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# Web Application: Time Series-COVID19 Prediction

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## I. INTRODUCTION

Covid-19 has become a dangerous name in 2020. The first case was registered in Wuhan of Hubei province, China on Dec 12, 2020. It has severe spreading power, it is found that in England R-number is around 1.1-1.6 i.e an infected person can spread up to 40000 people before he gets cured. So, the health department failed with the wrong prediction of numbers. Therefore, to avoid such misassumptions, I designed a web application based on the time series and the outbreak prediction of Covid-19 in India by analyzing the daily confirmed cases as well as daily deceased cases from January to July.

This helps in the right evaluation of cases thereby helping the health department to preplan the future rise in cases and creates a chance of defeating the virus and saving the lives of millions of people. Only in India the daily confirmed cases reached around 90k and daily deceased around 1200.

My application is designed using the Django web framework and the prediction is done using multi-linear regression in Machine learning in Python by taking all the possible dependent factors such as time, daily confirmed cases, total confirmed cases, total deceased, and daily deceased as per the dataset.

## II. DATA COLLECTION

The COVID-19 dataset consists of around 173 records. These records show the information related to coronavirus cases in the country over the period of time from January to July. It contains around 7 attributes like date, daily confirmed, total confirmed, daily recovered, total recovered, daily deceased, total decreased, etc. Based on this information, we need to predict the total confirmed as well as total deceased cases as per the given future dates.

## III. DATA REPRESENTATION

The Dataset we are using is COVID-19. It consists of various details like date, daily confirmed, total confirmed, daily recovered, total recovered, daily deceased, total decreased, etc. of around 173 days daily record. The following are the steps to be performed on the dataset to solve the problem.

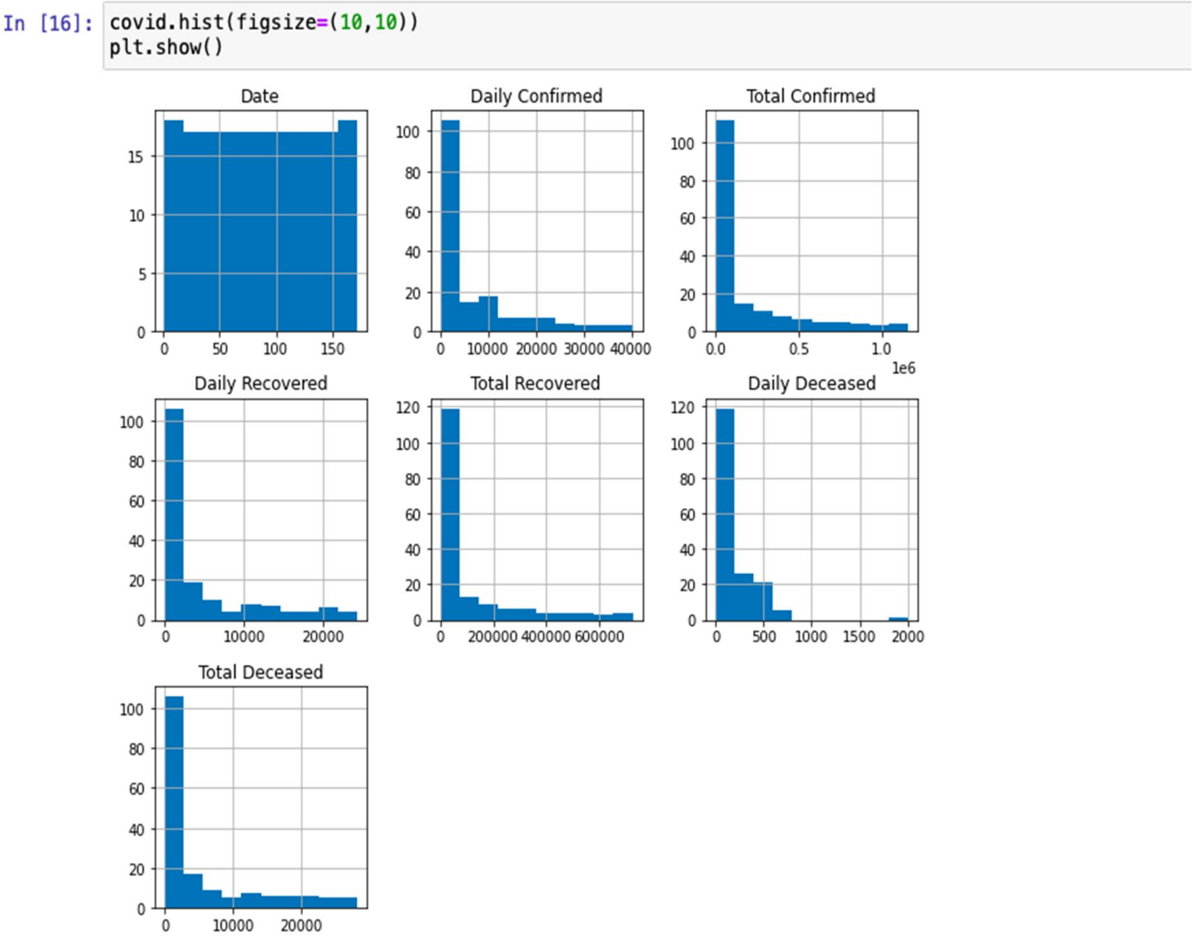
1) Read the Input dataset.
2) Perform all necessary Data Normalization, Standardization processing to prepare the transformed format of the given input dataset.
3) Handle the missing values.
4) Perform Exploratory Data Analysis/Visualization and bring insights into the predictor variables.
5) Apply Multi-linear regression algorithm by splitting the data into train and test sets
6) Measure and compare the performance of the models using confusion matrix and metrics like

Therefore, after all data preprocessing techniques, all the columns have the same data type i.e int64.

### A. *Data Visualisation*

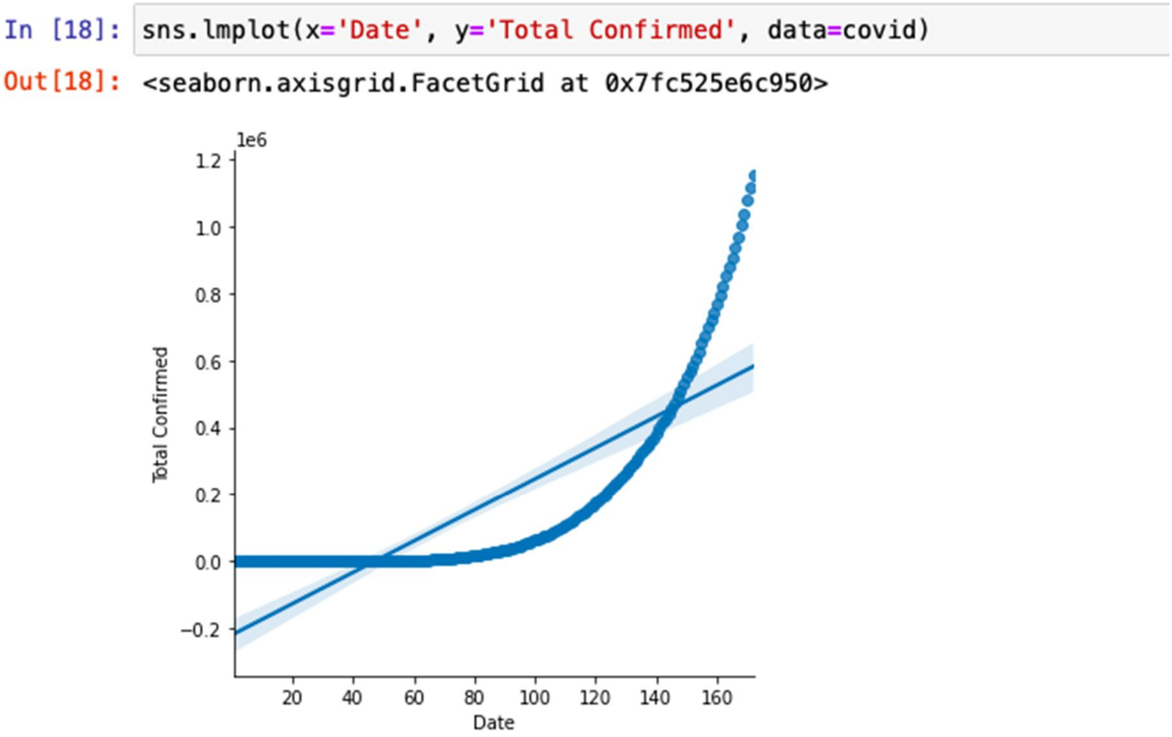
Now, we are going to visualize the dataset in different methods.

1) We are plotting the individual columns below.
2) Now, we concentrate only on the total confirmed cases vs date.
3) Plotting the points of each column in different combinations.



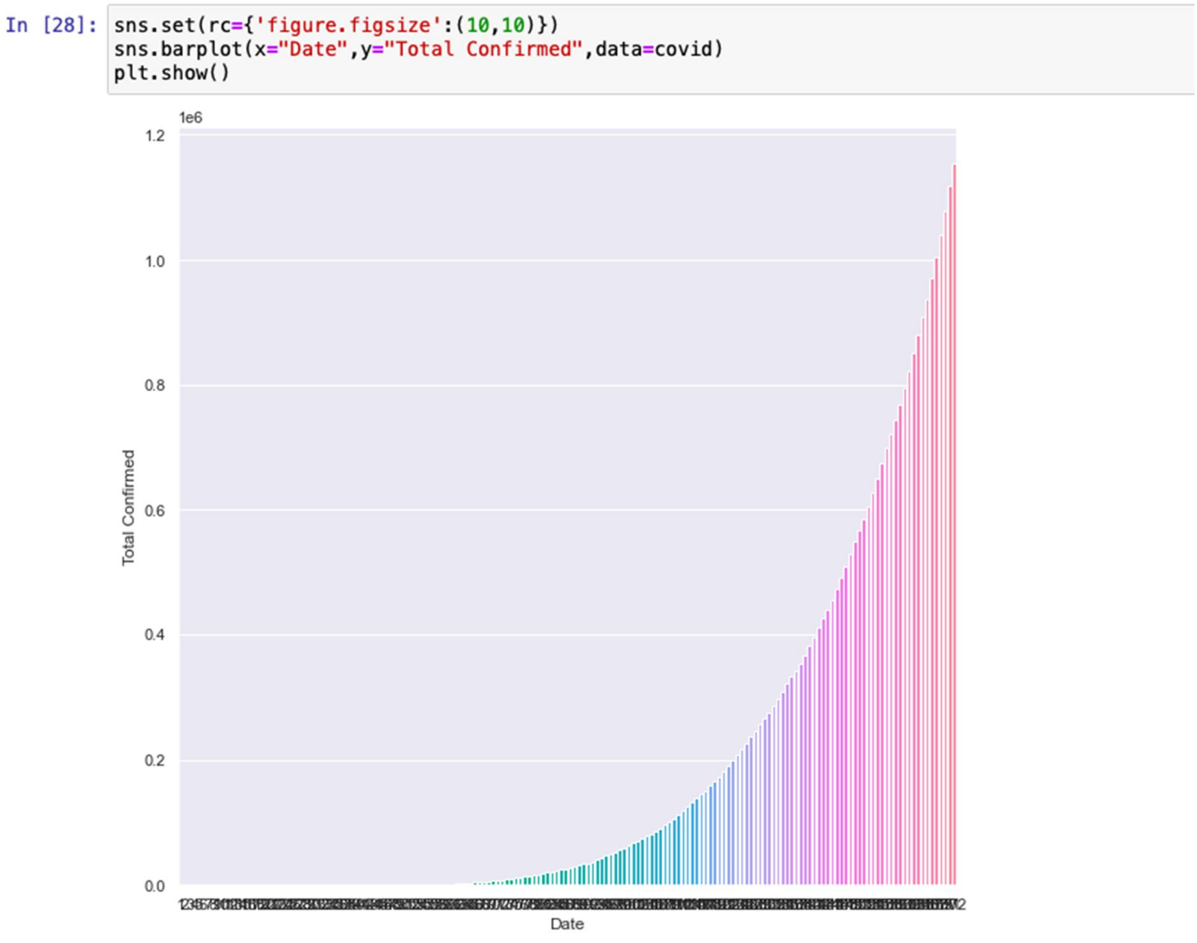
```
In [16]: covid.hist(figsize=(10,10))
         plt.show()
```

(i)



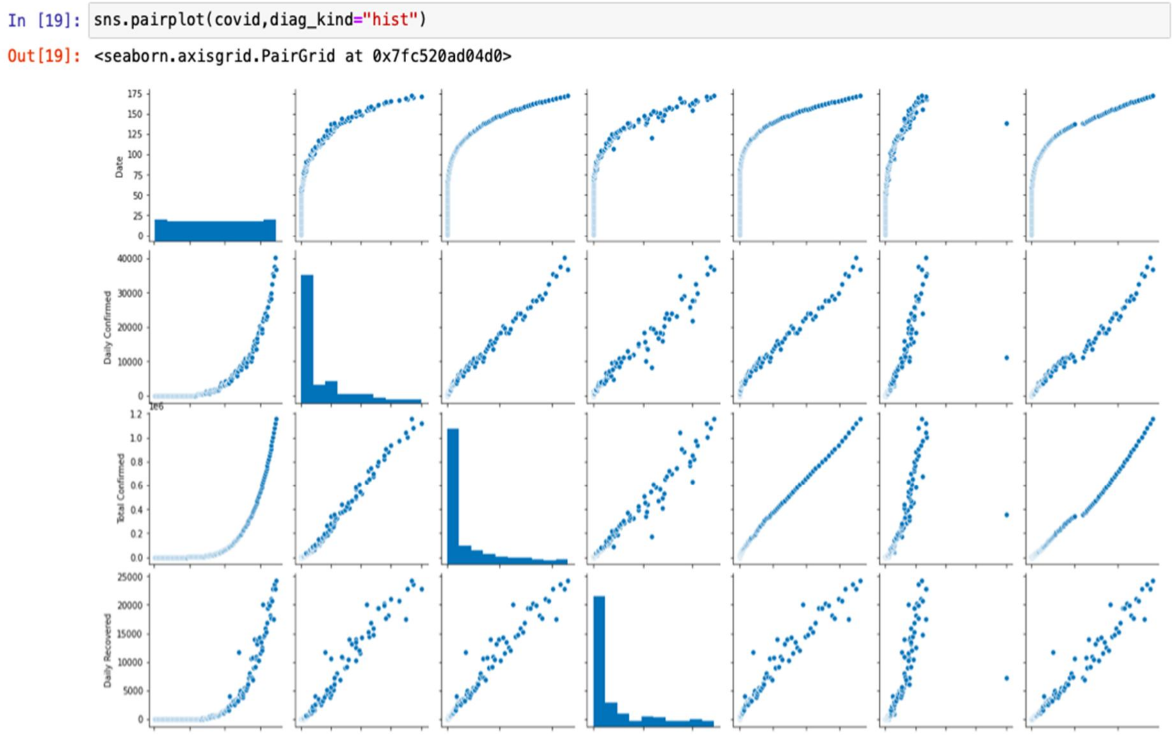
```
In [18]: sns.lmplot(x='Date', y='Total Confirmed', data=covid)

Out[18]: <seaborn.axisgrid.FacetGrid at 0x7fc525e6c950>
```



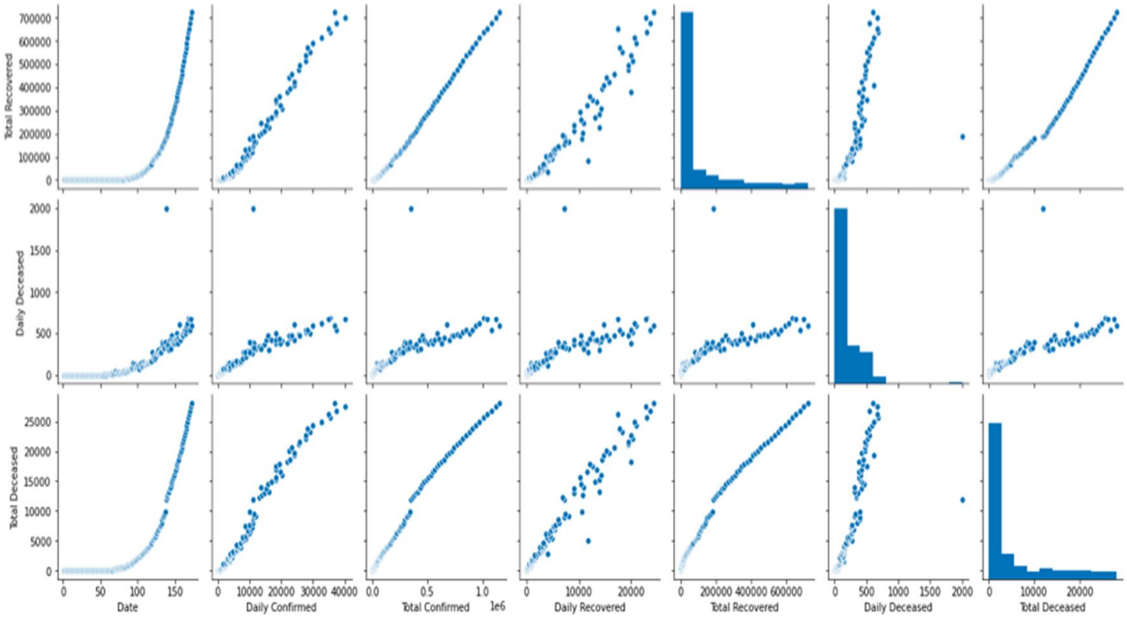
```
In [28]: sns.set(rc={'figure.figsize':(10,10)})
         sns.barplot(x="Date",y="Total Confirmed",data=covid)
         plt.show()
```

(ii)



```
In [19]: sns.pairplot(covid,diag_kind="hist")
Out[19]: <seaborn.axisgrid.PairGrid at 0x7fc520ad04d0>
```

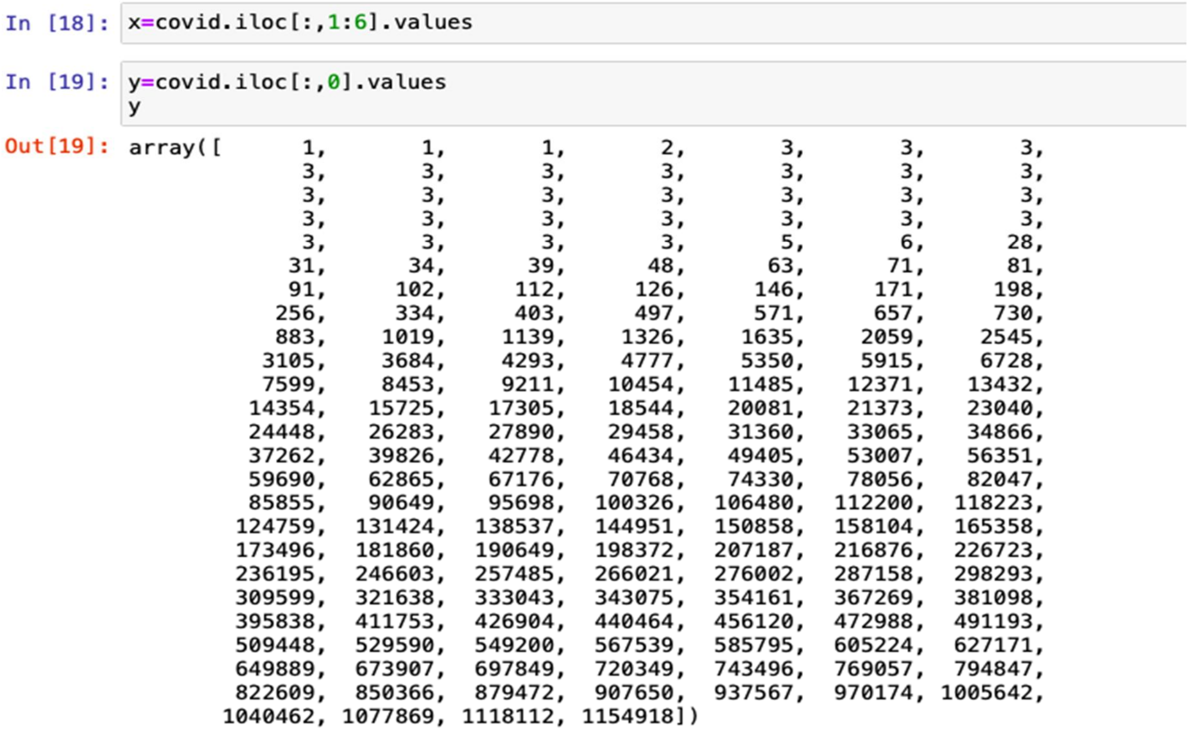
Continued…



(iii)

Here the purpose of Visualization is to observe whether the data is distributed normally or not and to observe and remove the outliers. If data in each attribute is not normally distributed we have to apply some normalization techniques. But we have data distributed normally after removing outliers and normalization. And we can gain some meaningful insights from the observations above histograms and plots.

Now, we are separating the features and label values into two different data frames.



```
In [18]: x=covid.iloc[:,1:6].values

In [19]: y=covid.iloc[:,0].values
         y

Out[19]: array([      1,       1,       1,       2,       3,       3,       3,
                      3,       3,       3,       3,       3,       3,       3,
                      3,       3,       3,       3,       3,       3,       3,
                      3,       3,       3,       3,       3,       3,       3,
                      3,       3,       3,       3,       5,       6,      28,
                     31,      34,      39,      48,      63,      71,      81,
                     91,     102,     112,     126,     146,     171,     198,
                    256,     334,     403,     497,     571,     657,     730,
                    883,    1019,    1139,    1326,    1635,    2059,    2545,
                   3105,    3684,    4293,    4777,    5350,    5915,    6728,
                   7599,    8453,    9211,   10454,   11485,   12371,   13432,
                  14354,   15725,   17305,   18544,   20081,   21373,   23040,
                  24448,   26283,   27890,   29458,   31360,   33065,   34866,
                  37262,   39826,   42778,   46434,   49405,   53007,   56351,
                  59690,   62865,   67176,   70768,   74330,   78056,   82047,
                  85855,   90649,   95698,  100326,  106480,  112200,  118223,
                 124759,  131424,  138537,  144951,  150858,  158104,  165358,
                 173496,  181860,  190649,  198372,  207187,  216876,  226723,
                 236195,  246603,  257485,  266021,  276002,  287158,  298293,
                 309599,  321638,  333043,  343075,  354161,  367269,  381098,
                 395838,  411753,  426904,  440464,  456120,  472988,  491193,
                 509448,  529590,  549200,  567539,  585795,  605224,  627171,
                 649889,  673907,  697849,  720349,  743496,  769057,  794847,
                 822609,  850366,  879472,  907650,  937567,  970174, 1005642,
                1040462, 1077869, 1118112, 1154918])
```

## IV. APPLYING CLASSIFICATION MODELS

### *A. Linear Regression Classifier*

Linear regression is modeling the relationship between a dependent variable and an independent variable.
Linear regression transforms its output using the logistic function i.e y=mx+c to return a probability value.

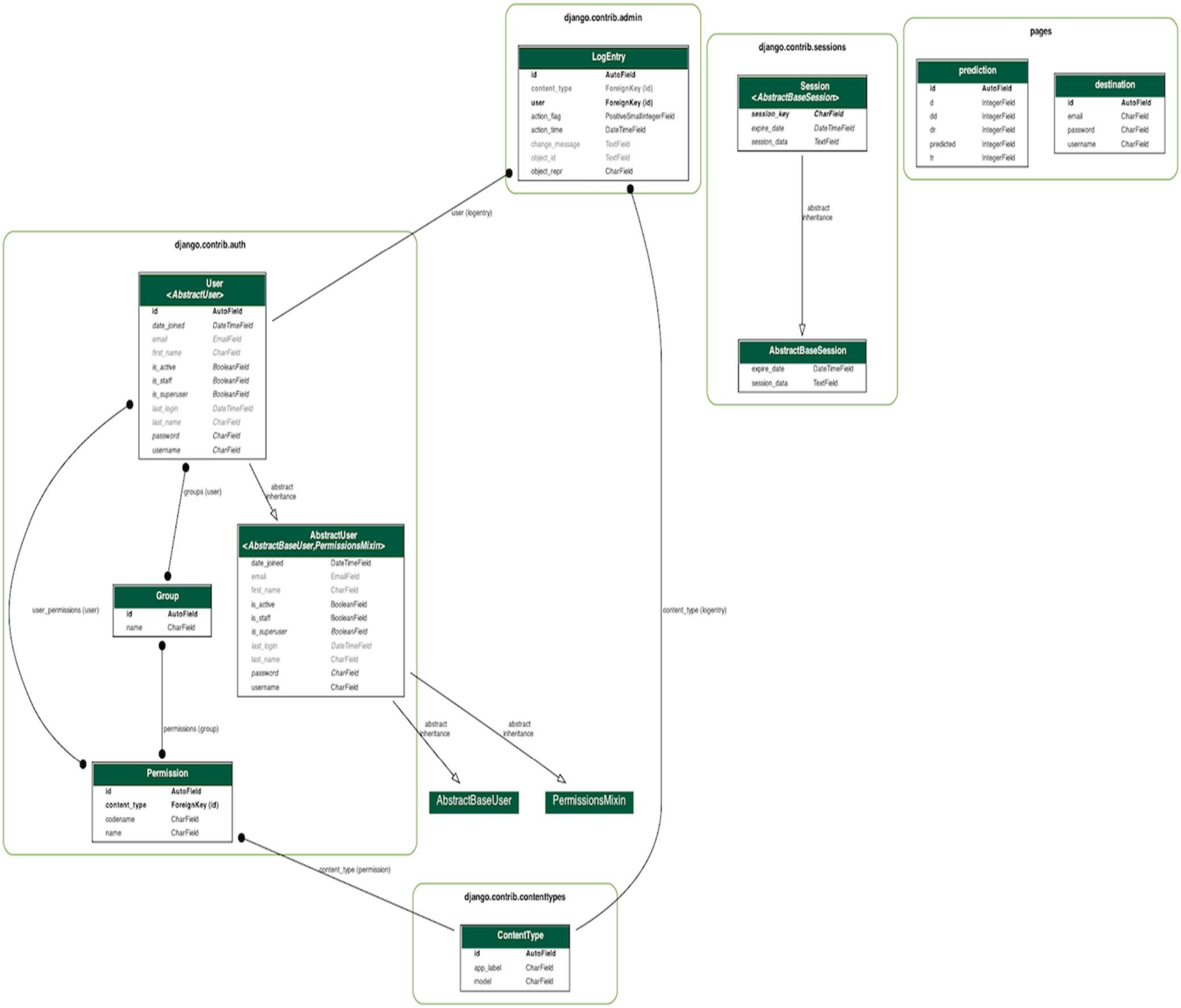
Where,

y= target variable/dependent variable
x=independent variable

### *B. Multiple Linear Regression*

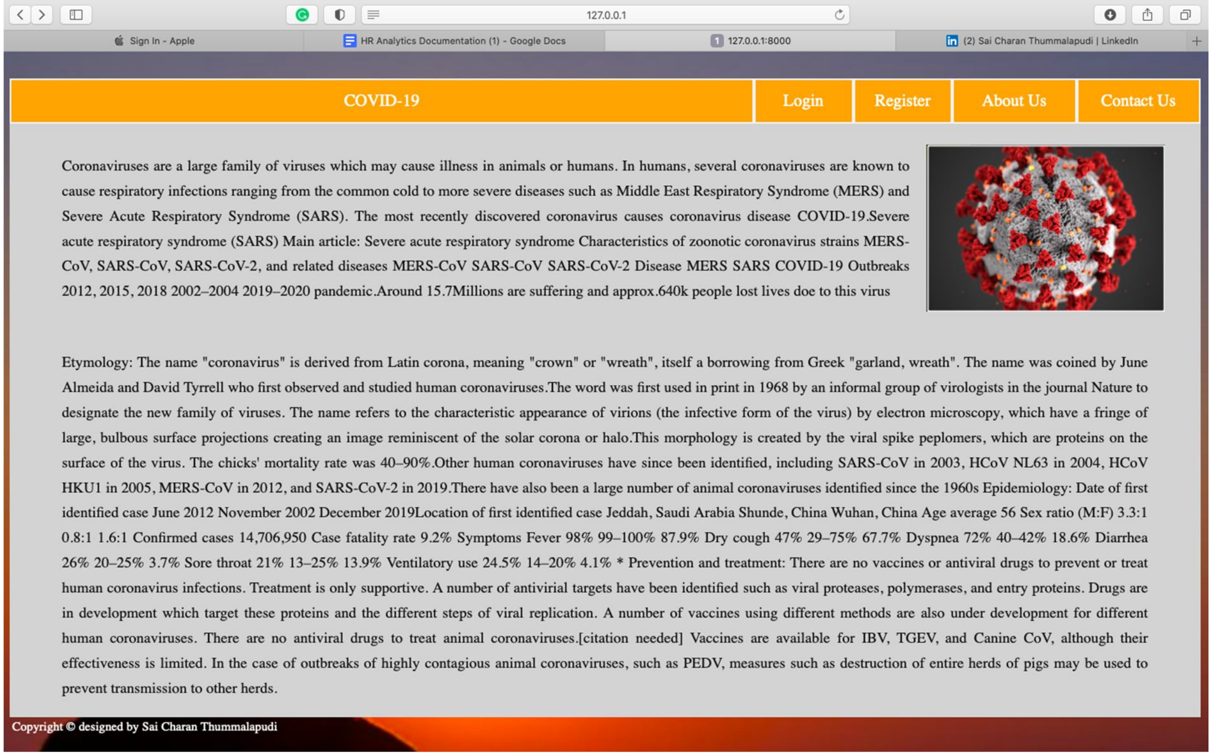
Multiple linear regression is in general known simply as multiple regression, it is a statistical technique that uses several explanatory variables to predict the outcome of a response variable. The goal of multiple linear regression is to model the linear relationship between the explanatory independent variables and response dependent variables. It is the extension of ordinary least-squares regression because it involves more than one explanatory variable.

UML Diagram of the project



## V. OUTPUTS

*1)* Home Page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Sign In - Apple
HR Analytics Documentation (1) - Google Docs
127.0.0.1:8000
(2) Sai Charan Thummalapudi | LinkedIn
COVID-19
Login
Register
About Us
Contact Us

Coronaviruses are a large family of viruses which may cause illness in animals or humans. In humans, several coronaviruses are known to cause respiratory infections ranging from the common cold to more severe diseases such as Middle East Respiratory Syndrome (MERS) and Severe Acute Respiratory Syndrome (SARS). The most recently discovered coronavirus causes coronavirus disease COVID-19.Severe acute respiratory syndrome (SARS) Main article: Severe acute respiratory syndrome Characteristics of zoonotic coronavirus strains MERS-CoV, SARS-CoV, SARS-CoV-2, and related diseases MERS-CoV SARS-CoV SARS-CoV-2 Disease MERS SARS COVID-19 Outbreaks 2012, 2015, 2018 2002–2004 2019–2020 pandemic.Around 15.7Millions are suffering and approx.640k people lost lives doe to this virus

Etymology: The name "coronavirus" is derived from Latin corona, meaning "crown" or "wreath", itself a borrowing from Greek "garland, wreath". The name was coined by June Almeida and David Tyrrell who first observed and studied human coronaviruses.The word was first used in print in 1968 by an informal group of virologists in the journal Nature to designate the new family of viruses. The name refers to the characteristic appearance of virions (the infective form of the virus) by electron microscopy, which have a fringe of large, bulbous surface projections creating an image reminiscent of the solar corona or halo.This morphology is created by the viral spike peplomers, which are proteins on the surface of the virus. The chicks' mortality rate was 40–90%.Other human coronaviruses have since been identified, including SARS-CoV in 2003, HCoV NL63 in 2004, HCoV HKU1 in 2005, MERS-CoV in 2012, and SARS-CoV-2 in 2019.There have also been a large number of animal coronaviruses identified since the 1960s Epidemiology: Date of first identified case June 2012 November 2002 December 2019Location of first identified case Jeddah, Saudi Arabia Shunde, China Wuhan, China Age average 56 Sex ratio (M:F) 3.3:1 0.8:1 1.6:1 Confirmed cases 14,706,950 Case fatality rate 9.2% Symptoms Fever 98% 99–100% 87.9% Dry cough 47% 29–75% 67.7% Dyspnea 72% 40–42% 18.6% Diarrhea 26% 20–25% 3.7% Sore throat 21% 13–25% 13.9% Ventilatory use 24.5% 14–20% 4.1% * Prevention and treatment: There are no vaccines or antiviral drugs to prevent or treat human coronavirus infections. Treatment is only supportive. A number of antivirial targets have been identified such as viral proteases, polymerases, and entry proteins. Drugs are in development which target these proteins and the different steps of viral replication. A number of vaccines using different methods are also under development for different human coronaviruses. There are no antiviral drugs to treat animal coronaviruses.[citation needed] Vaccines are available for IBV, TGEV, and Canine CoV, although their effectiveness is limited. In the case of outbreaks of highly contagious animal coronaviruses, such as PEDV, measures such as destruction of entire herds of pigs may be used to prevent transmission to other herds.

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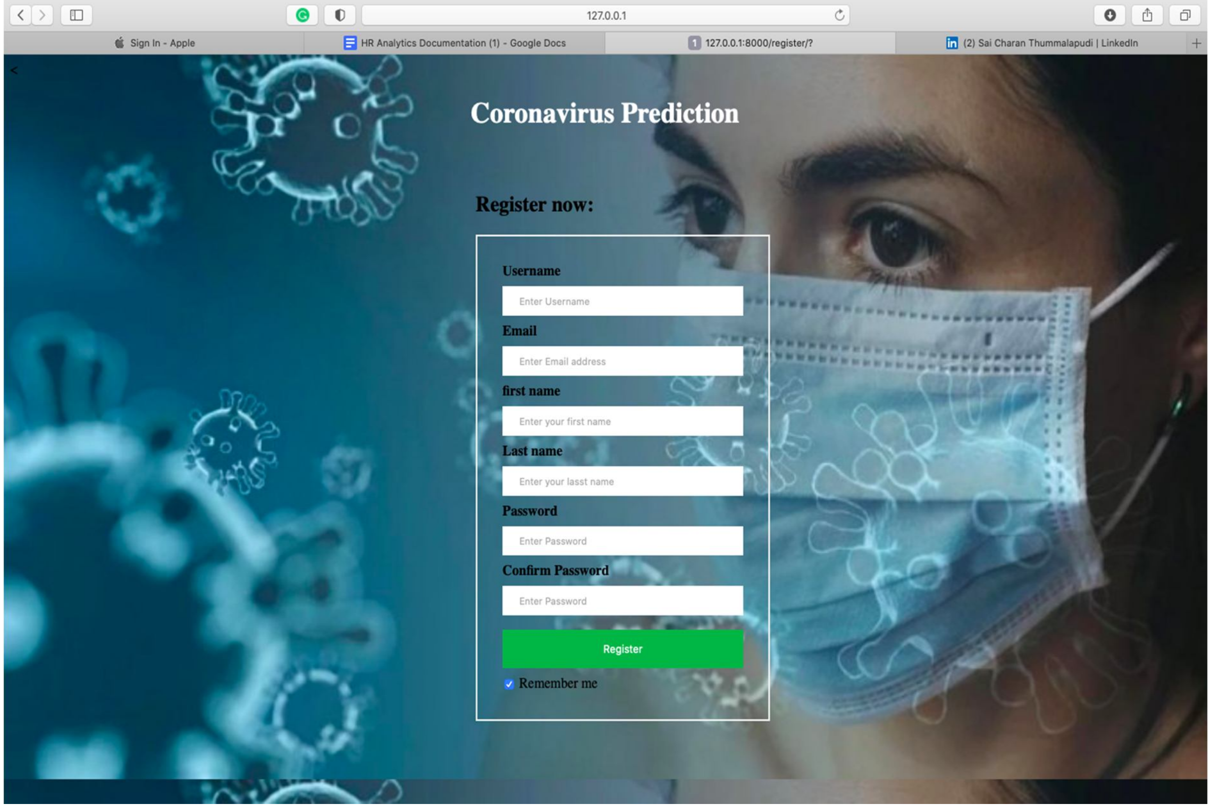
*2)* Register Page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Sign In - Apple
HR Analytics Documentation (1) - Google Docs
127.0.0.1:8000/register/?
(2) Sai Charan Thummalapudi | LinkedIn
Register

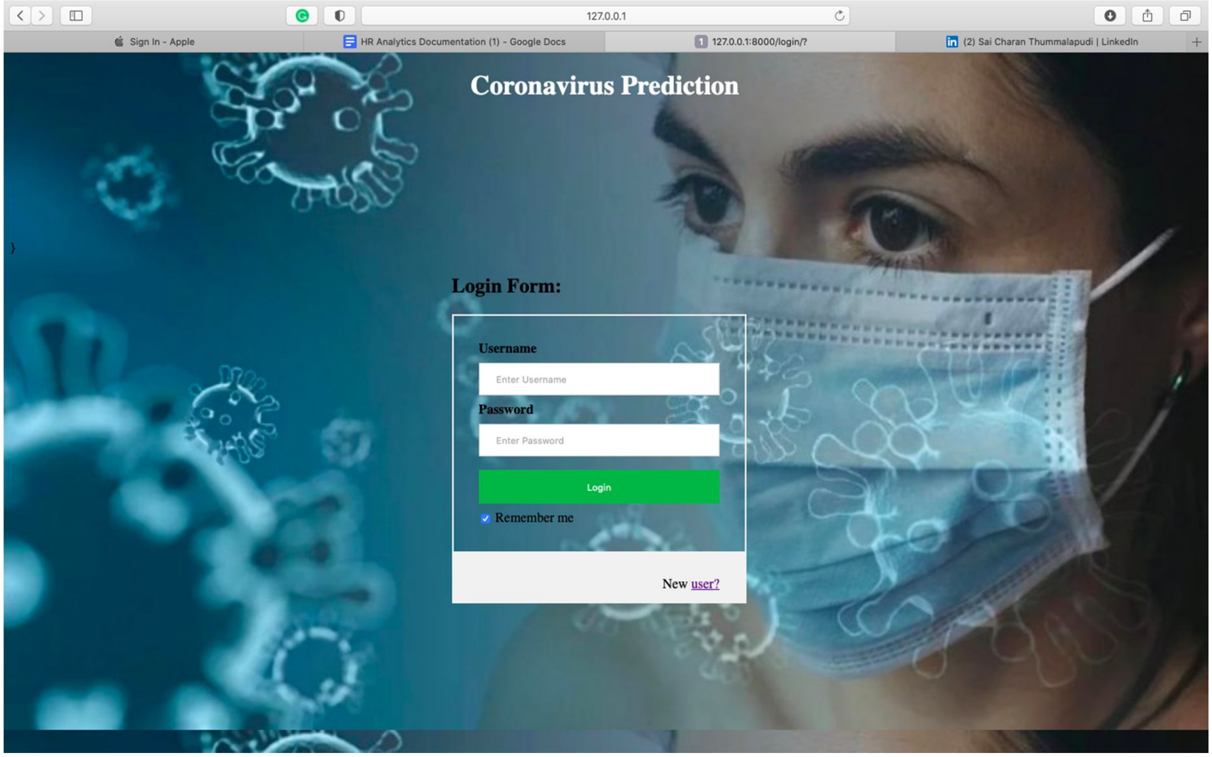
Coronavirus Prediction

Register now:

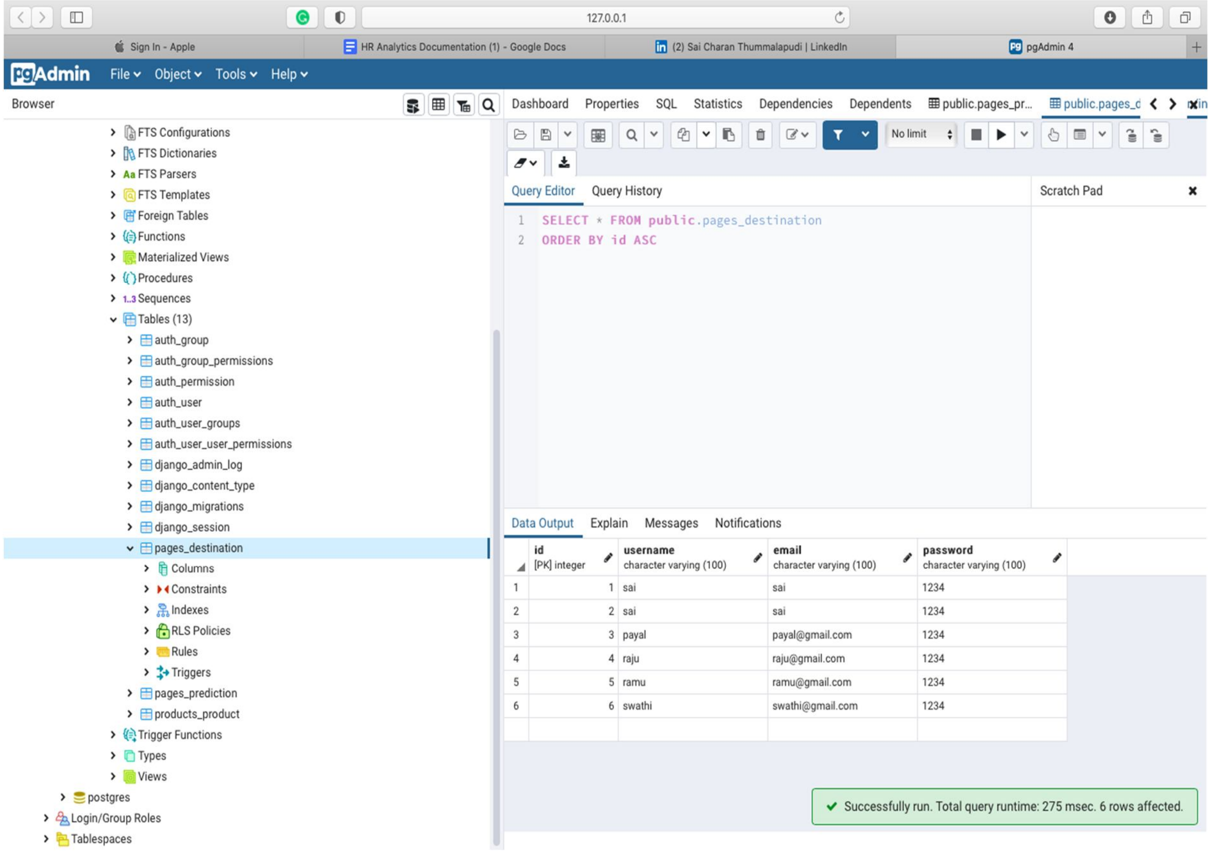
Username
Enter Username
Email
Enter Email address
first name
Enter your first name
Last name
Enter your lasst name
Password
Enter Password
Confirm Password
Enter Password

☑ Remember me

*3)* Login Page



*4)* Checking the email id and password from the PgAdmin 4 Postgres database.

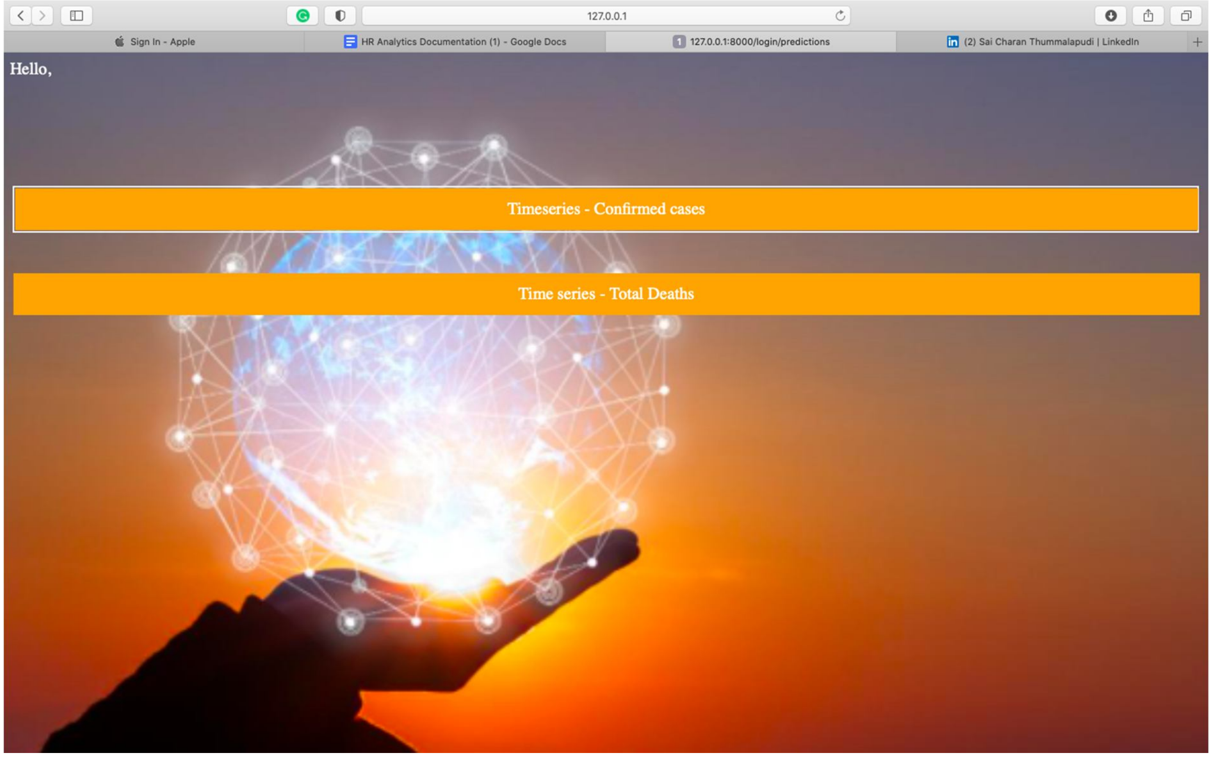


```
SELECT * FROM public.pages_destination
ORDER BY id ASC
```

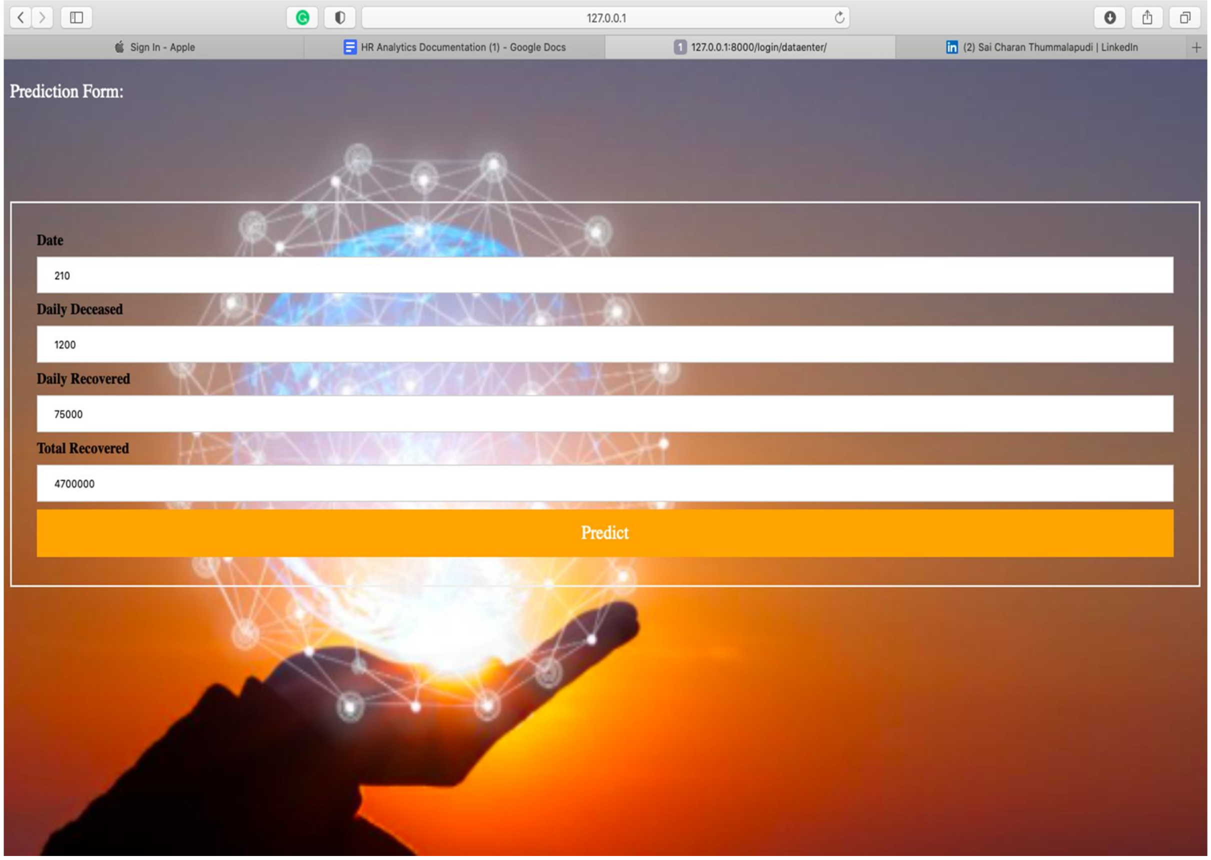
| | id<br>[PK] integer | username<br>character varying (100) | email<br>character varying (100) | password<br>character varying (100) |
|---|---|---|---|---|
| 1 | 1 | sai | sai | 1234 |
| 2 | 2 | sai | sai | 1234 |
| 3 | 3 | payal | payal@gmail.com | 1234 |
| 4 | 4 | raju | raju@gmail.com | 1234 |
| 5 | 5 | ramu | ramu@gmail.com | 1234 |
| 6 | 6 | swathi | swathi@gmail.com | 1234 |

✓ Successfully run. Total query runtime: 275 msec. 6 rows affected.

*5)* Choosing between whether to predict total confirmed cases or total deceased.


127.0.0.1
Sign In - Apple
HR Analytics Documentation (1) - Google Docs
127.0.0.1:8000/login/predictions
(2) Sai Charan Thummalapudi | LinkedIn
Hello,
Timeseries - Confirmed cases
Time series - Total Deaths

*6)* Entering the user-defined data to predict and to power up the machine learning algorithm.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Sign In - Apple
HR Analytics Documentation (1) - Google Docs
127.0.0.1:8000/login/dataenter/
(2) Sai Charan Thummalapudi | LinkedIn

Prediction Form:

Date

210

Daily Deceased

1200

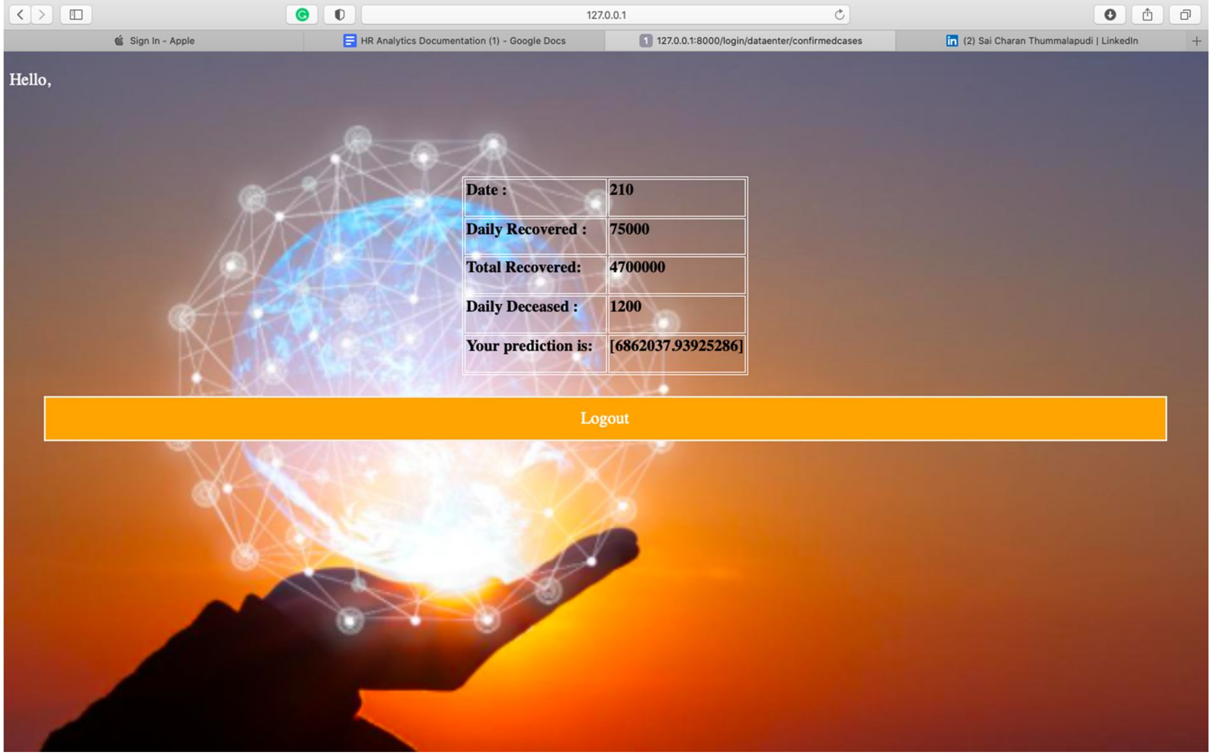
Daily Recovered

75000

Total Recovered

4700000

*7)* Predicted output in tabular form.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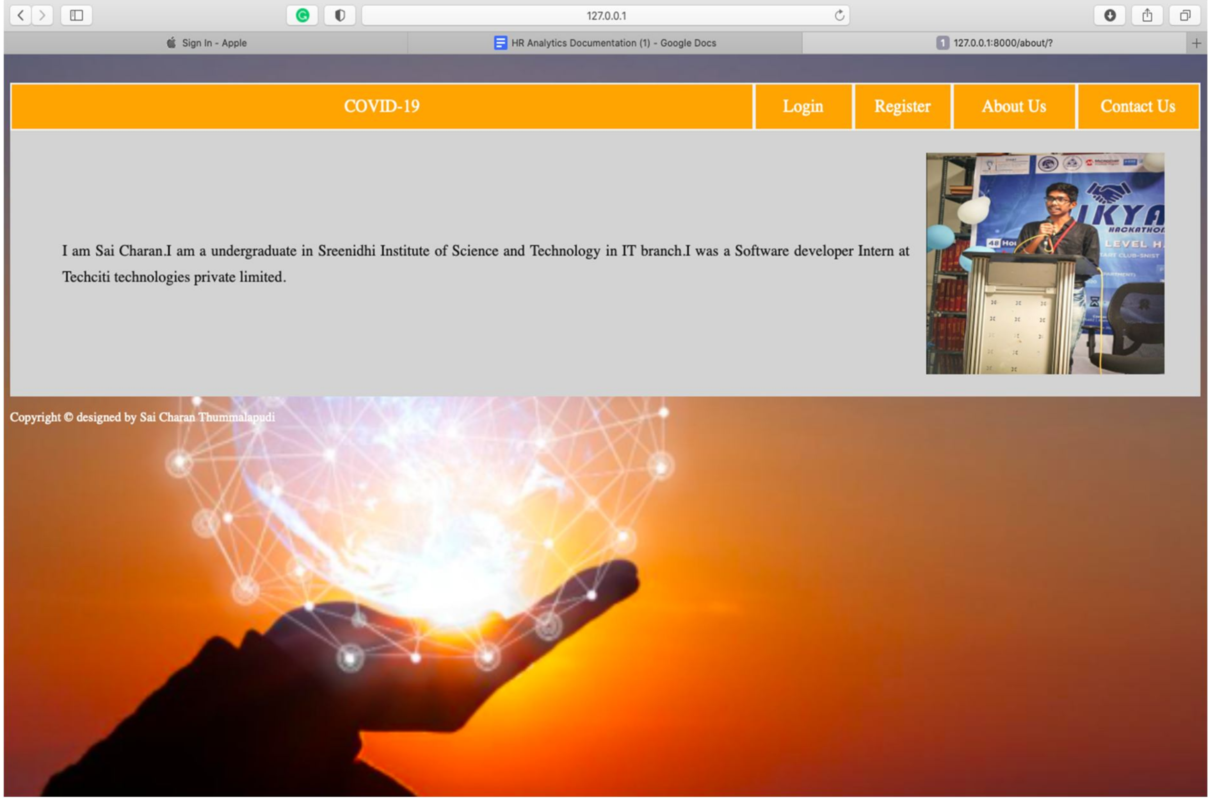
Sign In - Apple
HR Analytics Documentation (1) - Google Docs
127.0.0.1:8000/login/dataenter/confirmedcases
(2) Sai Charan Thummalapudi | LinkedIn
Logout

Hello,

| | |
|---|---|
| **Date :** | **210** |
| **Daily Recovered :** | **75000** |
| **Total Recovered:** | **4700000** |
| **Daily Deceased :** | **1200** |
| **Your prediction is:** | **[6862037.93925286]** |

*8)* About us page for knowing about the creator.



I am Sai Charan.I am a undergraduate in Sreenidhi Institute of Science and Technology in IT branch.I was a Software developer Intern at Techciti technologies private limited.

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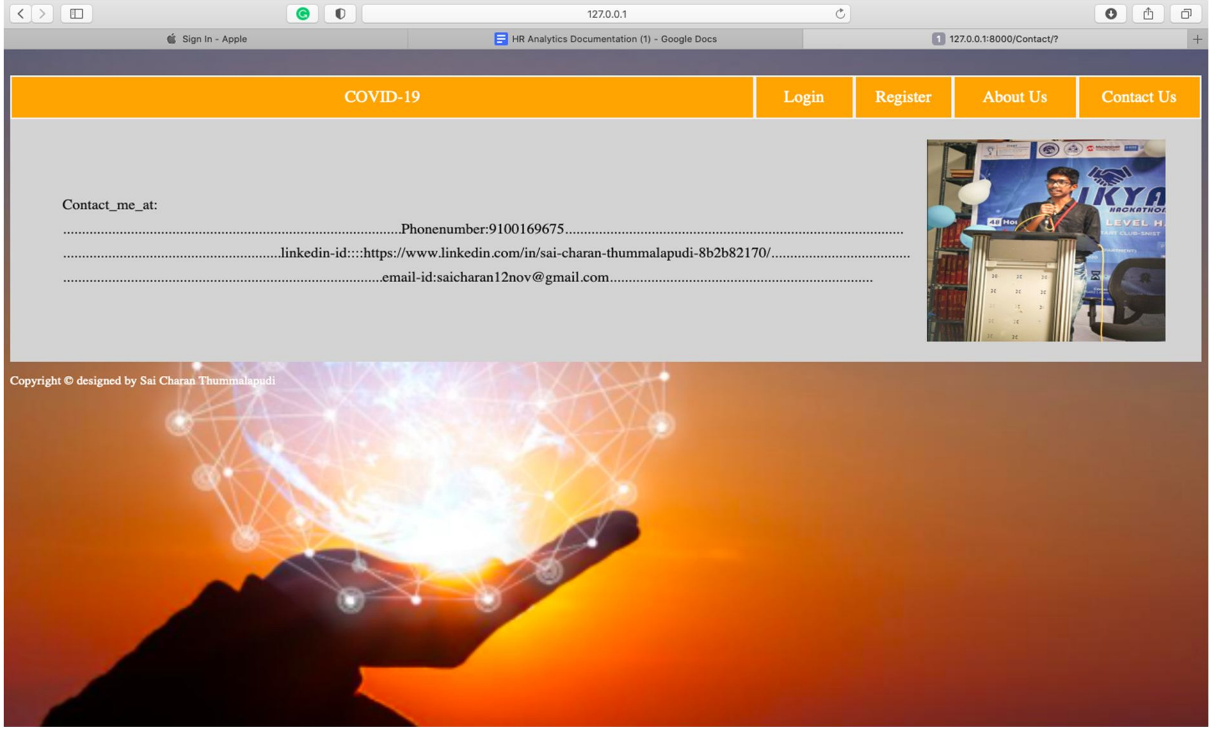
*9)* Contact us page if the user wants to contact with the creator. Which provides a phone number, email id, and LinkedIn id, and the photograph of the creator i.e me.



Contact_me_at:

..........................................................................................Phonenumber:9100169675..........................................................................................

.........................................................linkedin-id:::https://www.linkedin.com/in/sai-charan-thummalapudi-8b2b82170/....................................

....................................................................................email-id:saicharan12nov@gmail.com.....................................................................

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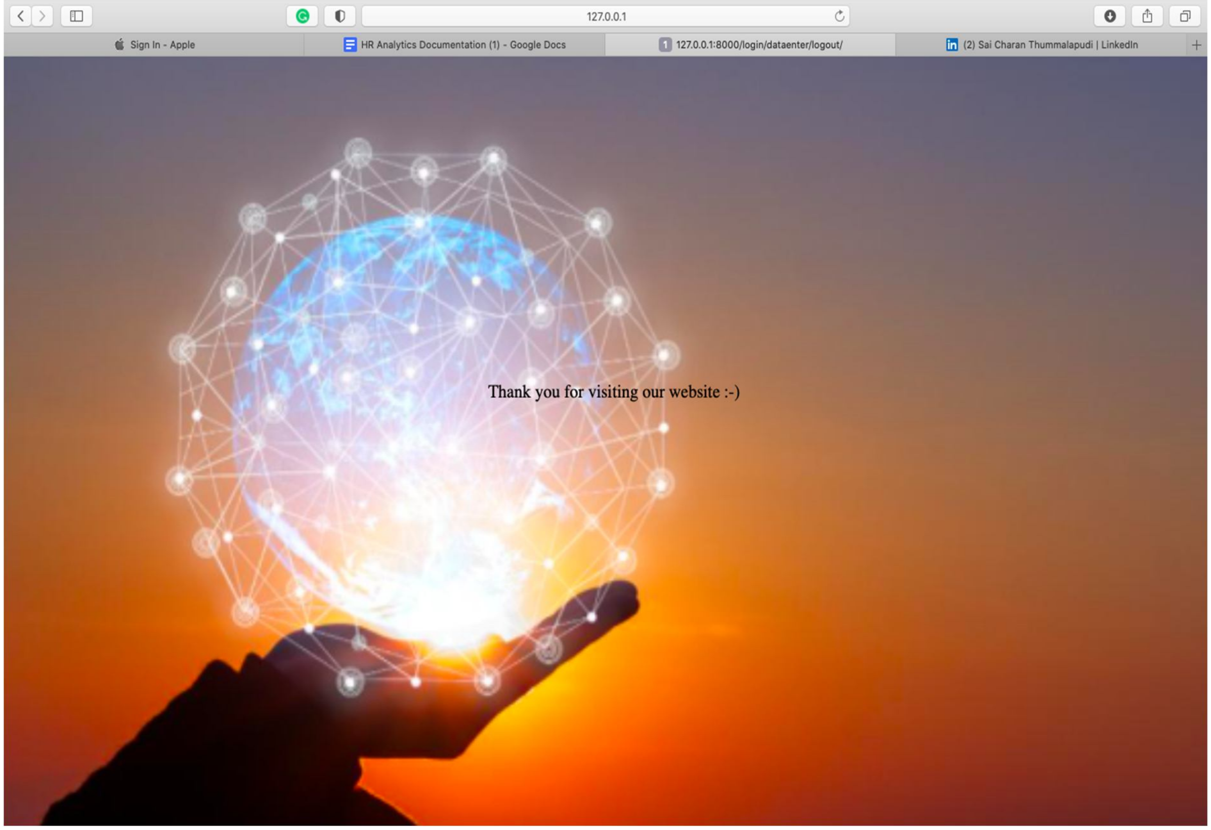
*10)* Thankyou/Logout page.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## VI. CONCLUSION

My project is very useful for the health department as well as common people. Because no one is able to predict the rise or fall in cases day by day. And it is human inefficient to predict the cases and changes from person to person. So to avoid the chaos, my web application is very much useful to predict future cases with efficiency.

The health department of India as well as the world are facing a great challenge with this pandemic and they could not meet the right needs of a patient and lack in the number of drugs, ventilators, oxygen cylinders,etc..

So, by using my project one could easily predict the number of cases on any day as per the user wish.

I can proudly say that this can save many lives and can remove the chaos in many minds.

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[6] https://www.coursera.org/programs/sreenidhi-institute-of-science-and-tech-on-coursera-tcvb9?productId=COgVtZQLEeqkcQ4Ni0FYhw&productType=course&showMiniModal=true

[7] https://www.coursera.org/programs/sreenidhi-institute-of-science-and-tech-on-coursera-tcvb9?collectionId=&productId=ZtbS2tDqEemmzBL13JFZTg&productType=s12n&showMiniModal=true

[8] https://www.geeksforgeeks.org/django-tutorial/

[9] https://www.geeksforgeeks.org/machine-learning/

[10] https://github.com/susanli2016/Machine-Learning-with-Python

[11] https://www.kaggle.com/datasets for datasets and reference.

To access my project:https://github.com/saicharan1312