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Analysis & Prediction of Covid -19 using Prophet Model

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Abstract: ***The World has experienced the new pandemic caused by COVID-19 virus and several countries are affected by this disease specially India. Due to socio-economic problems of this disease, it is required to predict the trend of the outbreak and propose a beneficial method to find out the correct trend. In this paper, we have analysed the COVID-19 progression in India and developed a system to forecast the behaviour of COVID-19 spread in the future months using machine learning.***
The objective of this paper is to use prophet model in Machine Learning for analysing and predicting the information of COVID-19. The user or consumer can glimpse a machine learning formula that analyses the data and how the machine learning algorithm predicts the data to facilitate in future health care mechanism.
Keywords: COVID-19, Coronavirus, FbProphet model, Machine Learning, India

I. INTRODUCTION

On 30 January 2020, Director-General WHO declared that the outbreak of novel coronavirus (2019-nCoV) constitutes a Public Health Emergency of International Concern (PHEIC) as per the advice of International Heath Regulations (IHR) Emergency Committee et al [1] .As on 31th January 2020, a total of 9720 confirmed cases and 213 deaths have been reported in China et al [3].The epicenter of the outbreak was initially in Wuhan City, Hubei province but has rapidly extended to all other provinces of China et al [2]. Outside of China, 19 countries have reported a total of 106 confirmed cases, most with travel history from China. These countries are Australia (9), Cambodia (1), Canada (3), Finland (1), France (6), Germany (5), India (1), Italy (2), Japan (14), Malaysia (8), Nepal (1), Philippines (1), Singapore (13), South Korea (11), Sri Lanka (1), Thailand (14), UAE (4), USA (6), and Vietnam (5).On 30 January 2020, a laboratory confirmed case of 2019-nCoV was reported in Kerala.

II. LITERATURE REVIEW

Narayana Darapaneni et al [12] has used FbProphet Model which is for time-series forecasting which was made open source by Facebook in 2017. The work in this paper is focusing on COVID-19 Data analysis prediction using Machine learning with FbProphet algorithm approach. The main is prediction work in this project i.e., the future rarely repeat itself in the same way as the past specifically cases of covid - 19 it will be difficult to predict accurately. Arman Behnam et al [13] used predictive analytics which is based on dataset, active cases are derived reveals the number of confirmed, recovered, and death cases per day. A tremendous rise in the case number is obvious though freshly the active cases number is decreasing. Death cases trend has a gentle slope.

Hamzah, F. Binti, et al [7] analyzed the sentiments
from news extracted by CoronaTracker to further understand people's reaction towards this outbreak. COVID-19 is still an infectious disease with some unclear or unknown properties, which means accurate SEIR prediction can only be obtained once the outbreak has been successfully contained. The outbreak spreads are largely influenced by each country's policy and social responsibility.

III. MATERIALS AND METHODS

A. Data Collection and Preparation

Variables in our research include number of newly found cases, new death cases, and newly found recovered cases in India. All information has been collected and classified from reputable sources such as WHO (World Health Organization). These variables are chosen for use in our prediction methods because of their numerical nature. The high prevalence rate of COVID19 and the need for estimates necessitate the collection of the necessary datasets from reliable sources including WHO and Worldometer. Examination data, including observational data, are from a three-part collection of sample reports (i.e., death, confirmation, and recovery). This daily information at national level is confirmed by WHO.

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Machine learning involves structural data that we see in a table. Algorithms for this comprise both linear and nonlinear varieties. Linear algorithms train more quickly, while nonlinear are better optimized for the problems they are likely to face (which are often nonlinear).

B. Prophet Model

Prophet is a procedure for forecasting time series data based on an additive model where non-linear trends are fit with yearly, weekly, and daily seasonality, plus holiday effects. It works best with time series that have strong seasonal effects and several seasons of historical data. Prophet is robust to missing data and shifts in the trend, and typically handles outliers well. (Narayana Darapaneni et al 2020)

The Prophet algorithm is used in the time series and Forecast models. It is an open-source algorithm developed by Facebook, used internally by the company for forecasting. The Prophet algorithm is of great use in capacity planning, such as allocating resources and setting sales goals. Owing to the inconsistent level of performance of fully automated forecasting algorithms, and their inflexibility, successfully automating this process has been difficult. On the other hand, manual forecasting requires hours of labor by highly experienced analysts.

Prophet isn't just automatic; it's also flexible enough to incorporate heuristics and useful assumptions. The algorithm's speed, reliability and robustness when dealing with messy data have made it a popular alternative algorithm choice for the time series and forecasting analytics models. Both expert analysts and those less experienced with forecasting find it valuable.

C. Our Analysis

We have done our analysis on the data gathered from the official website of the Ministry of Health and Family Welfare, Government of India. Also, for the sake of our analysis, considering the huge population of our country, we have assumed that not the whole population is likely to be infected with this disease.

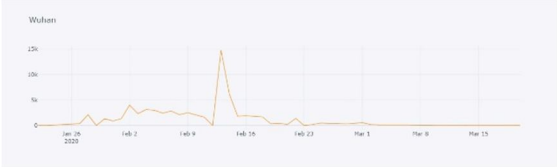


Fig. This graph shows new cases in Wuhan

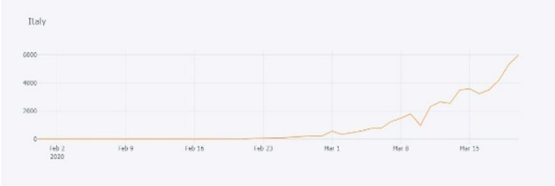


Fig. This graph shows new cases in Italy

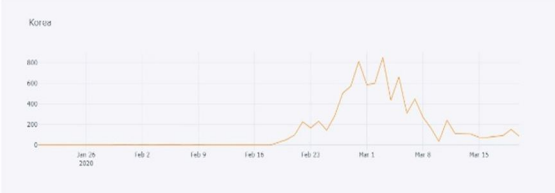


Fig. This graph shows new cases in Korea

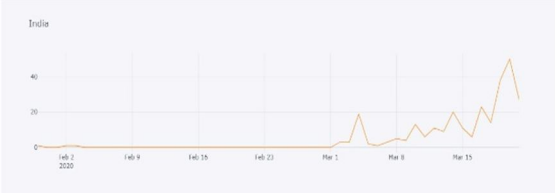


Fig. This graph shows new cases in India

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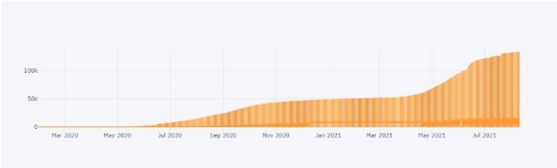


Fig. Cured cases in India

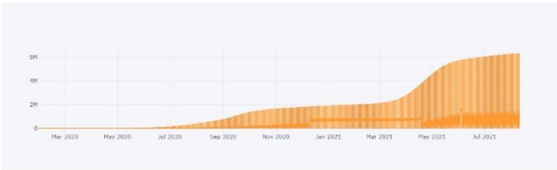


Fig. Death rate in India

The above graph shows the death rate in India in a date-wise manner. On the x-axis, it shows the time duration between March 2020 to July 2021, and on the y-axis, it shows the death rate due to covid 19.This graph shows that the COVID mortality graph has grown exponentially since September 2020.

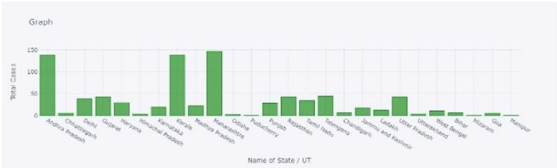


Fig. Total cases according to States in India

The above graph shows the total cases in India in a state wise manner, on x- axis there is name of states in India and on y- axis there is total cases of covid-19 found in India. Among states, Andhra Pradesh, Kerala, Maharashtra, Tamil Nadu, and Delhi are the hotspots for Covid-19 cases. The above graph shows the total cases in India in a state wise manner. The Asian country was divided into three zones particularly 1) Red zones (Hotspots) 2) Orange zones (non-hotspots) and 3) inexperienced zone (Area while not ensure cases for 3 uninterrupted weeks). Machine Learning approaches are used and there is 2 resolutions, one for Analysing the information and the alternative to predict the chances of being infected and the other to predict the number of positive cases. According to these zones, Andhra Pradesh, Kerala, Maharashtra, Tamil Nadu, and Delhi are the hotspots for Covid-19 cases.

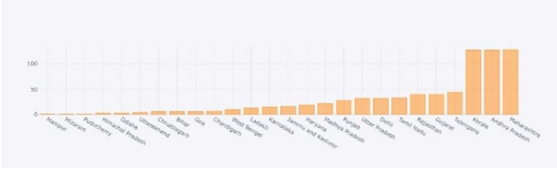


Fig. Total cases in India according to States in ascending order

The above graph shows the total cases in India in state wise manner, on x- axis there is name of states in India and on y- axis there is total cases of covid-19 in India This graph shows the total cases in India in state wise manner, Whichever state has the maximum number of total cases, according to that, this graph has been shown in ascending order, and its shows Kerala, Maharashtra, Andhra Pradesh are the main hotspots for Covid-19 cases.

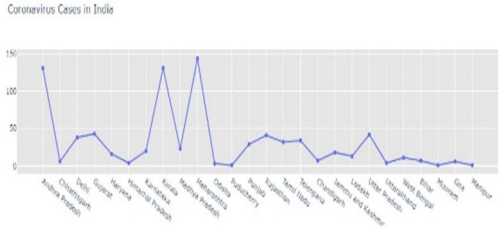


Fig. Total Cases in India

IV. PREDICTION

Prediction refers to the output of an algorithm after it has been trained on a particular dataset and applied to new data when forecasting the likelihood of a particular outcome, and based on our dataset, future active cases are derived. It reveals the number of confirmed, recovered, and death cases per day. (Arman Behnam et al 2 January 2021)

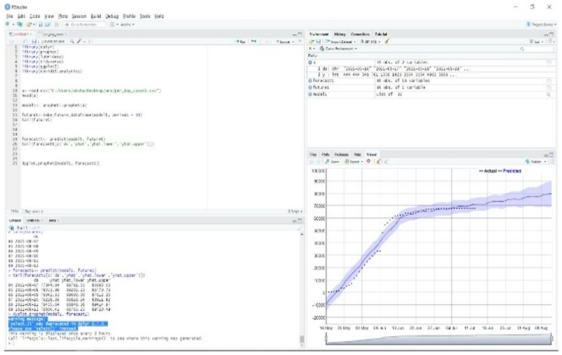


Fig. Shows the predictive Model

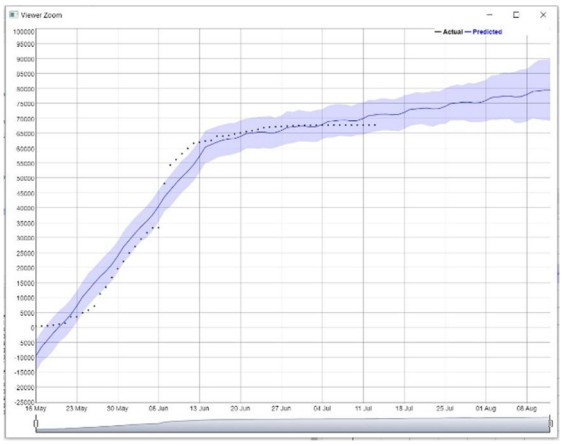


Fig. Prediction Graph

This Graph shows the total cases on y-axis and dates on x-axis. The dots represent the total cases on the date mentioned in the graph. The blue line represents the prediction done by the fbProphet Model.

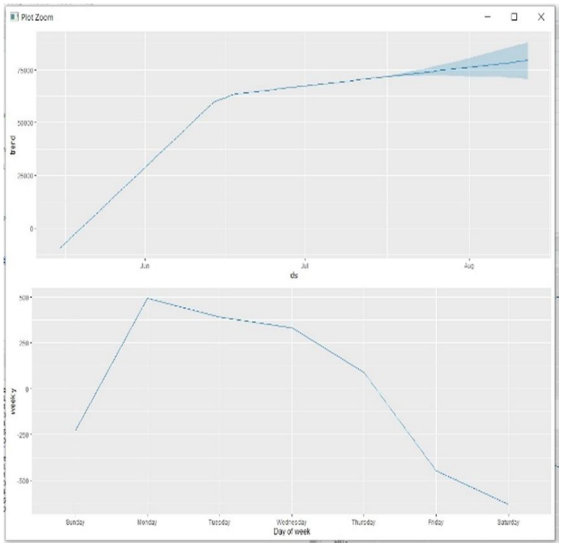


Fig. Shows the weekly prediction and trends of prediction

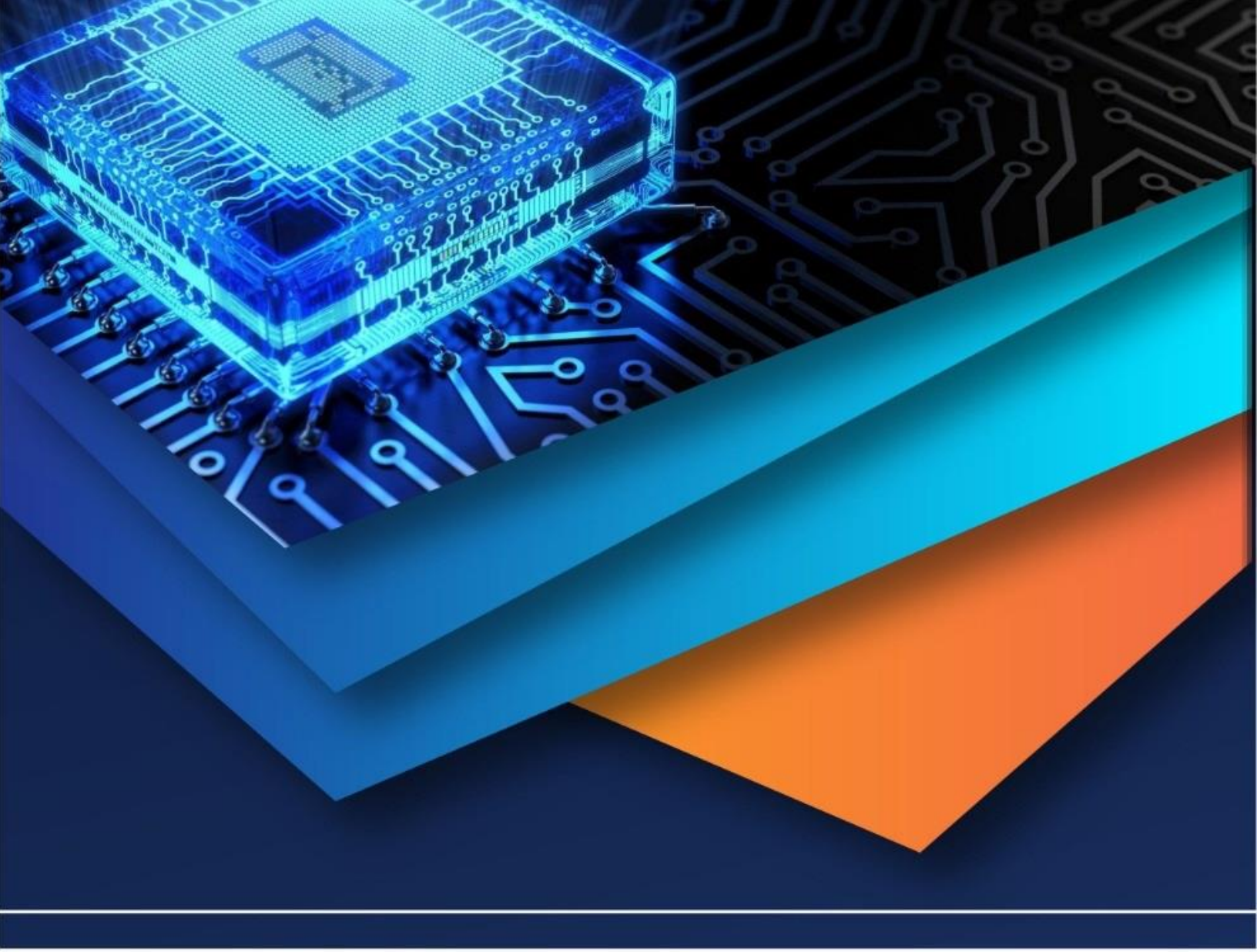
V. CONCLUSION AND FUTURE SCOPE

The pandemic caused by COVID-19 is responsible for the advanced mortality rate and lower recovery rate. In this study, timewise patterns of the rise and fall of confirmed, deaths and recovery cases have been presented visually. The scope is to study the trend of Covid-19 Outbreak and give a predictive system to stop the outbreak. Thus, in this project the data of Covid is analysed a mere prediction has been done if the cases will grow or not. Accordingly, the action can be taken to stop this outbreak.

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