HealthManagement
Promoting Management and Leadership

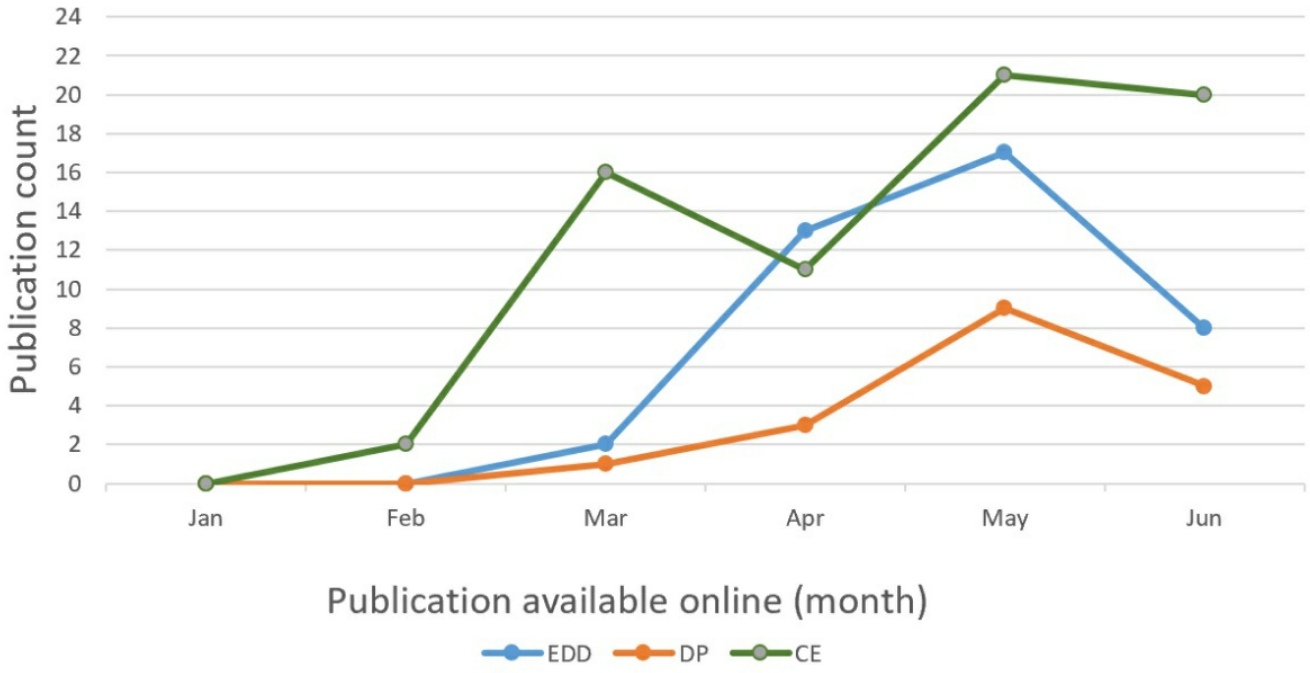
Machine Learning and COVID-19 Management

A new systematic review (Syeda et al. 2021) analyses artificial intelligence (AI)-based methods utilised to tackle the pandemic and provides insights into different COVID-19 themes.

You might also like: AI Tool Helps to Reduce COVID-19 Mortality

Since the onset of the COVID-19 pandemic, many healthcare organisations have embraced AI technologies for problem-solving in different domains, such as forecasting the spread of the disease, or diagnostic and prognostic modelling using various data types, from social media to omics to drug databases. The researchers have selected 130 publications, made available online between 1 December 2019 and 27 June 2020, to review the role of AI in the COVID-19 response; its application and performance in the epidemiological, clinical and molecular advancements; implementation challenges, etc.

The 130-study sample was divided according to the following three themes: computational epidemiology (CE), early detection and diagnosis (EDD), and disease progression (DP), with the share of publication in each one changing as the pandemic progressed (see figure).



Over time (trend analysis) of COVID-19 studies focussed on the application of AI techniques that were made available online in 2020 (Syeda et al. 2021).

Computational epidemiology. The 71 publications (54.6%) under this theme mainly analysed data from either social media or public data repositories and belonged to three categories of AI applications in epidemiology:

- molecular analysis-drug discovery (MADD), e.g. protein structure analysis, drug repurposing, genome sequencing
- facilitate COVID-19 response (FCR), e.g. current initiatives, the pandemic's impact on mental health
- COVID-19 disease trajectory (CDT), e.g. modelling and forecasting.

Early detection and diagnosis. This theme comprised 40 studies (30.8%) with the majority focussing on COVID-19 diagnostics using chest radiological images. The publications looked into the current situation and analysed various diagnostic models.

Disease progression. There were two main research clusters, namely on risk stratification (risk assessment) and hospital resource management (e.g. outcomes and length of stay), and in the 19 publications (14.6%) various data, including demographic variables, comorbidities and imaging results, were analysed.

The authors also note that the pandemic instigated creation of distributed AI architecture for sharing of data and code between the stakeholders, as well as transfer learning, especially using imaging data.

In conclusion, the study lists some proposals to allow more efficient AI applications in the pandemic context. For example, the authors argue that diagnostic models should be expanded to include not only RT-PCR testing but also radiological images, laboratory tests and other data for better accuracy. They also note the lack of proper sample sizes in many publications, which might bias AI-driven modelling, and the need to identify effective clinical variables correlated with COVID-19 for future research. Another area for improvement might be using natural language processing (NLP) techniques for more accurate analysis of social media content, and providing more details on how the AI model predictions were interpreted.

© For personal and private use only. Reproduction must be permitted by the copyright holder. Email to copyright@mindbyte.eu.

The authors point out some limitations to their review, such as incomprehensive representation of the research context (e.g. due to some studies being unavailable for analysis and others being preprints) or incomparability of variables for proper AI performance assessment. In addition, they emphasise that the studies analysed were available as of late June 2020, which limits the scope of the review.

Image credit: sdecoret via iStock; Syeda et al. 2021

Published on : Thu, 14 Jan 2021

© For personal and private use only. Reproduction must be permitted by the copyright holder. Email to copyright@mindbyte.eu.