Predict the India's COVID-19 Spread by using Machine Learning

On day one, no one knows that you are sick. You are feeling like it's a normal day. It takes a long time until one day a few people you know are sick. Suddenly a few days mater you are going to see everyone is sick and it will feel like it happens so instantly. Everyting looks fine until it is not. This is the paradox of a pandemic and this is why an outbreak like coronavirus disease is bigger than it seems. We are hearing officials calling for huge drastic and rapid response in early days when infections numbers are relatively small.

On 25th March Afternoon and India has reported its 9th death with 562 total confirmed cases due to COVID-19. Fresh cases from Manipur, Bihar, Gujrat, and Madhya Pradhesh have been reported by the Union Ministry of Health and Family Welfare.

As the coronavirus outbreak continues to spread in the country,the question that we as Indians are trying to answer is : whether India will be able to tackle its menance or are we going to witness another Italy or S.Korea?

To respond we are going to use Machine Learning for predicts the spread of the virus in the next 7 days by using.

Thus, we are going to analysing in the first part the present condition in India. Then we will see if this trend is like Italy/S. Korea/ Wuhan. Also, we will explore the worldwide data. Finally, we will talk about forecasting total number of cases worldwide thanks to Prophet.

Analysing the present condition in India

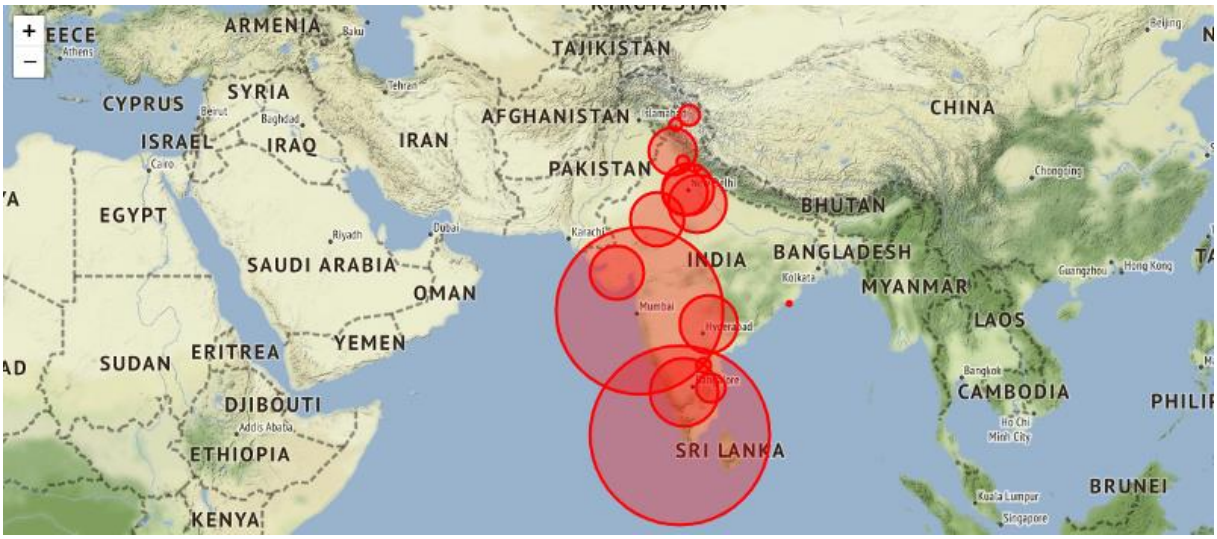
Here is a brief timeline of the cases in India.

The first COVID-19 case was reported on 30th January 2020 when a student arrived Kerala from Wuhan. Just in next 2 days, Kerela reported 2 more cases. For almost a month, no new cases were reported in India, however, on 2nd March 2020, five new cases of corona virus were reported in Kerala again and since then the cases have been rising affecting 25 states.

Name of State / UT	Total Confirmed cases (Indian National)	Total Confirmed cases (Foreign National)	Cured	Death	Total cases
Andhra Pradesh	9	0	0	0	9
Bihar	3	0	0	1	3
Chhattisgarh	1	0	0	0	1
Delhi	30	1	6	1	31
Gujarat	32	1	0	1	33
Haryana	14	14	11	0	28
Himachal Pradesh	3	0	0	1	3
Karnataka	41	0	3	1	41
Kerala	101	8	4	0	109
Madhya Pradesh	9	0	0	0	9
Maharashtra	98	3	0	2	101
Manipur	1	0	0	0	1
Mizoram	1	0	0	0	1
Odisha	2	0	0	0	2
Puducherry	1	0	0	0	1
Punjab	29	0	0	1	29
Rajasthan	30	2	3	0	32
Tamil Nadu	16	2	1	0	18
Telengana	25	10	1	0	35
Chandigarh	7	0	0	0	7
Jammu and Kashmir	7	0	1	0	7
Ladakh	13	0	0	0	13
Uttar Pradesh	34	1	11	0	35
Uttarakhand	3	1	0	0	4
West Bengal	9	0	0	1	9

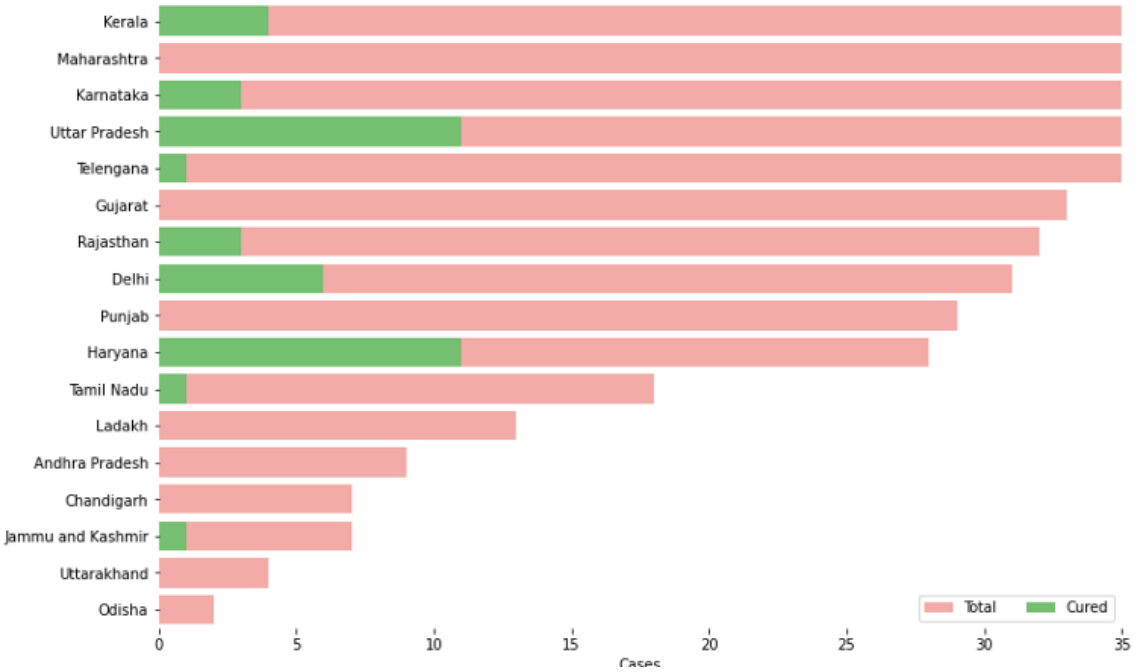
As we can see in this sheet Kerala, Maharashtra, and karnataka are currently TOP 3 states with maximum number of confirmed cases

Visualising the spread geographically

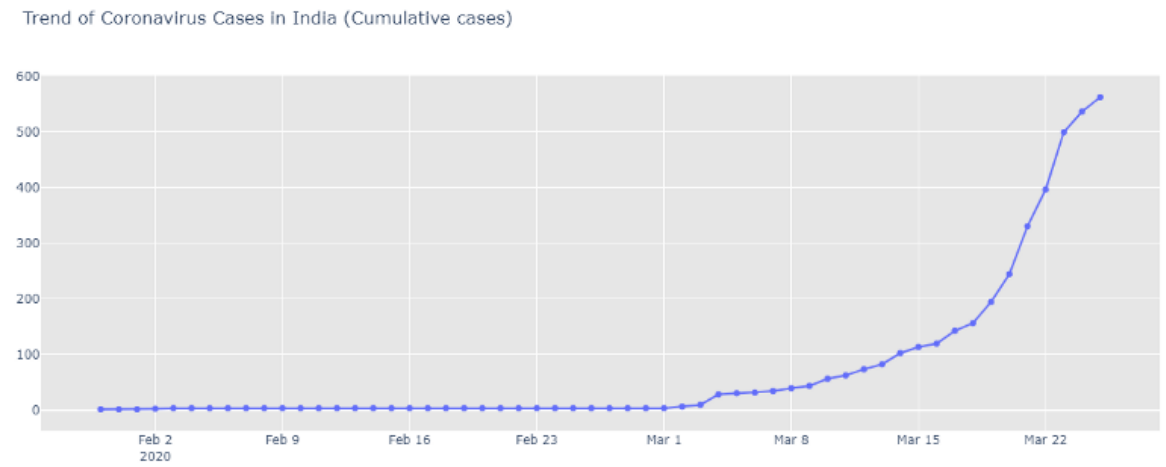


Confirmed vs Recovered figures

Here we can see that Kereka is the highest number of cases, immediately followed by Kamatak. We can deduce from this that Kereka despite having tlhe maximum number of cases also have more amount of recoveries from Maharashtra which brings us to a conclusion that the net percentage of affected people are actually lesser in Kerela than that of Maharashtra.



How the Coronavirus cases are rising?

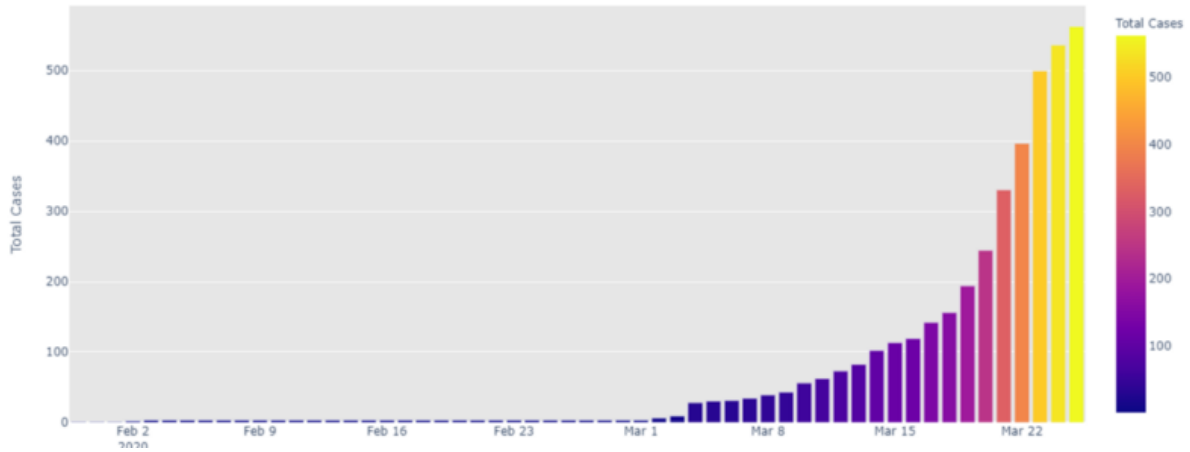


Is the trend similar to Italy, South Korea and Wuhan ?

India has already crossed 562 cases. It is very important to contain the situation in the coming 21 days.The numbers of coronavirus patients starting doubling after these countries hit the 100 mark and almost starting increasing exponentially.

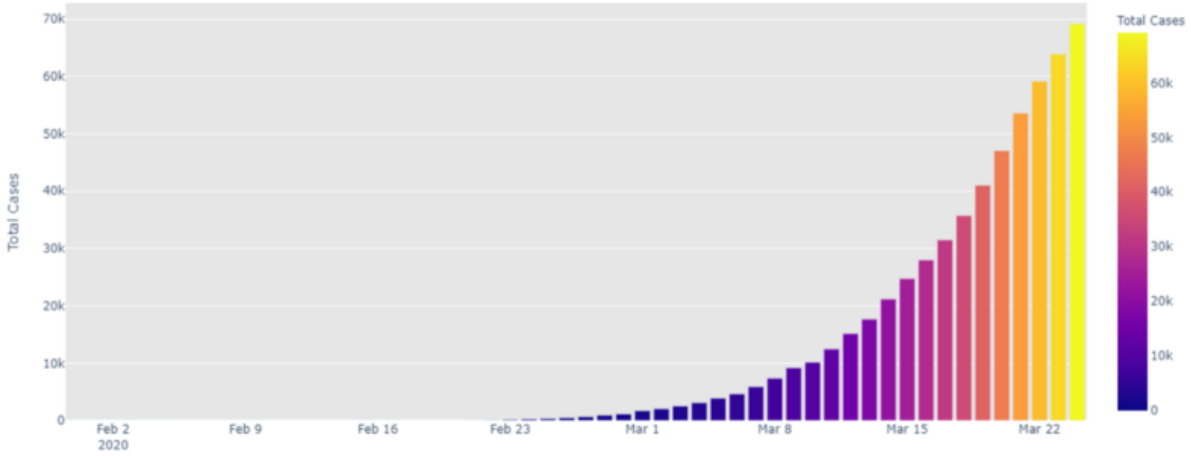
Cumulative cases in India, Italy, S.Korea, and Wuhan

Confirmed cases in India is rising exponentially with no fixed pattern (Very less test in India)



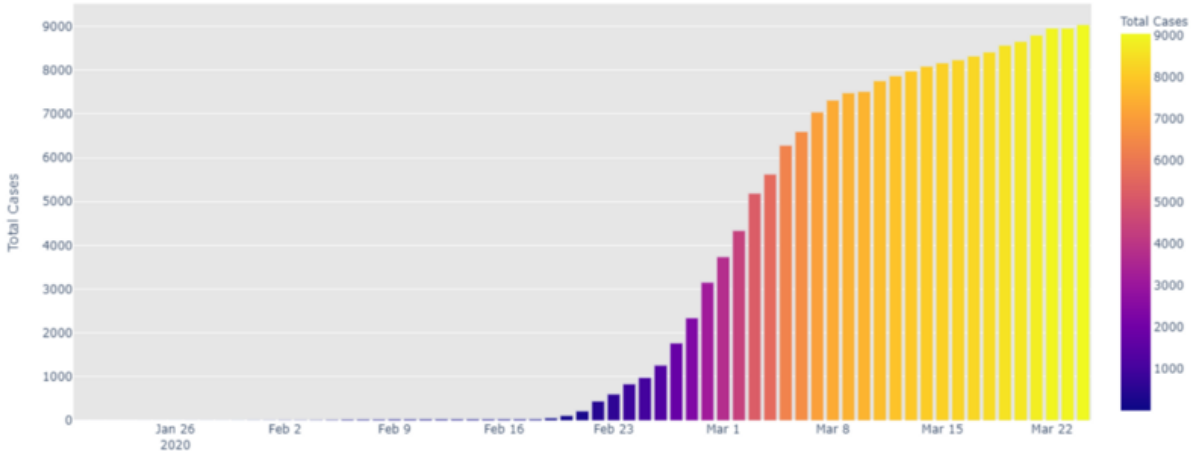
Confirmed Cases in India

Confirmed cases in Italy is rising exponentially with certain fixed pattern

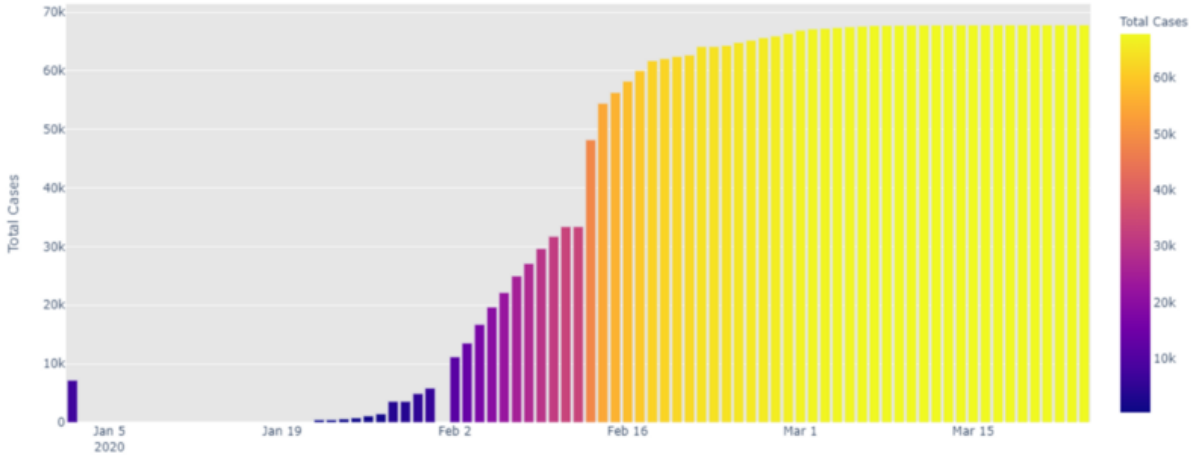


Confirmed Cases in Italy

Confirmed cases in South Korea is rising gradually



Confirmed Cases in South Korea



Confirmed Cases in Wuhan

In Wuhan they did many tests on people to know if they are infected of COVID-19 disease. Thats why the number of total cases is very high compared to the other countries.

Why is India testing so little?

The official assumption is the disease has still not spread in the community. As early "evidence" health authorities say 826 samples collected from patients suffering from acute respiratory disease from 50 government hospitals across India between 1 and 15 March tested negative for coronavirus. Also, hospitals have not yet reported a spike in admissions of respiratory distress cases.

Many of experts believe India is also testing below scale because it fears that its under-resourced and uneven public health system could be swamped by patients.

Furthermore, India has eight doctors per 10,000 people compared to 41 in Italy and 71 in Korea. It has one state-run hospital for more than 55,000 people. (Private hospitals are out of reach for most people). India has a poor culture of testing, and most people with flu symptoms do not go to doctors and instead try home remedies or go to pharmacies. There's a scarcity of isolation beds, trained nursing staff and medics, and ventilators and intensive care beds.

Worldwide COVID-19 cases

The number of confirmed cases is increasing exponentially around the world. The number of recoveries and deaths is increasing slightly.We notice that the number of healed is much higher than the number of deaths. However, the number of deaths continues to increase day by day.

Forecasting Total Number of Cases Worldwide with Prophet

Prophet is open source software released by Facebook's Core Data Science team. It is available for download on CRAN and PyPI.

We use Prophet, 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.

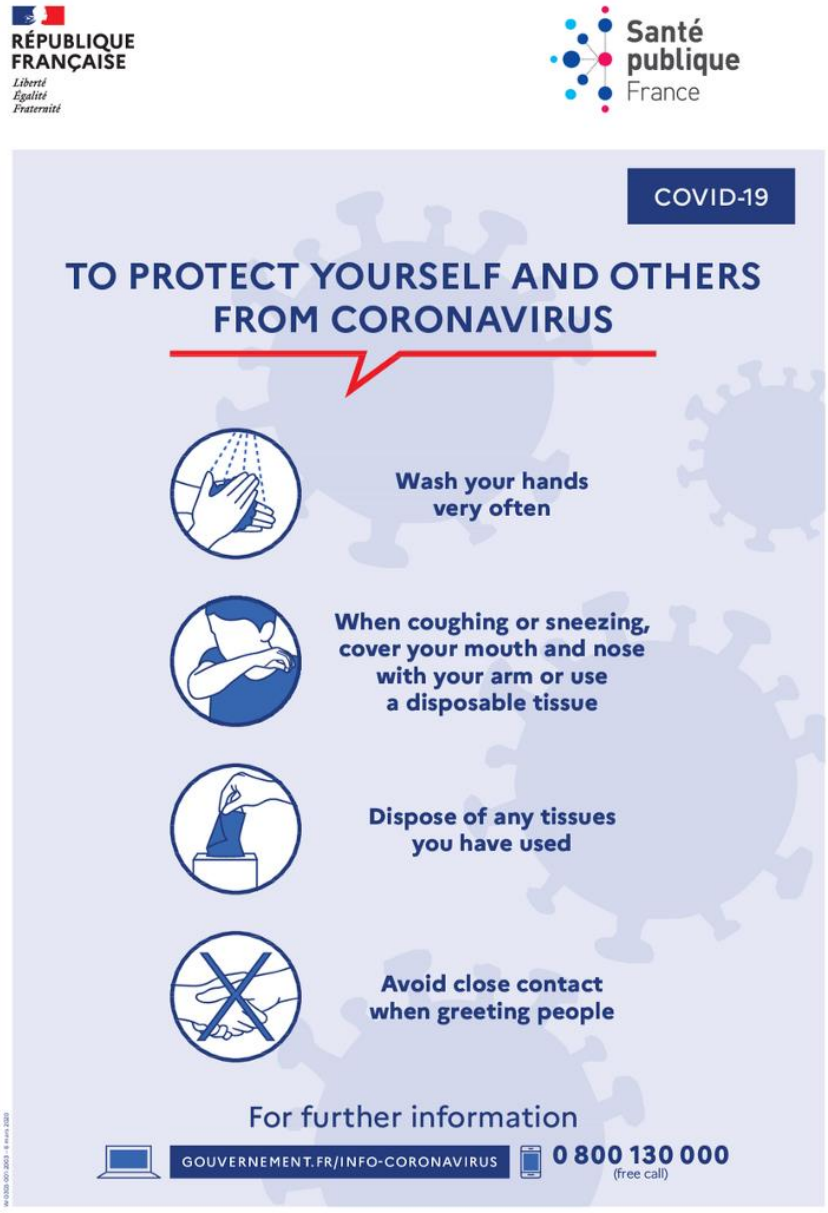
We decided to use Prophet because it is:

- Accurate and fast
- Fully automatic

- Good forecasts
- Available in R or Python

To responde to our issue we did lots of visualitation to gerenate a week ahead forecast of confirmed cases of COVID-19 thanks to Prophet, with 95% prediction interval by creating a base model with no tweaking of seasonality-related parameters and additional regressors.

Don’t forget !!!



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