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A Time Series Based Machine Learning Strategy for Wastewater-Based Forecasting and Nowcasting of COVID-19 Dynamics

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Monitoring COVID-19 infection cases has been a singular focus of many policy makers and communities. However, direct monitoring through testing has become more onerous for a number of reasons, such as costs, delays, and personal choices. Wastewater-based epidemiology (WBE) has emerged as a viable tool for monitoring disease prevalence and dynamics to supplement direct monitoring. In this talk, I describe a time-series based machine learning strategy (TSML) which incorporates WBE information for nowcasting and forecasting new weekly COVID-19 cases. In addition to WBE information, other relevant temporal variables such as minimum ambient temperature and water temperature are accounted for via feature engineering in order to enhance the predictive capability of the model. As one might expect, the best features for short-term nowcasting are often different than those for long-term forecasting of COVID-19 case numbers. The proposed TSML approach performs as well, and sometimes better, than simple predictions that assume available and accurate COVID-19 case numbers from extensive monitoring and testing. As such, machine learning based WBE offers a promising alternative to direct monitoring via testing for decision-makers and public health practitioners when preparing for the next wave of COVID-19 or a future pandemic.

Keywords

machine learning; COVID-19; monitoring;

Classification

Mainly application

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