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### Abstract

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Respiratory Syncytial Virus (RSV) is a flu-like illness annually responsible for 60K-160K hospitalizations and 6K-10K deaths in adults above the age of 65 as well as 58K-80K hospitalizations and 100-300 deaths in children under 5 years of age in the United States. A live prediction of the rate of growth of RSV cases during the RSV season can empower healthcare organizations to best prepare for RSV peaks and ultimately reduce the RSV mortality rate without over-budgeting, be it pharmaceutical companies producing too many perishable testing kits, vaccines and medications or hospitals keeping too many beds and staffing in reserve and thus away from other needed patients.

This study adds a new RSV forecasting model to eVision, the collection of disease-forecasting Long Short-Term Memory (LSTM) neural networks, developed by Santa Clara University's EPIC (Ethical, Pragmatic, and Intelligent Computing) Research lab. This model leverages data from the Centers of Disease Control and Prevention (CDC) and Google Trends between 2021-2024 to predict the trend of RSV cases through the typical RSV season and beyond in the United States. Given the lack of extensive RSV data -- which has only been collected by the CDC on a national level since 2021 -- and how easily RSV is mistaken for other diseases, this model has a limitation on the number of weeks ahead in which its prediction can maintain a high accuracy for. This model successfully predicts percent positive RSV Polymerase Chain Reaction (PCR) tests with 94.45% forecasting accuracy three weeks in advance at the national level, respectively for the 2024-2025 RSV season.

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