EXL EQ-21

Forecasting Covid-19 cases
at a country level

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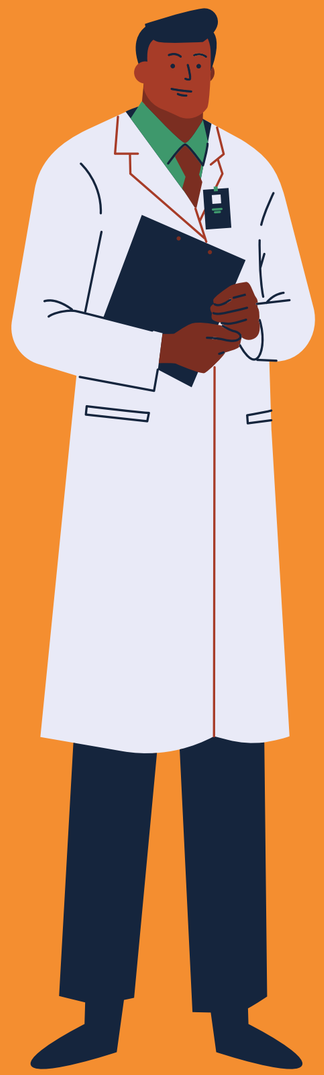


Key Presentation Points

- Executive Summary
- Solution Design
- Development Process
- Key drivers of the Model & Validation results
- Top 5 states expected to be worst affected by Covid-19
- Vaccination Strategy

Executive Summary

Problem

To develop a tool for a US public health client to predict daily Covid-19 cases at a country level.

What we know!

Dataset containing the information about country-wise Covid-19 information updated till January, 2021.

What we need to find?

To develop a model which can forecast the number of daily new Covid-19 cases at a country level.

Solution Design

Used the provided dataset to develop a model which can forecast the number of new Covid-19 cases at a country level.

Used **XGBoost Regressor model** to predict the number of daily new Covid-19 cases.

Used **fbprophet** procedure for forecasting time series data based on an additive model to predict future observations.

Developmental Process

Modelling Developmental Process

Data Preprocessing

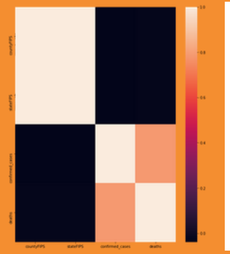
Preprocessed the data, treated the NaN values and found the correlation heatmap between various features to identify the statistically significant ones.

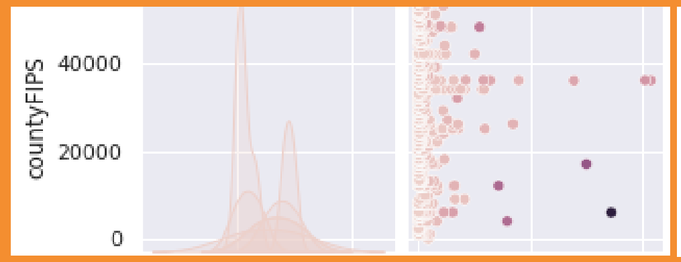
Data Modelling

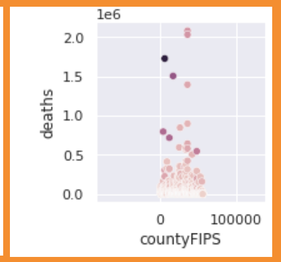
Used XGBoost Regressor for optimal performance to predict the daily Covid-19 cases as it involves training and combining individual models to get a single prediction.

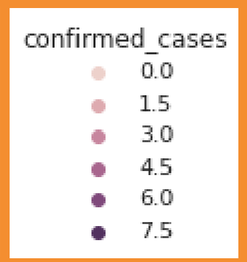
Data Prediction

Model Prediction on Test Data. Gives a probability score on each prediction.



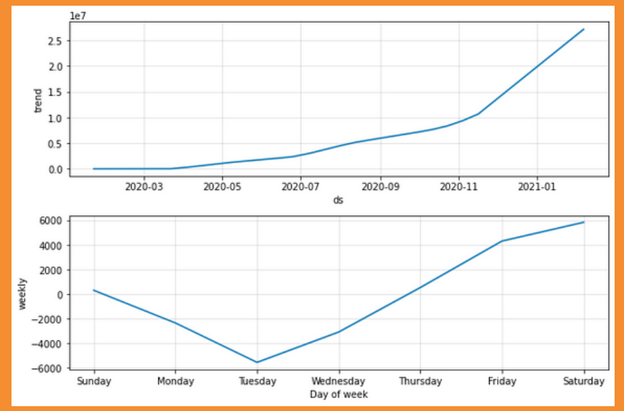






Forecasting Developmental Process

Analyzed the dataset over the features 'Confirmed Cases' and 'Number of deaths' and applied the Fbprophet procedure for forecasting time series data based on an additive model where non-linear trends were fitted on the 'Date' feature.



Key drivers of the Model

01 **countryFIPS**

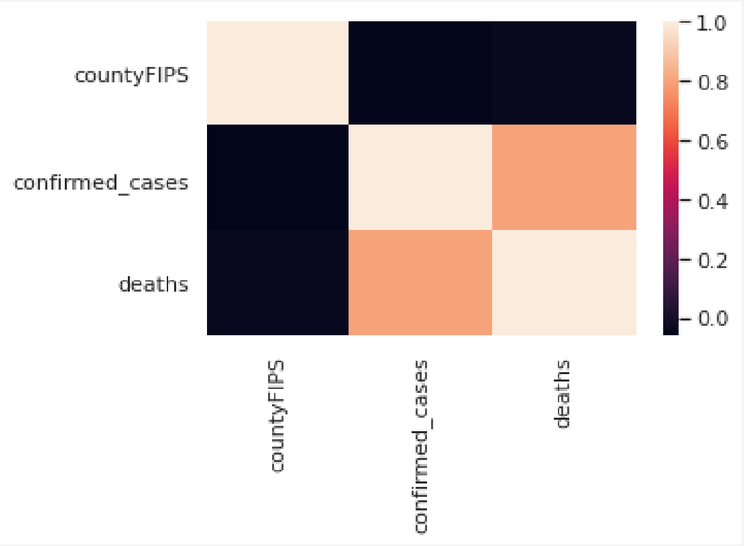
Predicted the number of Confirmed Cases by the 5-digit Federal Information Processing Standards Code which uniquely identifies countries.

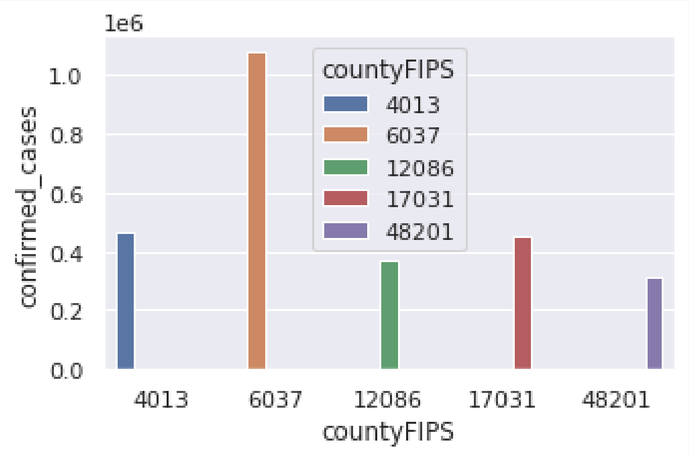
02 **stateFIPS**

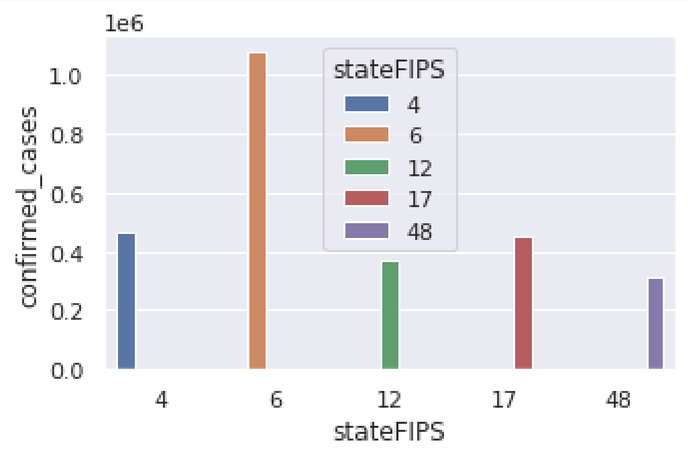
Predicted the number of Confirmed Cases by the 2-digit Federal Information Processing Standards Code which uniquely identifies states.

03 **date**

Mapped the dates into ordinal values to predict the model based on the feature.







Validation Results

91.97%

Training Accuracy

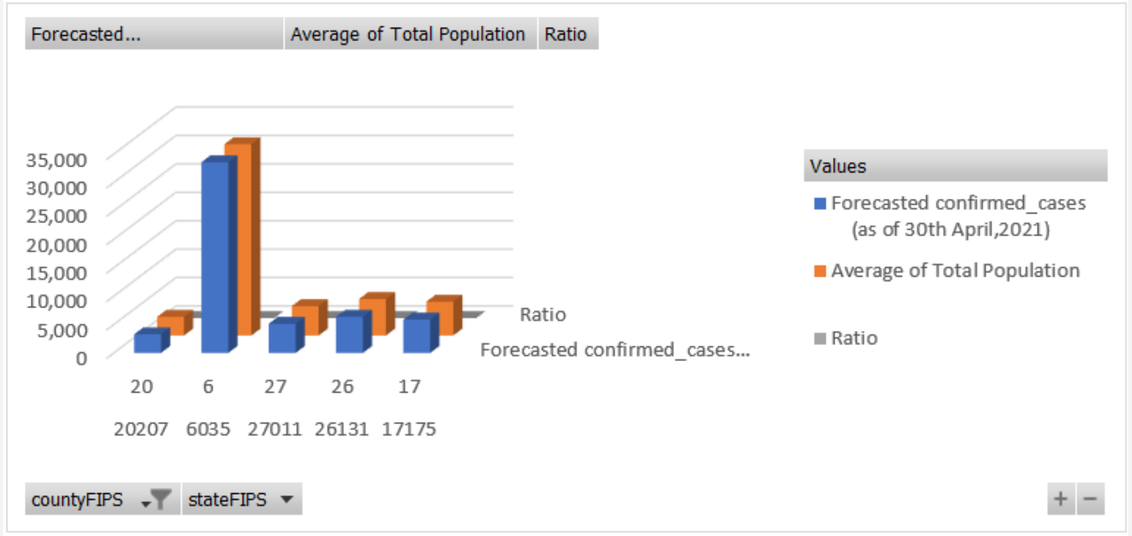
91.48%

Test Accuracy

Top 5 States expected to be worst affected by COVID-19

countryFIPS	stateFIPS
20207	20
6035	6
27011	27
26131	26
17175	17

countryFIPS	stateFIPS	Forecasted confirmed_cases (as of 30th April,2021)	Average of Total Population	Ratio
20207	20	3,268	3,278	0.9969
6035	6	33,548	33,658	0.9967
27011	27	5,127	5,164	0.9929
26131	26	6,361	6,413	0.9919
17175	17	5,867	5,946	0.9867



07

Vaccination Strategy

Setting up a unified vaccination strategy system

Training & Awareness

- Training authorized vaccinators on how to vaccinate and how to explain side effects.
- Awareness programs for the vaccine-agnostic masses through various media.

Unified Digital Platform

Setting up a unified digital platform system for trouble-free vaccination procedures for both the public as well as healthcare officials.

Network of Vaccination centres

- Set up a network of public and private vaccination centers with trained vaccinations and proper infrastructure.
- Vaccination centres could be govt sponsored or hospitals, corporates or pharmacies, all registered onto the unified application technology.

Slot Booking

- The public could book slots for vaccination through mobile app/ through e-service centers and get their vaccination done in nearby centers.
- Slot booking would be conducted phase-wise based on age & health parameters.

Communication Strategy

INFORMATION ON THE NEW COVID-19 VACCINE

Provide prompt, simple and focused communication on the COVID-19 vaccine(s) and vaccination processes.

VACCINE HESITANCY

Build public confidence on the safety and efficacy of the new vaccine.

VACCINE EAGERNESS

Ensure understanding and acceptance of the phased and prioritized approach to overcome concerns of the population waiting for vaccination.

COVID APPROPRIATE BEHAVIOURS

Maintain and sustain key preventive behaviors: wearing masks, maintaining physical distance, and handwashing with soap.

Initial Target Audience

- Health care workers
- Frontline functionaries
- People over 50 yrs of age
- People under 50 yrs with co-morbidities