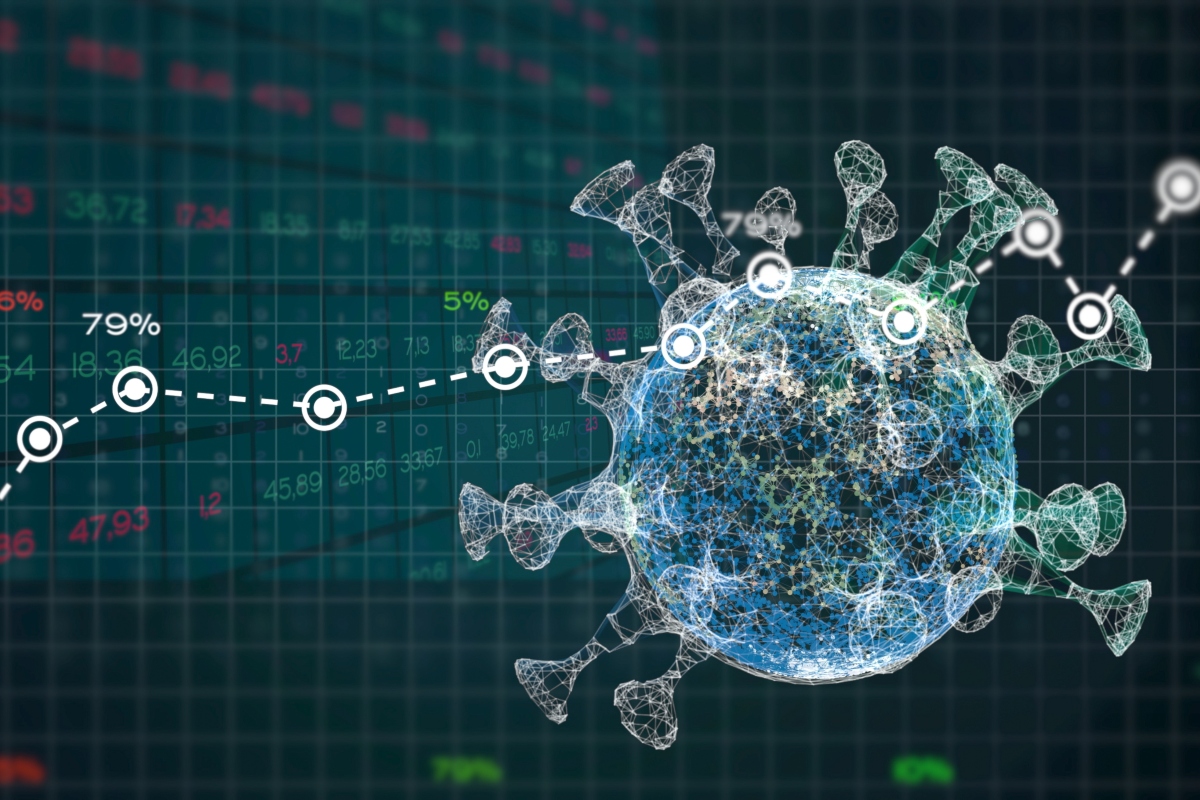
**COVID 19 CASE ANALYTICS**



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**COVID 19 CASE ANALYSIS**

**PROBLEM DEFINITION**

ABSTRACT

**BACKGROUND**

The highly infectious coronavirus disease (COVID-19) was first detected in Wuhan, China in December 2019 and subsequently spread to 212 countries and territories around the world, infecting millions of people. In India, a large country of about 1.3 billion people, the disease was first detected on January 30, 2020, in a student returning from Wuhan. The total number of confirmed infections in India as of May 3, 2020, is more than 37,000 and is currently growing fast.

Objective

Most of the prior research and media coverage focused on the number of infections in the entire country. However, given the size and diversity of India, it is important to look at the spread of the disease in each state separately, wherein the situations are quite different. In this paper, we aim to analyze data on the number of infected people in each Indian state (restricted to only those states with enough data for prediction) and predict the number of infections for that state in the next 30 days. We hope that such statewise predictions would help the state governments better channelize their limited health care resources.

### Methods

Since predictions from any one model can potentially be misleading, we considered three growth models, namely, the logistic, the exponential, and the susceptible-infectious-susceptible models, and finally developed a data-driven ensemble of predictions from the logistic and the exponential models using functions of the model-free maximum daily infection rate (DIR) over the last 2 weeks (a measure of recent trend) as weights. The DIR is used to measure the success of the nationwide lockdown. We jointly interpreted the results from all models along with the recent DIR values for each state and categorized the states as severe, moderate, or controlled.

### Results

We found that 7 states, namely, Maharashtra, Delhi, Gujarat, Madhya Pradesh, Andhra Pradesh, Uttar Pradesh, and West Bengal are in the severe category. Among the remaining states, Tamil Nadu, Rajasthan, Punjab, and Bihar are in the moderate category, whereas Kerala, Haryana, Jammu and Kashmir, Karnataka, and Telangana are in the controlled category. We also tabulated actual predicted numbers from various models for each state. All the R2 values corresponding to the logistic and the exponential models are above 0.90, indicating a reasonable goodness of fit. We also provide a web application to see the forecast based on recent data that is updated regularly.

### Conclusions

States with nondecreasing DIR values need to immediately ramp up the preventive measures to combat the COVID-19 pandemic. On the other hand, the states with decreasing DIR can maintain the same status to see the DIR slowly become zero or negative for a consecutive 14 days to be able to declare the end of the pandemic.