Shiraz E-Med J. In Press(In Press):e139784. https://doi.org/10.5812/semj-139784.

Published online 2023 November 7. **Letter**

Artificial Intelligence and Its Potential Applications to Combat the COVID-19 Pandemic

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Received 2023 August 07; **Revised** 2023 September 20; **Accepted** 2023 October 10.

Keywords: Artificial intelligence, COVID-19, Infection, Iran

Dear Editor,

As in other parts of the world, Iran has been dramatically impacted by the Coronavirus disease 2019 (COVID-19), experiencing one of the highest rates of illness and death in the Eastern Mediterranean Region (1). As of September 13, 2023, Iran has reported over 7,614,000 confirmed cases and 146,336 deaths caused by COVID-19 (1). This emphasizes the need for new approaches to combating this pandemic. One of the new approaches is the use of artificial intelligence. Artificial intelligence (AI) is the technology that makes computers think and learn like the human mind (2). AI offers solutions that can revolutionize controlling and managing Iran's pandemic. According to previous findings (3, 4), we explore the applications of AI in mitigating the impact of COVID-19 in Iran. We can enhance our country's response to this pandemic and improve healthcare management by utilizing AI-assisted technologies (3, 4).

• Predicting disease prevalence and severity: Through models and comprehensive disease data analysis, AI can forecast the occurrence, spread, and severity of COVID-19 across regions. This valuable information empowers health officials and policymakers to make informed decisions that effectively control and prevent disease transmission.

• Diagnosis and rapid identification of patients: With advanced techniques such as convolutional neural networks (CNNs) to analyze medical imaging data like chest X-rays, CT scans, and MRI images (5, 6), AI can accelerate the diagnosis process for COVID-19 patients, including asymptomatic patients. Rapid identification enables the implementation of measures and appropriate treatment strategies.

• Monitoring and surveillance of epidemics: Signal processing techniques and data analysis in bioinformatics allow for real-time monitoring of the spread of diseases within communities. This information is vital for governments and health organizations to proactively plan and implement disease control measures.

• Testing of drugs: Deep learning algorithms, such as recurrent neural networks (RNNs) and generative adversarial networks (GANs), aid drug discovery by simulating molecular interactions and predicting potential drug candidates (5, 6). However, experimental validation through randomized clinical trials may still be necessary. Additionally, these algorithms can analyze trial data, facilitating drug testing and monitoring their impact on patients.

• Support for healthcare systems: AI can predict the requirements of healthcare systems during crises like COVID-19, including determining the number of hospitals, medical equipment, and healthcare personnel needed. This proactive approach ensures that the healthcare system remains adequately prepared to manage crises.

• Control through trajectory tracking: AI-driven mathematical predictive models play a role in forecasting the path and development of pandemics. Health officials can make decisions regarding disease control strategies by considering factors such as demographics, geography, and social behavior.

Understanding the course of the disease has been crucial in predicting how COVID-19 spreads and planning for healthcare requirements (7). Public health officials

and researchers are empowered to create models that estimate how the disease will progress by analyzing data on cases, hospitalizations, and fatalities. These models can consider factors to project how COVID-19 will spread over the weeks or months (7). In response to this, decisions can be made by public health officials regarding implementing measures like lockdowns, social distancing, and vaccination campaigns. For instance, addressing concerns about booster doses of COVID-19 vaccines in Iran presents a challenge where AI-assisted strategies could be beneficial (8). AI technologies and strategies have the potential to control COVID-19. They are potentially reducing its spread while improving community health conditions.

Furthermore, AI could play a role in enhancing preparedness for pandemics and healthcare management. In other words, effectively connected intelligence capabilities require collaboration among researchers, policymakers, and healthcare professionals. We can better prepare for future pandemics and optimize healthcare management by utilizing AI capabilities.

Footnotes

Authors' Contribution: Conceptualization: M.R. Writing-original draft: M.R, and M.J.

Conflict of Interests: Both authors declared no potential conflicts of interest concerning this letter's research, authorship, and/or publication.

Funding/Support: Both authors received no financial support for this letter's research, authorship, and/ or publication.

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