Predicting COVID-19 infection spikes

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A comparison of two approaches to the popular moving average forecasting method in time series analysis could allow researchers to make more accurate predictions of COVID-19 infections in the short term. Details are published in the *International Journal of Management and Decision Making*.

Seng Hansun of the Informatics Department at Universitas Multimedia Nusantara in Tangerang, Indonesia, Vincent Charles of the School of Management at the University of Bradford, Tatiana Gherman of the Faculty of Business and Law at the University of Northampton, UK, and Vijayakumar Varadarajan of the School of Computer Science and Engineering at The University of New South Wales, Sydney, Australia, discuss the weighted exponential moving average (WEMA) and the Hull moving average (HMA). WEMA was first introduced in 2013 and is now widely used, but suffers from lags. To overcome this issue, the team has developed a novel zero-lag Hull-WEMA method that combines HMA and WEMA.

As a proof of principle, of this new hybridized approach, the team has used COVID-19 time-series data from ten different countries with the highest number of cases on the last observed date. Their results show that the new model has much greater accuracy than HMA and WEMA used separately. Indeed, the team's success points to the possibility of a general "white-box" forecasting method that could be used to make short-term predictions about how the number of confirmed COVID-19 cases in a given region will change.

Given the nature of the COVID-19 pandemic and how quickly healthcare systems can be overcome by sudden spikes in infection rates and sickness, an accurate forecasting method should allow providers and the authorities to make better calls on what staffing levels and equipment will be needed over a short time-frame in order to cope with those spikes and to free up resources when the model predictions that the number of infections are set to fall.

The team concludes that their work allows them to "join the recent research efforts made by the community of researchers to assist governments, policymakers, and other relevant stakeholders by providing forecasts that can be used as a tool towards making better decisions and

taking appropriate actions to contain or curb the spread of the coronavirus."

More information: Seng Hansun et al, Hull-WEMA: a novel zero-lag approach in the moving average family, with an application to COVID-19, *International Journal of Management and Decision Making* (2021). DOI: 10.1504/IJMDM.2022.119582

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