence– Based Safety Measures: Prediction and Prevention

Megha Nain

 <https://orcid.org/0000-0003-1592-652X>

Manipal University Jaipur, India

Shilpa Sharma

 <https://orcid.org/0000-0002-6013-820X>

Manipal University Jaipur, India

Sandeep Chaurasia

Manipal University Jaipur, India

ABSTRACT

The pandemic corona virus disease (COVID-19) caused by the virus ‘SARS-CoV-2’ continues affecting the health and affluence of the worldwide population. The role of artificial intelligence in improving safety and health conditions has been studied in the chapter. The various fields of artificial intelligence such as machine learning, computer vision, deep learning, and natural language processing are contributing to almost every field ranging from healthcare, agriculture, automotive, astronomy, and many others. For overcoming a global outbreak such as COVID-19, conventional approaches are not feasible enough, and therefore the requirement for the more robust and automated techniques for making predictions in advance is essential. The vision of this chapter is to assess and survey the impact of artificial intelligence-based approaches in the management of pandemics and recommend procedures for the enhancement of the currently used techniques along with the imminent research areas in artificial intelligence for controlling pandemics.

DOI: 10.4018/978-1-7998-7188-0.ch007

INTRODUCTION

The pandemic COVID-19 has disturbed the worldwide population. Roads are deserted, shops are shut, and individuals are out of employment, open social meetings have been prohibited in numerous regions, travel limitations have been forced and the entirety of this is majorly affecting the worldwide economy. With 165,158,285 confirmed cases globally and 26,031,991 cases in India as of 21 May 2021 (World Health Organization, 2020). As of May 2021, a total of 14448,242,899 vaccine doses have been administered globally to World Health Organization, however, inevitably it is going to continue to spread but how far and rapid that is going to occur and what can be done to control is still in question. Artificial Intelligence (AI) plays a vital part in providing the answers to all such questions and maybe even improving the outcome. AI has an indispensable role in the prime understanding of the outcome.

Numerous actions and mitigation measures are implemented globally for the COVID-19 pandemic, which involves total lockdowns, social distancing, compulsory face masks and hand-wash recommendations. These measures are based on the mathematical and prediction analysis of the virus spread (Alvarez FE et al. 2020), ((IHME) 2020), (Das S et al. 2020). From controlling through the platform of social media to interpreting the root of COVID-19, AI is employed to battle the COVID-19 pandemic in all diverse ways. For example, from the inception of the episode, when China first started giving reaction to COVID-19, China concentrated on AI using cameras for facial recognition to check the contaminated individuals having a history of travel, robots for the grocery delivery, sanitization using drones, announcements airing for urging people to stay home. With currently employed technologies in AI, firms require determining an optimized plan to unsettle COVID-19 (Jo Best, 2020). An extensive study of AI technologies that would help people to diminish and stifle the huge impacts of the pandemic have been presented in this chapter. Ongoing enhancements in AI have added substantially to the development and improvement of our health and safety and, with the usage of an appropriate framework of AI techniques, this difficult coronavirus fight could be vanquished (Estrada et al., 2020). A variety of researchers and scientists are using AI for finding out new prescriptions and remedies to concentrate on detecting infected persons through medical imaging techniques such as ‘X-rays’ and ‘CT scans’ ((Nguyen TT et al., 2020).

There are several contributions of AI techniques enlightened in this chapter which is not just limited to the current pandemic but also for any future outbreaks. With that objective, AI is conferred comprehensively to bring attention towards the existing technologies in AI for improved assistance in healthcare. For instance, AI in Radiology for detecting COVID-19 or AI in the Intensive Care Unit (ICU) advancement, for the smooth diagnosis and treatment. In the next section, Computer Vision (CV) techniques have been examined for monitoring the safety measures like detection of face masks, social distancing violations, thermal vision cameras for the inspection of the body temperature of an individual for controlling the spread of coronavirus. A list of CV approaches has been addressed in terms of their accuracy of treatment. Apart from this, Mathematical models based on deep learning (DL) are analyzed to obtain predictions about the spread where Natural Language Processing (NLP) has also been brought up as extensive support in creating an enhanced mathematical model and in identifying the key symptoms of the coronavirus. Proceeding ahead, Machine Learning (ML) based methodologies have been recognized for the usage in contact tracing applications for knowing the contaminated patients as well as **locations** that would aid in monitoring the virus spread. Several contact tracing applications are discussed which are getting employed worldwide. Thorough matters concerning the present technologies in AI and an in-depth review of the model accuracy are presented in the discussion.

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