

Fighting COVID-19, a place for artificial intelligence

The emergence of the coronavirus disease 2019 (COVID-19) heralded a new era in the cross-species transmission of severe respiratory illness leading to rapid spread in mainland China and around the world with a case fatality rate of 2.3% in China and 1.8%–7.2% outside China (Centers for Disease Control & Prevention, 2020; Onder, Rezza, & Brusaferro, 2020; World Health Organization, 2020; Wu & McGoogan, 2019). As of 15 May 2020, a total of 4,338,658 confirmed cases of COVID-19 and 297,119 death cases have been documented globally (World Health Organization, 2020). Several strategies have been adopted to contain the outbreak including classic infection-control and public health measures; nevertheless, these measures may not be effective for tackling the scale of COVID-19.

Uninfluenced by the boundary of rationality and behavioural limitations, artificial intelligence (AI) has emerged as a new technology that helps advance healthcare systems, which at times can be more effective than humans in diagnosis of various medical conditions as well as prediction of progression and prognosis of diseases (Loh, 2018; Makino et al., 2019). In the setting of COVID-19 pandemic, AI may facilitate the estimation of the actual number of infected individuals, identification of patients at high risk of developing severe disease and estimation of the expected healthcare burden, notably ICU demands, during the outbreak. By using advanced machine learning, raw data including the number of actual confirmed cases, contact tracing, fatalities, population demographics, travel patterns and the availability of healthcare service can be compiled and processed using algorithmic models. These models can predict the number of new cases, total number of actual cases including asymptomatic carriers, and the peak infection rates (Loten, 2020). Indeed, the use of an AI epidemiological model, incorporating domestic migration and COVID-19 epidemiological data around January 23, was shown to be effective in predicting the COVID-19 epidemic peaks and sizes in China. Based on this model, the authors concluded that implementation of infection-control measures around the same time period was indispensable in reducing the eventual epidemic size, and advocated the policy of strict monitoring and early detection should remain in place till the end of April 2020 (Yang et al., 2020). Moreover, employing AI algorithm using a cell phone-based surveys can be helpful in preliminary screening and early identification of possible COVID-19 cases, thereby assisting in guiding infection-control measures at the community level. After possible case identification, the AI algorithm can send alerts to the respondent for an immediate health visit and to the nearest health clinic (Rao & Vazquez, 2020). This may help in reducing the pressure on healthcare resources and avoid possible mismatch between supply and demand.

In another aspect, AI and deep learning can enhance the detection and diagnosis of COVID-19. Using deep learning models and AI-based software, such as inferVISION, can identify typical and partial pulmonary signs of COVID-19 on computed tomography scan with a diagnostic accuracy of up to 95% (Chen et al., 2020). Additionally, developing AI algorithms based on low-cost tests, such as chest X-ray, can be extremely useful in screening particularly in resource-constrained settings. In this context, China has a large data set of over 70,000 COVID-19 cases, which may be ideal for AI and deep learning (Simonite, 2020). Developing an AI algorithm based on these data may serve as an initial low-cost screening tool for suspected cases.

Finally, AI models can predict survival of confirmed COVID-19 cases. Yan et al. (2020) recently developed a three indices-based prognostic model including lactic dehydrogenase, lymphocyte and high-sensitivity C-reactive protein. The model showed excellent performance and was able to predict survival of COVID-19 patients with more than 90% accuracy. This model may help physicians to adjust the level of isolation, treatment and monitoring of COVID-19 patients.

Notwithstanding the limited data on its use, AI and deep learning can be useful tools to combat and control the current COVID-19 pandemic. More studies on the use of AI in prediction of the outbreak progression, identification of disease trends, early detection of potential new infections and discovery of novel drugs to treat COVID-19 are needed.

CONFLICT OF INTEREST

None to be declared by the authors.

AUTHOR CONTRIBUTIONS


Sameh Emile and Hytham Hamid wrote and revised the manuscript.

ETHICAL STATEMENT

Not applicable.

DATA AVAILABILITY STATEMENT

Data sharing is not applicable to this article as no new data were created or analysed in this study.

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