Covid 19 Case Analysis

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Introduction

Corona virus widely known as COVID-19 are a large family of viruses that are known to cause illness ranging from the common cold to more severe diseases such as Middle East Respiratory Syndrome (MERS) and Severe Acute Respiratory Syndrome (SARS). The virus out-braked on Nov-2019 from Wuhan city of china.

The virus affected southChina for about a month and then it spread throughout the world making its way through Europe. The champion's league game between Atlanta and Valencia became the poison for spreading the virus in Europe as more than 80,000 spectators were in the stadium. Till date, the virus had spread in about 235 territories affecting more than 55 million of population. The timely imposing of the lockdown controlled the chances of rapid incrementation of the infected population till June.

A large number of people are being infected and killed on a daily basis all over the world. And the data of death, infected and recovered cases are being provided on different websites, Google, web pages etc. But these data are only limited to national and international level. Therefore, with the necessity to bring the data to the local level with effective analysis, and to make a project work possible through virtual classes we The students of Geomatics engineering were assigned with the project "Covid-19 Case Analysis".

Literature Review

In a study by Arti (2020) noticed that the lock-down and isolation are the important techniques to prevent the spreading of the disease. They studied the effect of these prevention techniques on the spread of Covid19 mathematically, and proposed a new mathematical model to predict the new cases or total infected cases in practical scenarios. This prediction is very much required to prepare medical set-ups and proceed for future plan-of-action. A new model for constrained scenarios is proposed for Covid19 spread. A tree-based model is considered, in which some people are quarantined and few are left undetected (hidden nodes) because of various reasons like symptoms not shown, hiding travel history, etc., and these hidden nodes spread the disease in the community.

In another study made by Varsha Kachroo (2020) reviewed the possible mode of transmission, definitions, some basic advice, diagnosis, treatment and management protocol being followed right now in India; however subjected to change in due course of time as is the number of cases and mortality. The health care personnel are doing their job perfectly and so is the Government, but what is important for everyone being a citizen of India is to maintain social distance and follow advisories strictly from time to time so that we can make way for our own lives and lives of our dear ones.

Di Gennaro (2020) performed a narrative review to describe existing literature with regard to CoronaVirus Disease 2019 (COVID-19) epidemiology, pathophysiology, diagnosis, management and future perspective. MEDLINE, EMBASE and Scopus databases were searched for relevant articles. Although only when the pandemic ends it will be possible to assess the full health, social and economic impact of this global disaster, this review represents a picture of the current state of the art. In particular, we focus on public health impact, pathophysiology and clinical manifestations, diagnosis, case management, emergency response and preparedness.

Gupta et al. (2020) has shown the current situation of coronavirus spread in India along with the impact of various measures taken for it. With the help of data sources (till 7th–8th April 2020) from various state units of India and Ministry of Health and Family Welfare, Government of India, this study presents various trends and patterns. This study answers six different research questions in a comprehensive manner. It has been reported that the growth rate of infected cases has been controlled with the help of National Lockdown, however some uncontrolled mass level events had negatively impacted the infected cases.

Objectives

The primary objective of our project is:

- To study timely trend of Covid-19 in our home districts along with the comparative study of situations.

The secondary objectives of our project are:

- To determine the possible analytical outcomes of COVID-19 situations based on different age groups and other divisions.
- To study and predict the number of cases and their growth in future time period.
- To develop the idea and concept of teamwork, field project and analytical skills to us.

Scope

We have collected the COVID-19 data through different sources. We have used the official website of the Ministry of Health and Population, the CDO Offices of individual home districts, and Municipality's website. We have refined, and analyzed those data in different aspects and displayed it in a systematic form. So, this report/project can be helpful to different students who are doing COVID -19 research and projects of different districts. Similarly, local level bodies can utilize it to study the pattern of COVID-19 and formulate the further plans as per need.

Coding

```
#Library
library(covid19.analytics)
library(dplyr)
library(prophet)
library(lubridate)
library(ggplot2)
# Data
tsc <- covid19.data(case = 'ts-confirmed')
tsc <- tsc %>% filter(Country.Region == 'India')
tsc <- data.frame(t(tsc))
tsc <- cbind(rownames(tsc), data.frame(tsc, row.names = NULL))
colnames(tsc) <- c('Date', 'Confirmed')
tsc <- tsc[-c(1:4),]
tsc$Date <- ymd(tsc$Date)
str(tsc)
tsc$Confirmed <- as.numeric(tsc$Confirmed)
# Plot
qplot(Date, Confirmed, data = tsc, main = 'Covid19 confirmed cases in India')
ds <- tsc$Date
y <- tsc$Confirmed
df <- data.frame(ds, y)
# Forecasting
m <- prophet(df)
# Prediction
future <- make_future_dataframe(m, periods = 28)
forecast <- predict(m, future)
# Plot forecast
plot(m, forecast)
dyplot.prophet(m,forecast)
```

```
prophet_plot_components(m, forecast)
#forecast smaller components
prophet_plot_components(m, forecast)
# Model performance
pred <- forecast$yhat[1:803]
actual <- m$history$y
plot(actual, pred)
abline(lm(pred~actual),col = 'red')
summary(lm(pred~actual))
```

Outputs

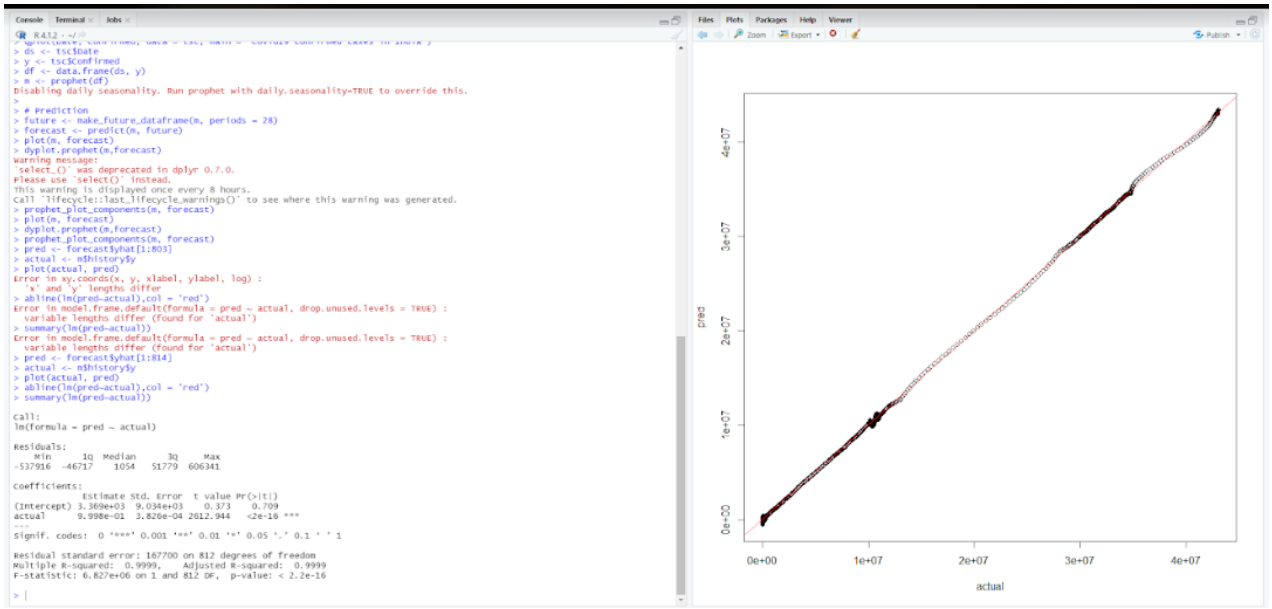

Fig.1 Model performance of actual and predicted values

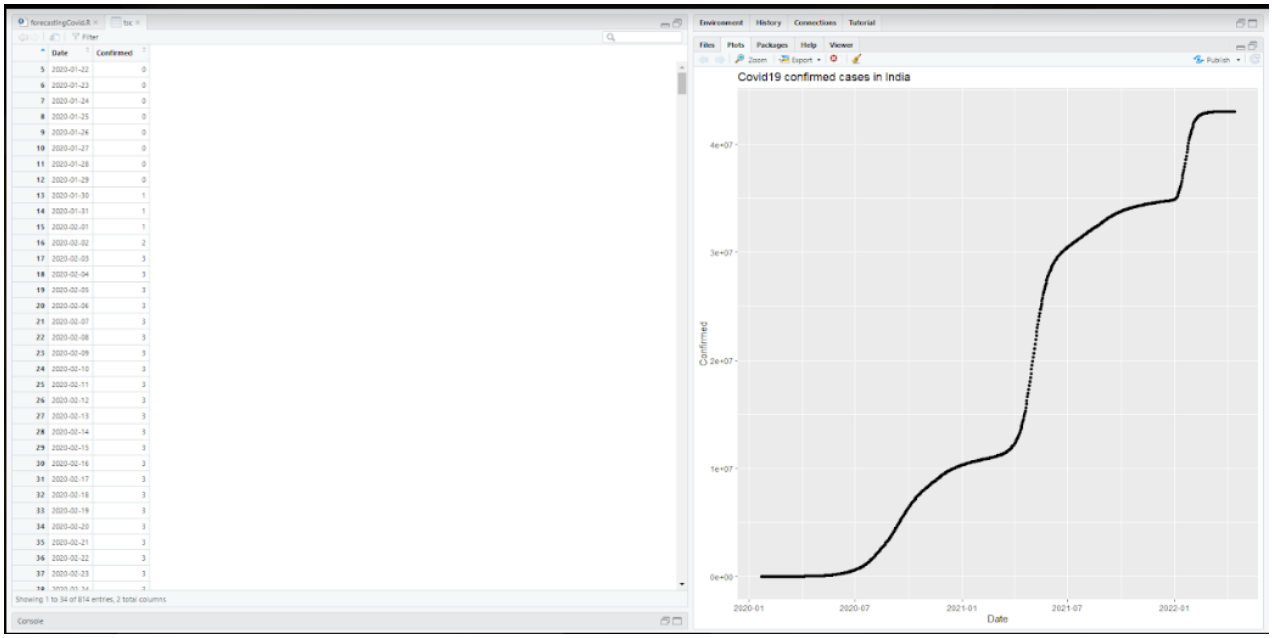

Fig.2 Dataset and plotting of confirmed covid19 cases

Fig.3 Plotting of forecasting actual and predicted values of covid19 cases

Conclusion

The study concerns the spread of COVID-19 in India. A control-theoretic approach is used to develop an epidemic model to simulate and predict the disease variations in 10 most affected states of India. Results depict a rapid increase in the number of cases in the coming days. However, it is pertinent to mention that the future estimation provided, is subject to certain system parameters and can vary based on the external inputs like lock-down measures, social-distancing, vaccine/drug development, rapid testing, etc. Information provided by our model could help establish a realistic assessment of the situation for the time-being and in the near future in order to apply the appropriate public health measures.

References

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