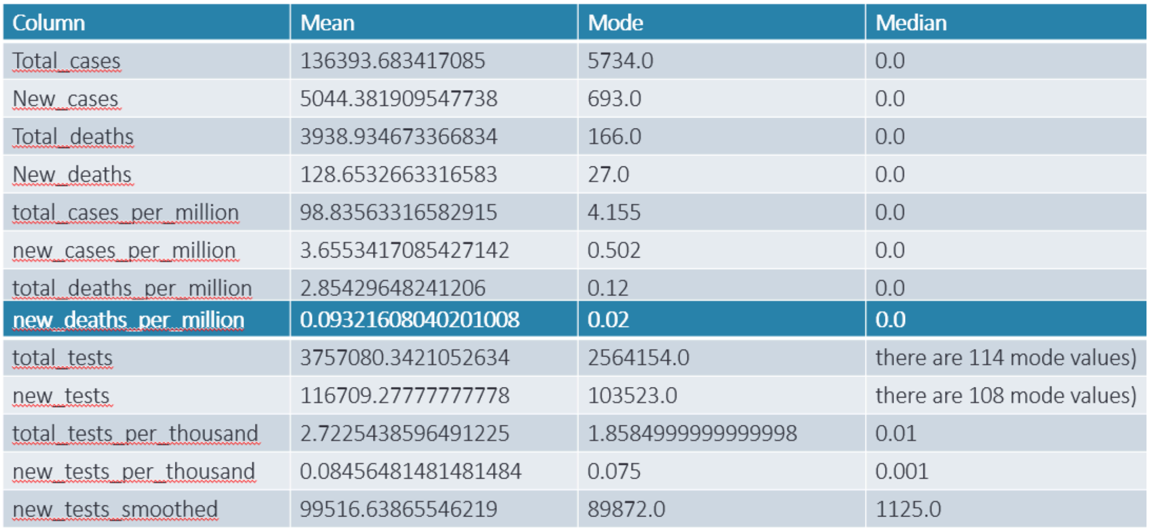
# COVID-19 total case prediction using Machine Learning

COVID-19 has been a pandemic of high concern due to its effects on human health and the large amount of deaths caused by the SARS-CoV-2 virus widespread across the world in today's situation. It is Very important for us to know the total number of cases that could have been on a particular day according to the daily updates of the new cases in that location. Hence, the aim of this Study was to build a machine learning model with two of the extremely popular Regression Algorithms such as Random Forest Regressor as well as the Linear Regression Algorithm.

In this study, the prediction of total covid-19 cases is carried out and also the suitable model of best fit for the type of data is analyzed. Data is taken from Owid COVID-19 Data Website where we are using the latest data of 18th July,2020.

The Description of data is provided below till 18th July ,2020



| Column | Mean | Mode | Median |
|---|---|---|---|
| Total_cases | 136393.683417085 | 5734.0 | 0.0 |
| New_cases | 5044.381909547738 | 693.0 | 0.0 |
| Total_deaths | 3938.934673366834 | 166.0 | 0.0 |
| New_deaths | 128.6532663316583 | 27.0 | 0.0 |
| total_cases_per_million | 98.83563316582915 | 4.155 | 0.0 |
| new_cases_per_million | 3.6553417085427142 | 0.502 | 0.0 |
| total_deaths_per_million | 2.85429648241206 | 0.12 | 0.0 |
| new_deaths_per_million | 0.09321608040201008 | 0.02 | 0.0 |
| total_tests | 3757080.3421052634 | 2564154.0 | there are 114 mode values) |
| new_tests | 116709.27777777778 | 103523.0 | there are 108 mode values) |
| total_tests_per_thousand | 2.7225438596491225 | 1.8584999999999998 | 0.01 |
| new_tests_per_thousand | 0.08456481481481484 | 0.075 | 0.001 |
| new_tests_smoothed | 99516.63865546219 | 89872.0 | 1125.0 |

The actual columns which are used as the Independent or the Feature Variables are being showed above. Various Basic calculations such as Mean, Median, Mode are being calculated here**.**

## Various Analysis was done on the data:

## 1.Univariate analysis:

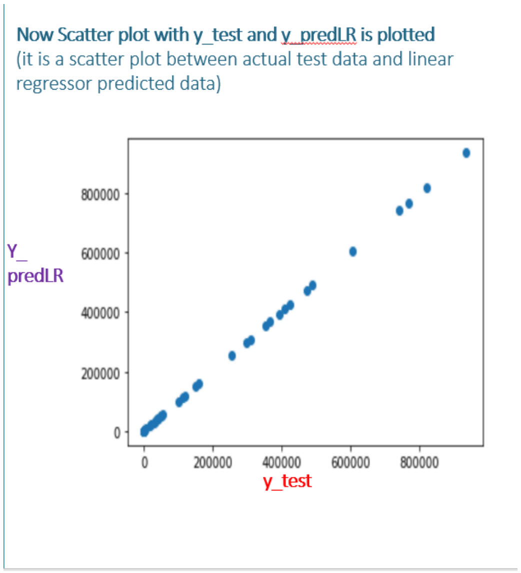
Histogram is one of the common univariate analysis methods where the distribution of the data can be observed. The Various feature variables used in our analysis are being plotted to find their distribution of data across the dataset.

### The Linear Regression Model:

Linear Regression is one of the popular regression models built for continuous data prediction. The linear regression model fits a line

$Y=\beta_o+\beta_1X_i$

- The Following Dataset after clearing the Null Values and Unnecessary Data columns the Model is fit to Linear Regression Model.
- Train test split was done and the training data is fit into the model.
- Then the testing is done accordingly.



Now Scatter plot with y_test and y_predLR is plotted
(it is a scatter plot between actual test data and linear regressor predicted data)

Analysis of fit of Linear Model on the data:

The Various Tests or Validation was been done and their scores are as follows:

1. Accuracy was found to be **:**0.9999999999968615

2. RMSE score: 0.4202825401794529

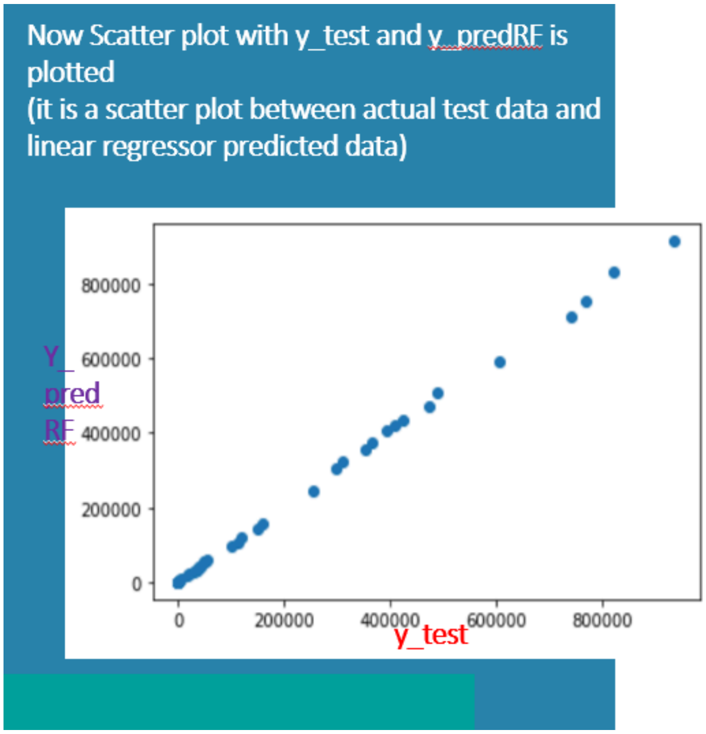
3.Fivefold Cross validation score: 0.9865092359544476

Analysis: The Conclusion is that the Model is quiet in good fit with data and can be expected to give good prediction results near to the originals.

**Random Forest Regressor:**

Random Forest Regression is on of the Ensemble Techniques called as Bagging.The Random Forest is an ensemble of Decision Trees where the Vote Casting is done to find the final output.

- Train test split was done and the training data is fit into the model.
- Then the testing is done accordingly.
- The testing prediction was scatter plotted against y_test in the data and deviations were found



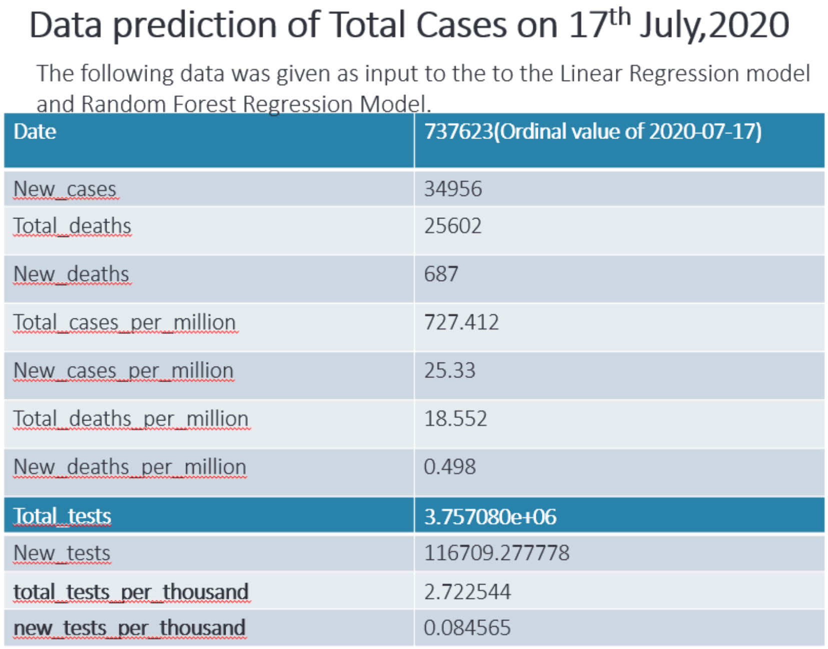
Now Scatter plot with y_test and y_predRF is plotted
(it is a scatter plot between actual test data and linear regressor predicted data)

1. Accuracy was found to be : 0.998994974199048
2. RMSE score: 0.4202825401794529
3. Five fold Cross Val score: -3.59914

Analysis: The Model has good Accuracy and RMSE score but the Fivefold Cross Val score is negative. Hence the prediction might be of less accuracy

**Prediction of data done on 17th July,2020:**

Using the above models built ,predicting the total_cases on 17th of July. The Data is as follows:



## Data prediction of Total Cases on 17th July,2020

The following data was given as input to the to the Linear Regression model and Random Forest Regression Model.

| Date | 737623(Ordinal value of 2020-07-17) |
|---|---|
| New_cases | 34956 |
| Total_deaths | 25602 |
| New_deaths | 687 |
| Total_cases_per_million | 727.412 |
| New_cases_per_million | 25.33 |
| Total_deaths_per_million | 18.552 |
| New_deaths_per_million | 0.498 |
| Total_tests | 3.757080e+06 |
| New_tests | 116709.277778 |
| total_tests_per_thousand | 2.722544 |
| new_tests_per_thousand | 0.084565 |

Results:

1.Linear Regression Prediction on Total cases = 1003831.90603254

2.Random Forest Regression prediction on Total cases=813695.315

3.Total Number of Covid cases on 17th July in Actual= 1003832

(as per data)

**So, it can be concluded that Linear Regressor fits really well than that of Random Forest Regressor.**