Covid Prediction Using Regression Model

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Project Report

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Prediction of Covid-19 – Using Linear Regression Algorithm

Abstract

In this project, prediction model is deployed to predict the possible cases of covid that can be expected to occur using a simple linear regression algorithm.

Regresion models help us describe a relationship between variables by fitting a line to the observed data. Linear regression models use a straight line, while logistic and nonlinear regression models use a curved line. Regression allows you to estimate how a dependent variable changes as the independent variable change.

Simple linear regression is used to estimate the relationship between two quantitative variables. Simple linear regression can be used in situations like -

1. How strong the relationship is between two variables (e.g. the relationship between rainfall and soil erosion).
2. The value of the dependent variable at a certain value of the independent variable (e.g. the amount of soil erosion at a certain level of rainfall).

Here, simple regression algorithm predicts the possibility of covid cases that can be confirmed using already available data from previous days using the existing Date and Confirmed columns. By doing so, suitable precautions could be taken from the government end to check for the stock of hospitality, medical equipments, doctors and much more in advance.

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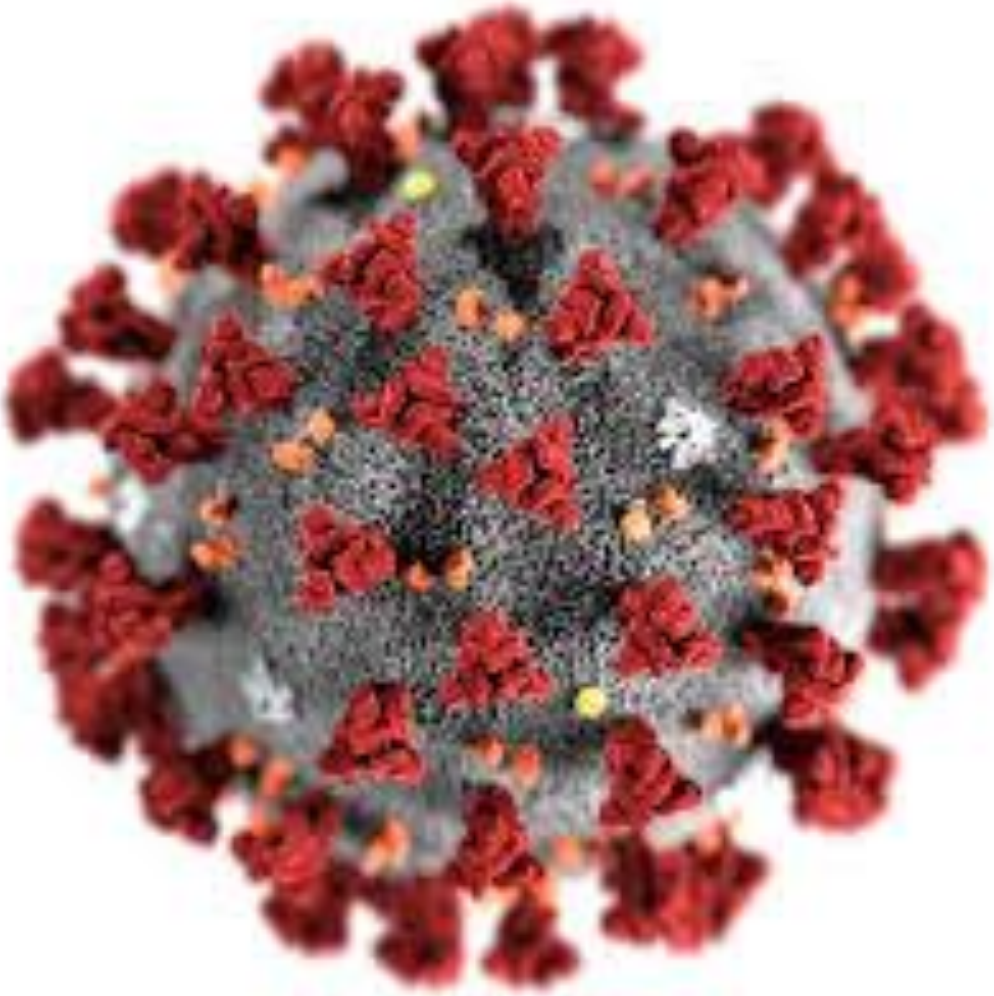
Statement of Purpose

The outbreak of COVID-19 Coronavirus, namely SARS-CoV-2, has created a calamitous situation throughout the world. The cumulative incidence of COVID-19 is rapidly increasing day by day. Machine Learning (ML) can be deployed very effectively to track the disease, predict growth of the epidemic and design strategies and policies to manage its spread.

The novel Coronavirus disease (COVID-19) was first reported on 31 December 2019 in Wuhan, Hubei Province, China. It started spreading rapidly across the world. The cumulative incidence of the causative virus (SARS-CoV-2) is rapidly increasing and has affected 196 countries and territories with USA, Spain, Italy, U.K. and France being the most affected. The World Health Organization (WHO) had declared the coronavirus outbreak a pandemic, while the virus continues to spread. As on 11 December 2020, a total of 30,031 confirmed new positive cases have been reported and 443 death counts. The major difference between the pandemic caused by CoV-2 and related viruses, like Severe Acute Respiratory Syndrome (SARS) and Middle East Respiratory Syndrome (MERS), is the ability of CoV-2 to spread rapidly through human contact and leave nearly 20% infected subjects as symptomless carriers.

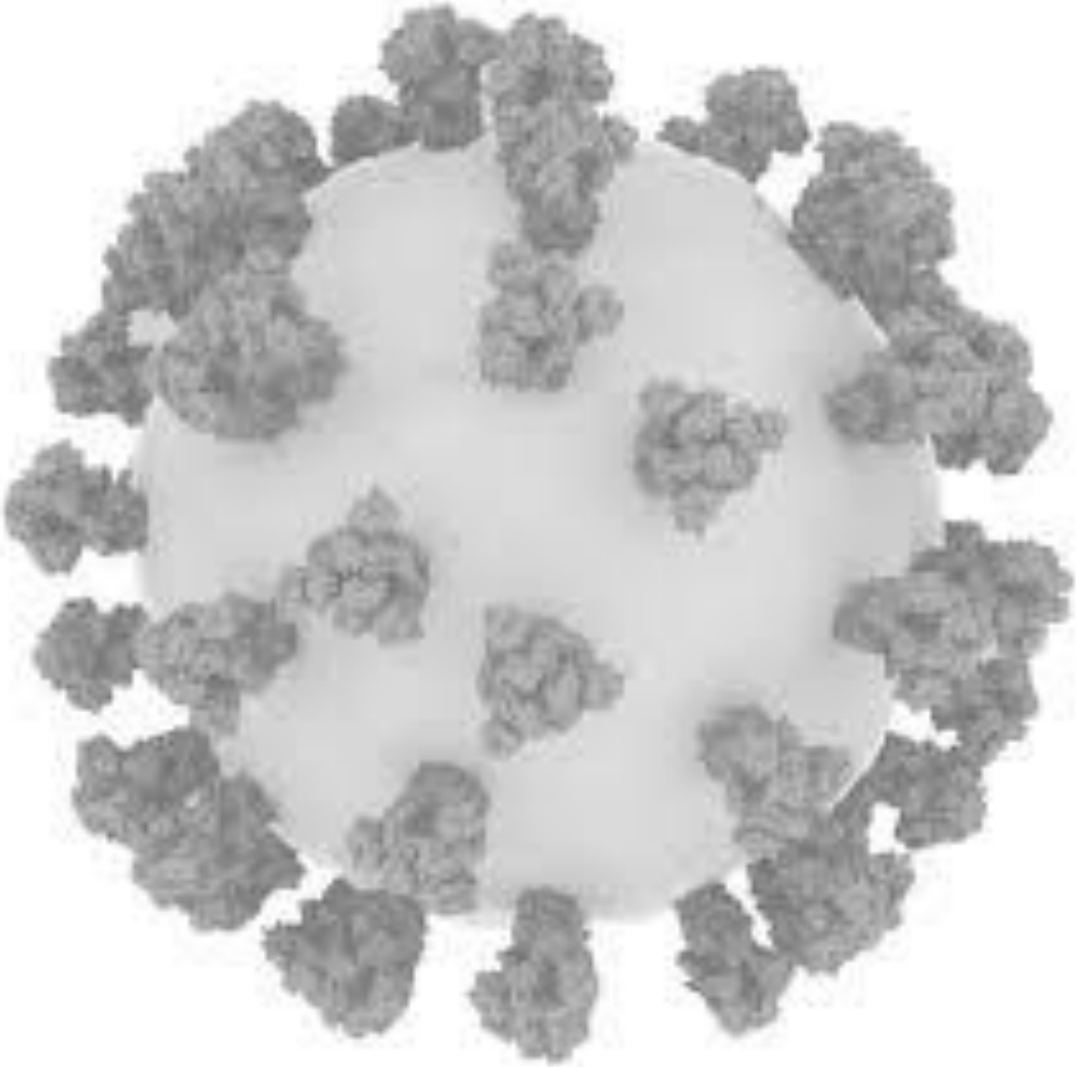
Moreover, various studies reported that the disease caused by CoV-2 is more dangerous for people with weak immune systems. The elderly people and patients with life threatening diseases like cancer, diabetes, neurological conditions, coronary heart disease and HIV/AIDS are more vulnerable to severe effects of COVID-19. In the absence of any curative drug, the only solution is to slow down the spread by exercising “social distancing” to block the chain of spread of the virus. This behavior of CoV-2 requires developing a robust mathematical basis for tracking its spread and automation of the tracking tools for online dynamic decision making.

There is a need for innovative solutions to develop, manage and analyse big data on the growing network of infected subjects, patient details, their community movements, and integrate with clinical trials and pharmaceutical, genomic and public health data. Multiple sources of data including, text messages, online communications, social media and web articles can be very helpful in analyzing the growth of infection with community behaviour. Wrapping this data with Machine Learning (ML) and Artificial Intelligence (AI), researchers can forecast where and when the disease is likely to spread, and notify those regions to match the required arrangements. Travel history of infected subjects can be tracked automatically, to study epidemiological correlations with the spread of the disease.Infrastructure for the storage and analytics of such huge data for further processing needs to be developed in an efficient and cost-effective manner. This needs to be organized through utilization of cloud computing and AI solutions. Alibaba developed cloud and AI solutions to help China, fight against coronavirus, predict the peak, size and duration of the outbreak, which is claimed to have been implemented with 98% accuracy in real world tests in various regions of China.Different types of pneumonia can be resolved using ML-based CT Image Analytics Solution, which can be helpful to monitor the patients with COVID-19. Details can be seen in. The development of vaccines for COVID-19 can also be accelerated even more by analysing the genome sequences and molecular docking, deploying various ML and AI techniques.



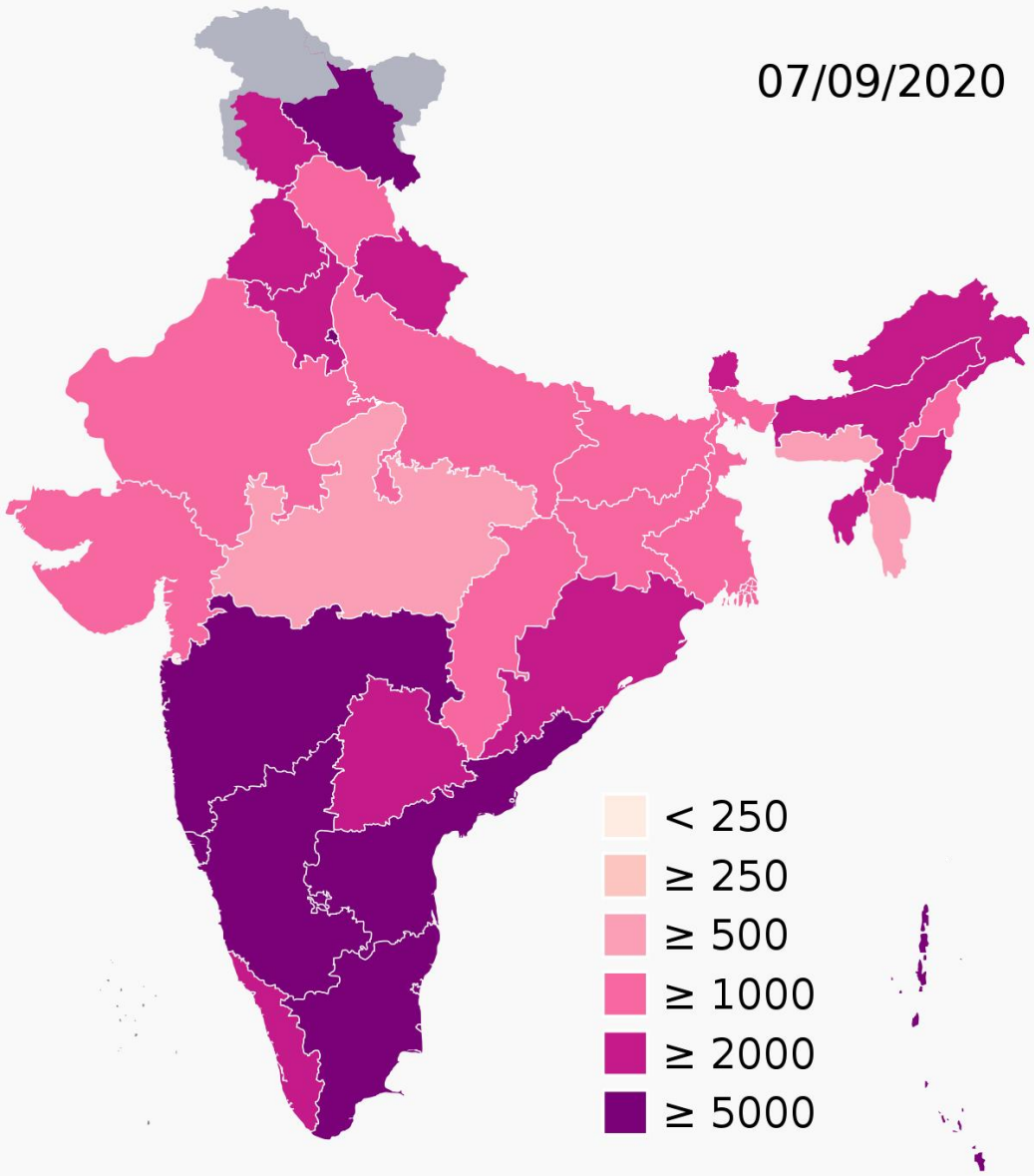
Procedure

- Here we use simple analysis, to find out the possibility of active cases
- Initially, we have dataset that consists of Date in which the cases are reported, State or Union Territory where it was reported, then the total active, cured and deaths reported.
- The dataset is explored to find out the occurences of null values and the reporting date is converted into an ordinal value using Pandas Timestamp.toordinal() function that returns proleptic Gregorian ordinal ie, if January 1 of year 1 is day 1 this function will return the ordinal value for the given Timestamp object.
- Using matplotlib library, we plot some visualizations to understand how the cases are reported in different datasets.
- Finally using sklearn traintest split function we split the dataset into train and test dataset and find out the predict the possible cases that can occur for the given Date where the date has to be an ordinal value



Observations

The predicted model worked with 80-90% of accuracy depending on the states in which the model was used and also because of some NAN values.



Conclusion

Using Linear Regression Algorithm, the model was trained and the covid-cases were predicted for any given Date.

By analysing this suitable measures can be taken by both people and government such as to equip themselves with the necessary medicines, avoid travelling to most affected states.