THIRUVALLUVAR UNIVERSITY

PERIYAR ARTS COLLEGE

CUDDALORE – 607001.

DEPARTMENT OF COMPUTER

MACHINE LEARNING WITH PYTHON

Project Title : Intelligent Admissions: The Future Of University Decision Making With Machine Learning

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Introduction

Overview

University admission is the process by which students are selected to attend a college or university. The process typically involves several steps, including submitting an application, taking entrance exams, and participating in interviews or other evaluations.

Students are often worried about their chances of admission in University. the university admission process for students can be demanding, but by being well-informed, prepared, and organized, students can increase their chances of being admitted to the university of their choice.

The aim of this project is to help students in short listing universities with their profiles. Machine learning algorithms are then used to train a model on this data, which can be used to predict the chances of future applicants being admitted.

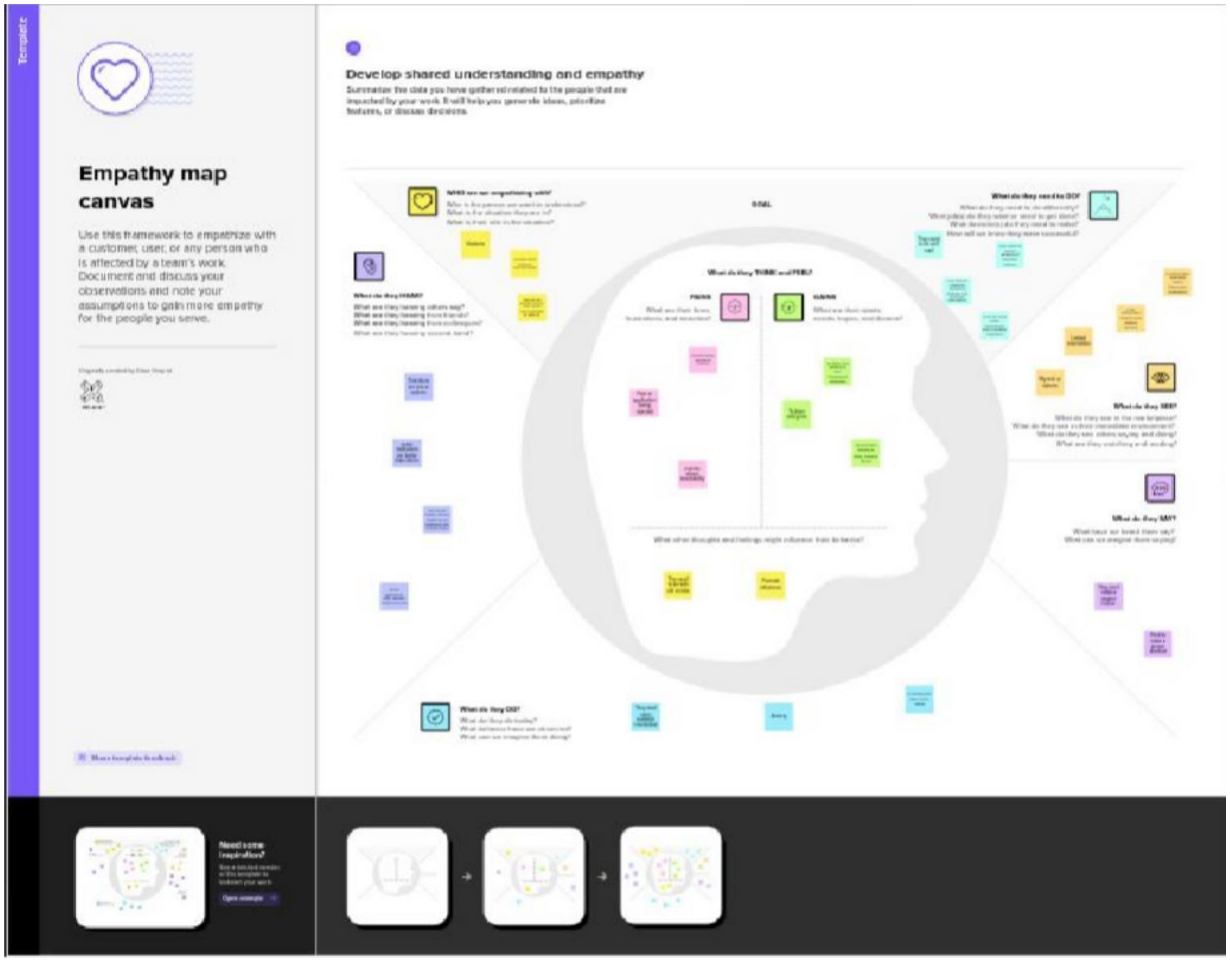
With this project, students can make more informed decisions about which universities to apply to, and universities can make more efficient use of their resources by focusing on the most promising applicants.The predicted output gives them a fair idea about their admission chances in a particular university. This analysis should also help students who are currently preparing or will be preparing to get a better idea.

Purpose

This project can help students to predict their chance of admission in universities.The project is employed with a well trained model which can predict accurate results. With proper user(student) input, the flask web app can predict the result with the trained model.

Problem Definition and Design Thinking

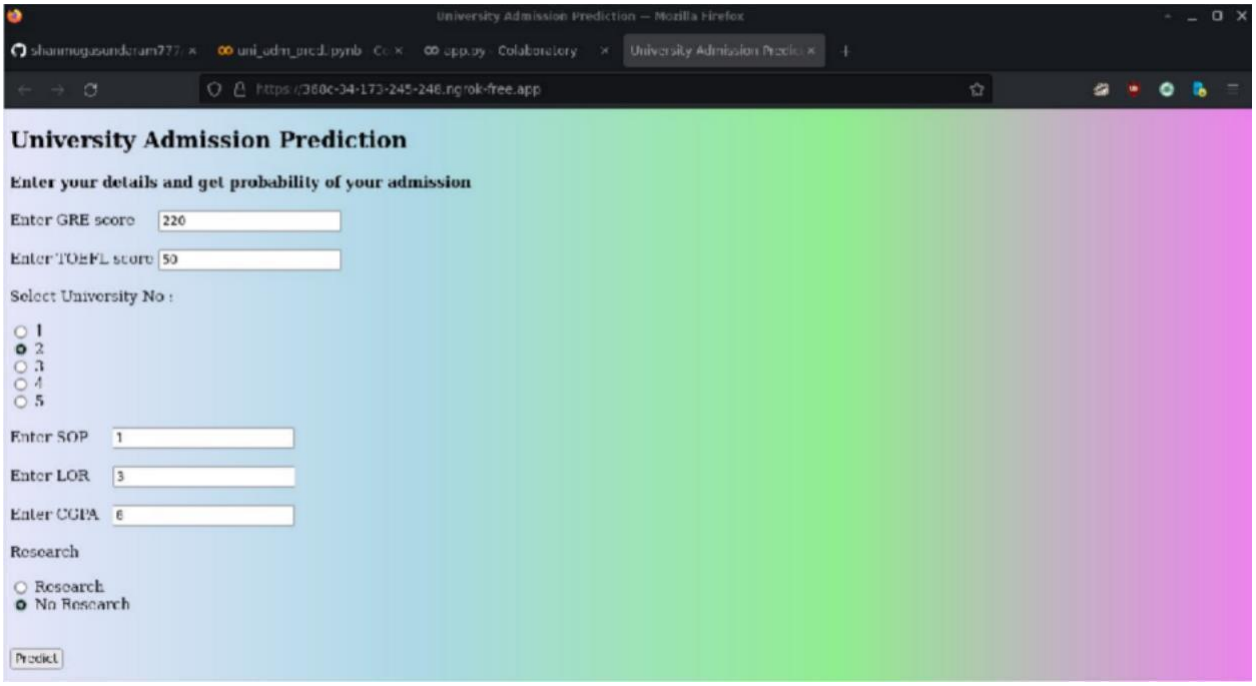
Empathy Map



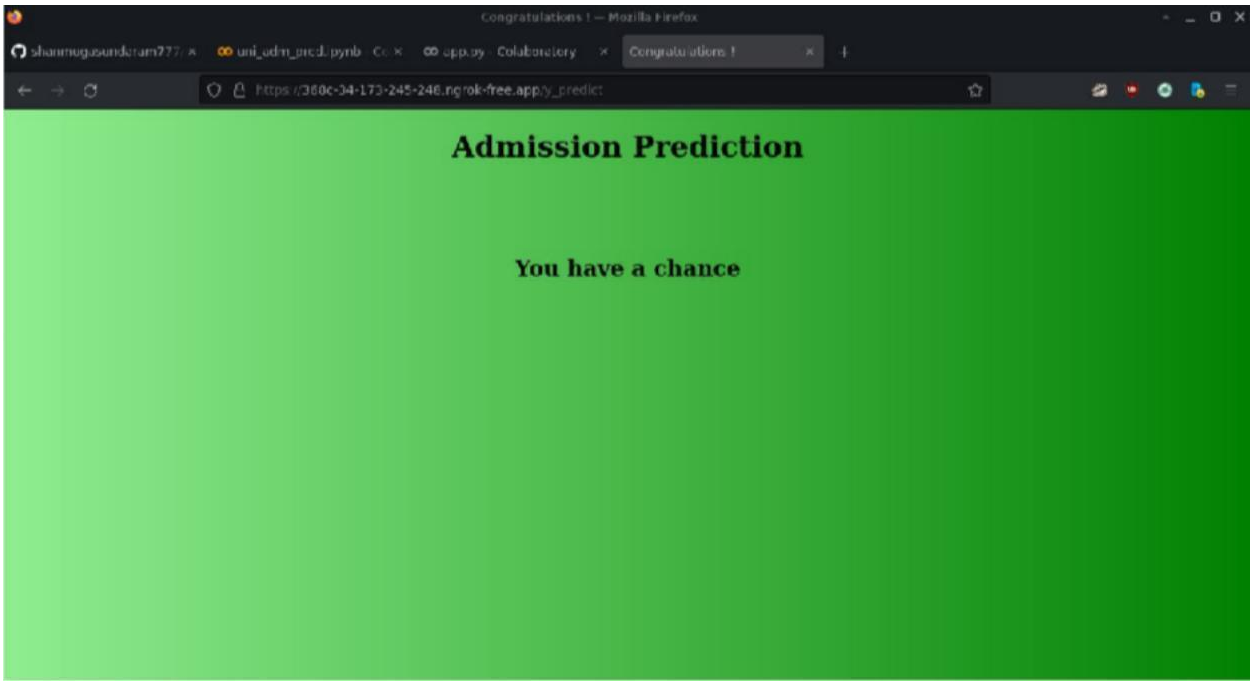
Brainstorm and Idea Prioritization

Result

Homepage



Prediction



"Chance of Admit" depends on CGPA,GRE,TOEFEL.The columns SOP,LOR and Reserach have less impact on university admission. GRE score TOEFL score and CGPA all are linearly related to each other.

Students in research score high in TOEFL and GRE compared to non research candidates.

Advantages and Disadvantages

Advantages

The project takes into account of all the necessary variables that determine the admissionof students in universities.

The variables are absolutely bare minimal and is strictly required to perfrom accurate predictions.

It help students to get a preliminary prediction of how their profile/score may perform on the university prediction process.

It enables students to get their overall image on university shortlistings...

Disadvantages

This projects only takes into account of minimal variables and special edge cases are not considered.

It omits certain special cases which the students and universities may have come across.

The dataset used is merely adequate not dense enough to train high or world class models that is capable of predicting complex inputs while producing accurate results.

Currently, this project makes uses of web technologies such as Google Colab and Ngrok.

Due to poor hardware at our end we have used the web technologies, to deploy the code in other environments and produce a valid webapp, the code must be modified to be run locally on the development server.

Applications

This project unfortunately can only be applied to Education Fields especially, Universities.

And it is only useful for students to assess their profile performance.

The project may be further modified to fit other educational fields such as schools and other educational bodies, that assess student's past performance to allow them in their institutions.

Conclusion

This project is very useful for students to assess their overall profile performance that is necessary to get a overall preliminary of their profile before applying applications to various universities.

It helps them to filter out universities that fit their profile and apply to selected universities that has high rate of being accepted.

Futute Scope

Currently, the project uses a bare minimal dataset that has entries of about 400 rows.

Although this dataset is enough, it is not feature rich.
To further enchance the project, a more dense and feature rich dataset is to be used.

The additional complex features helps in addressing edge or special cases that the students and universities may encounter during their academical span.

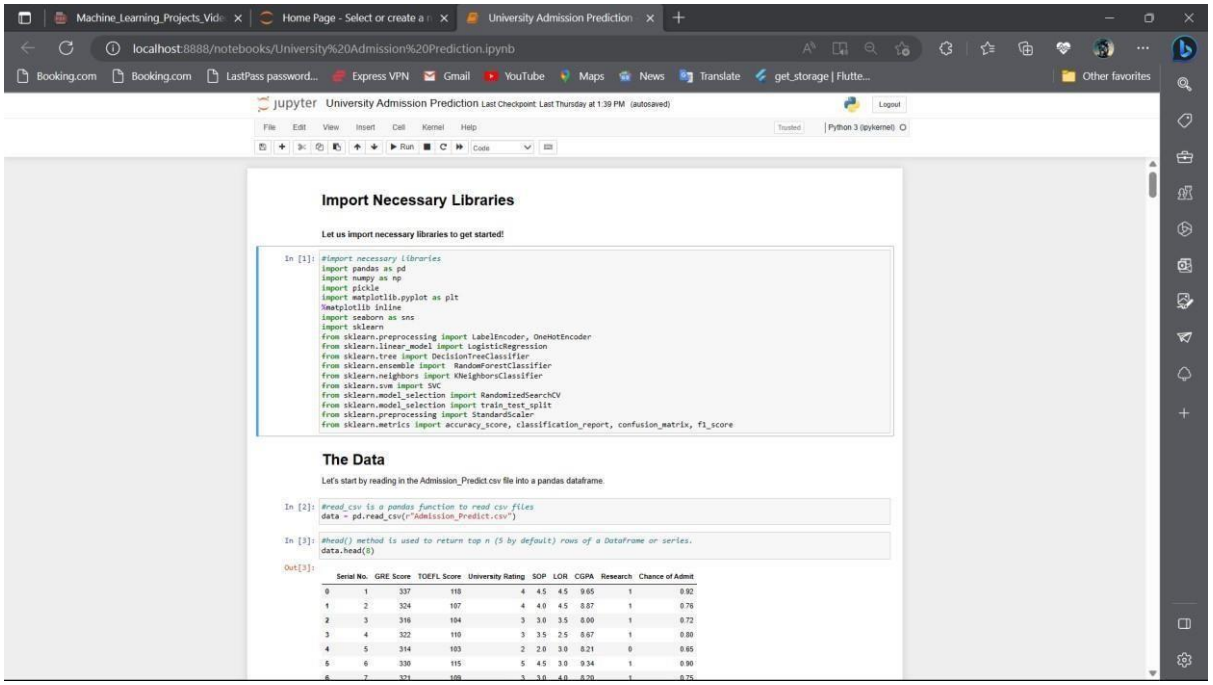
Additional algorithms will be used to proof the accuracy of the dataset split. And feature rich data helps in creating and training a model that can generate much precise and accurate results while handling special or edge cases.

The code needs to be further enhanced to get additional variable inputs from user that are helpful in overall prediction with much specialised and accurate results.

Appendix

Source code

University Admission Prediction.ipynb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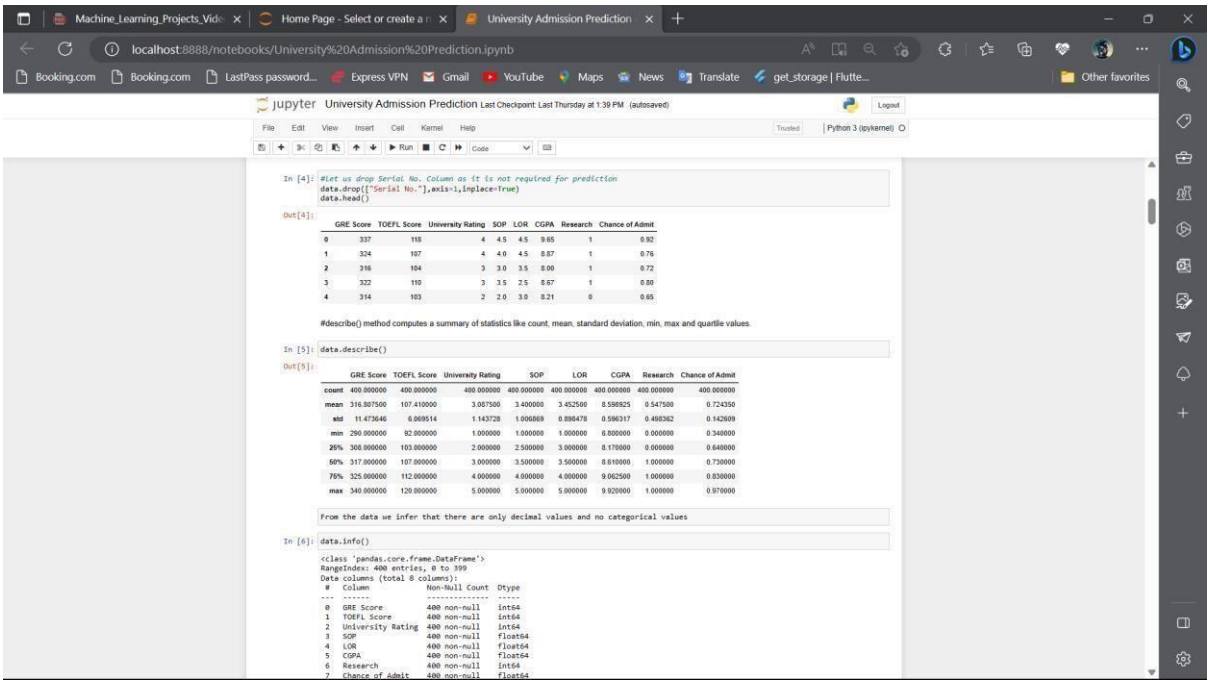
Run
Code
Import Necessary Libraries
Let us import necessary libraries to get started!
In [1]:
#import necessary libraries
import pandas as pd
import numpy as np
import pickle
import matplotlib.pyplot as plt
%matplotlib inline
import seaborn as sns
import sklearn
from sklearn.preprocessing import LabelEncoder, OneHotEncoder
from sklearn.linear_model import LogisticRegression
from sklearn.tree import DecisionTreeClassifier
from sklearn.ensemble import RandomForestClassifier
from sklearn.neighbors import KNeighborsClassifier
from sklearn.svm import SVC
from sklearn.model_selection import RandomizedSearchCV
from sklearn.model_selection import train_test_split
from sklearn.preprocessing import StandardScaler
from sklearn.metrics import accuracy_score, classification_report, confusion_matrix, f1_score
The Data
Let's start by reading in the Admission_Predict.csv file into a pandas dataframe.
In [2]:
#read_csv is a pandas function to read csv files
data = pd.read_csv(r"Admission_Predict.csv")
In [3]:
#head() method is used to return top n (5 by default) rows of a DataFrame or series.
data.head(8)
Out[3]:
Serial No. GRE Score TOEFL Score University Rating SOP LOR CGPA Research Chance of Admit
0 1 337 118 4 4.5 4.5 9.65 1 0.92
1 2 324 107 4 4.0 4.5 8.87 1 0.76
2 3 316 104 3 3.0 3.5 8.00 1 0.72
3 4 322 110 3 3.5 2.5 8.67 1 0.80
4 5 314 103 2 2.0 3.0 8.21 0 0.65
5 6 330 115 5 4.5 3.0 9.34 1 0.90
6 7 321 109 3 3.0 4.0 8.20 1 0.75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Code
In [4]:
#Let us drop Serial No. Column as it is not required for prediction
data.drop(["Serial No."],axis=1,inplace=True)
data.head()
Out[4]:
GRE Score TOEFL Score University Rating SOP LOR CGPA Research Chance of Admit
0 337 118 4 4.5 4.5 9.65 1 0.92
1 324 107 4 4.0 4.5 8.87 1 0.76
2 316 104 3 3.0 3.5 8.00 1 0.72
3 322 110 3 3.5 2.5 8.67 1 0.80
4 314 103 2 2.0 3.0 8.21 0 0.65
#describe() method computes a summary of statistics like count, mean, standard deviation, min, max and quartile values
In [5]:
data.describe()
Out[5]:
GRE Score TOEFL Score University Rating SOP LOR CGPA Research Chance of Admit
count 400.000000 400.000000 400.000000 400.000000 400.000000 400.000000 400.000000 400.000000
mean 316.807500 107.410000 3.087500 3.400000 3.452500 8.598925 0.547500 0.724350
std 11.473646 6.069514 1.143728 1.006869 0.898478 0.596317 0.498362 0.142609
min 290.000000 92.000000 1.000000 1.000000 1.000000 6.800000 0.000000 0.340000
25% 308.000000 103.000000 2.000000 2.500000 3.000000 8.170000 0.000000 0.640000
50% 317.000000 107.000000 3.000000 3.500000 3.500000 8.610000 1.000000 0.730000
75% 325.000000 112.000000 4.000000 4.000000 4.000000 9.062500 1.000000 0.830000
max 340.000000 120.000000 5.000000 5.000000 5.000000 9.920000 1.000000 0.970000
From the data we infer that there are only decimal values and no categorical values
In [6]:
data.info()
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 400 entries, 0 to 399
Data columns (total 8 columns):
Column Non-Null Count Dtype
--- ------ -------------- -----
0 GRE Score 400 non-null int64
1 TOEFL Score 400 non-null int64
2 University Rating 400 non-null int64
3 SOP 400 non-null float64
4 LOR 400 non-null float64
5 CGPA 400 non-null float64
6 Research 400 non-null int64
7 Chance of Admit 400 non-null float64

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Run Code

In [7]:
```
#Let us rename the column Chance of Admit because it has trailing space
data=data.rename(columns = {'Chance of Admit ':'Chance of Admit'})
```

Exploratory Data Analysis

Missing Data

We can use seaborn to create a simple heatmap to see where we have missing data!

In [8]:
```
data.isnull().any()
```

Out[8]:
```
GRE Score          False
TOEFL Score        False
University Rating  False
SOP                False
LOR                False
CGPA               False
Research           False
Chance of Admit    False
dtype: bool
```

From the heatmap,we see that there are no missing values in the dataset

In [9]:
```
data.corr()
```

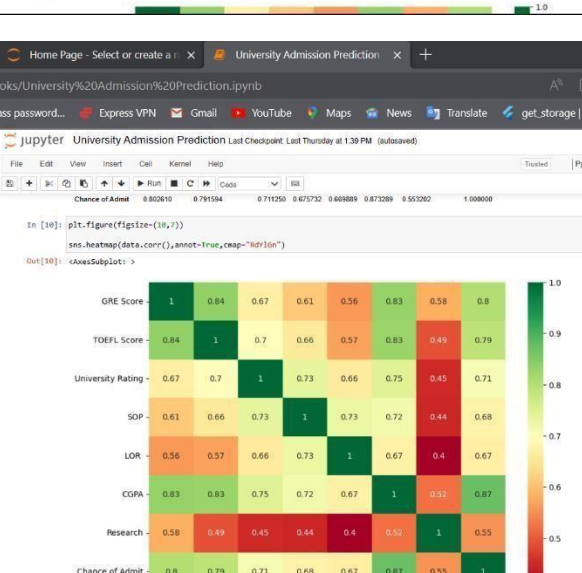
Out[9]:

	GRE Score	TOEFL Score	University Rating	SOP	LOR	CGPA	Research	Chance of Admit
GRE Score	1.000000	0.835977	0.668976	0.612831	0.557555	0.833060	0.580391	0.802610
TOEFL Score	0.835977	1.000000	0.695590	0.657981	0.567721	0.828417	0.489858	0.791594
University Rating	0.668976	0.695590	1.000000	0.734523	0.660123	0.746479	0.447783	0.711250
SOP	0.612831	0.657981	0.734523	1.000000	0.729593	0.718144	0.444029	0.675732
LOR	0.557555	0.567721	0.660123	0.729593	1.000000	0.670211	0.396859	0.669889
CGPA	0.833060	0.828417	0.746479	0.718144	0.670211	1.000000	0.521654	0.873289
Research	0.580391	0.489858	0.447783	0.444029	0.396859	0.521654	1.000000	0.553202
Chance of Admit	0.802610	0.791594	0.711250	0.675732	0.669889	0.873289	0.553202	1.000000

In [10]:
```
plt.figure(figsize=(10,7))

sns.heatmap(data.corr(),annot=True,cmap="RdYlGn")
```

Out[10]: <AxesSubplot: >



We see that the output variable "Chance of Admit" depends on CGPA,GRE,TOEFEL.The columns SOP,LOR and Reserach have less impact on university admission.

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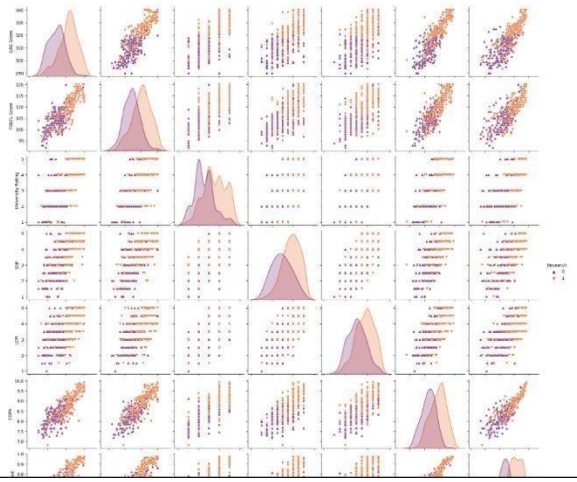
```
In [11]: sns.pairplot(data=data,hue='Research',markers=["^", "v"],palette='inferno')
```

```
Out[11]: <seaborn.axisgrid.PairGrid at 0x267f589b3d0>
```



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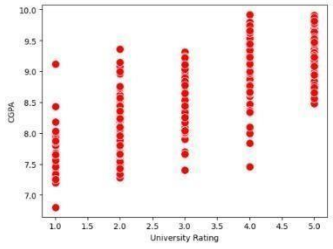
```
In [12]: sns.scatterplot(x='University Rating',y='CGPA',data=data,color='Red', s=100)
```

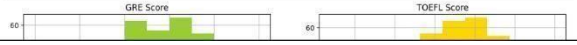
```
Out[12]: <AxesSubplot: xlabel='University Rating', ylabel='CGPA'>
```

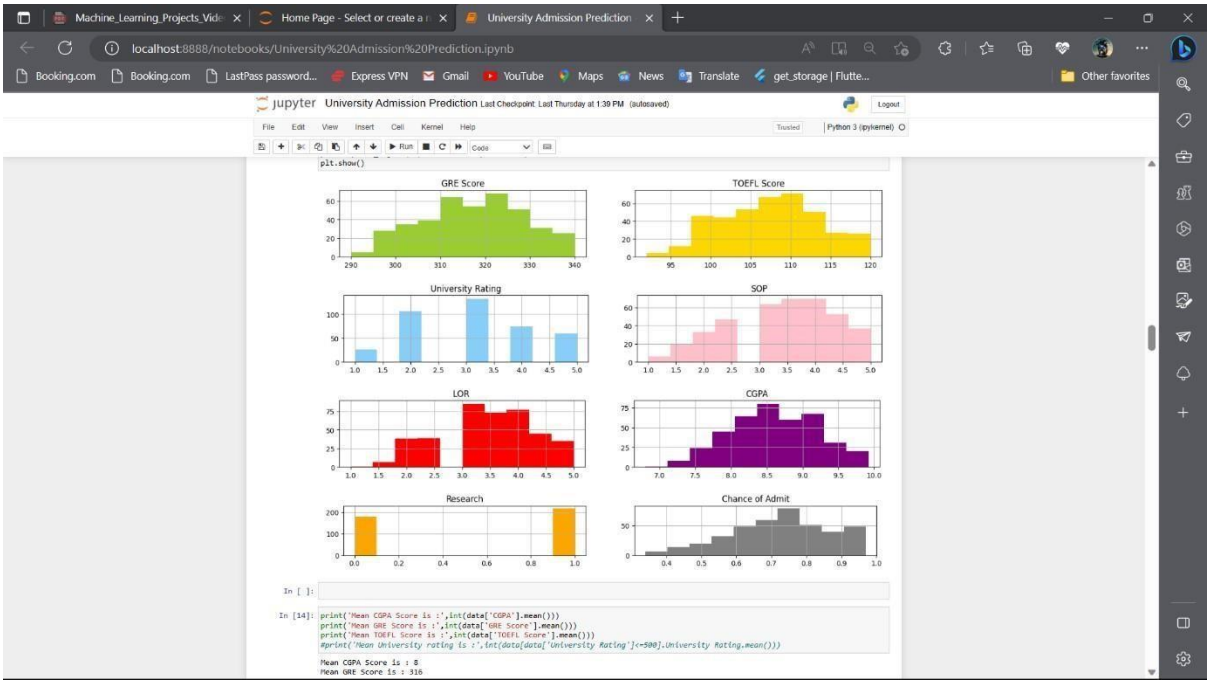


From the above scatter plot we infer that as the CGPA increases the university ratings increases

```
In [13]: category = ['GRE Score','TOEFL Score','University Rating','SOP','LOR ','CGPA','Research','Chance of Admit']
color = ['yellowgreen','gold','lightskyblue','pink','red','purple','orange','gray']
start = True
for i in np.arange(4):
    fig = plt.figure(figsize=(14,8))
    plt.subplot2grid((4,2),(i,0))
    data[category[2*i]].hist(color=color[2*i],bins=10)
    plt.title(category[2*i])
    plt.subplot2grid((4,2),(i,1))
    data[category[2*i+1]].hist(color=color[2*i+1],bins=10)
    plt.title(category[2*i+1])

plt.subplots_adjust(hspace = 0.7, wspace = 0.2)
plt.show()
```

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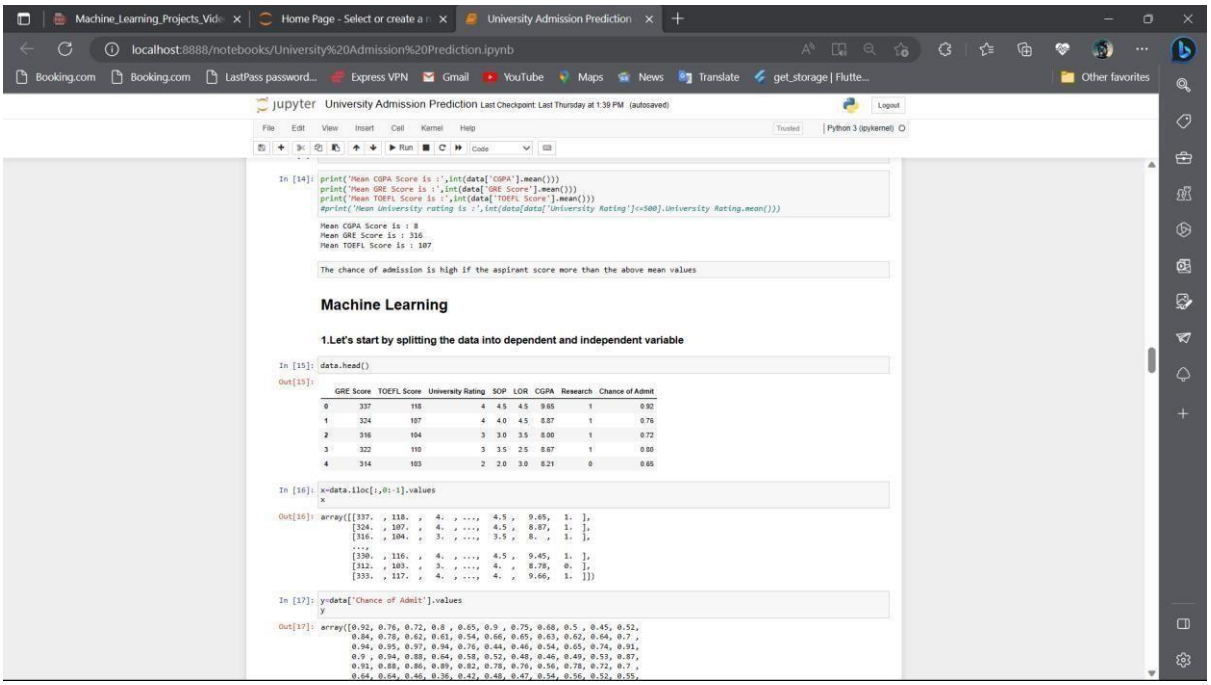
Run
Code
plt.show()
GRE Score
TOEFL Score
University Rating
SOP
LOR
CGPA
Research
Chance of Admit
In [ ]:
In [14]:
print('Mean CGPA Score is :',int(data['CGPA'].mean()))
print('Mean GRE Score is :',int(data['GRE Score'].mean()))
print('Mean TOEFL Score is :',int(data['TOEFL Score'].mean()))
#print('Mean University rating is :',int(data[data['University Rating']<=500].University Rating.mean()))
Mean CGPA Score is : 8
Mean GRE Score is : 316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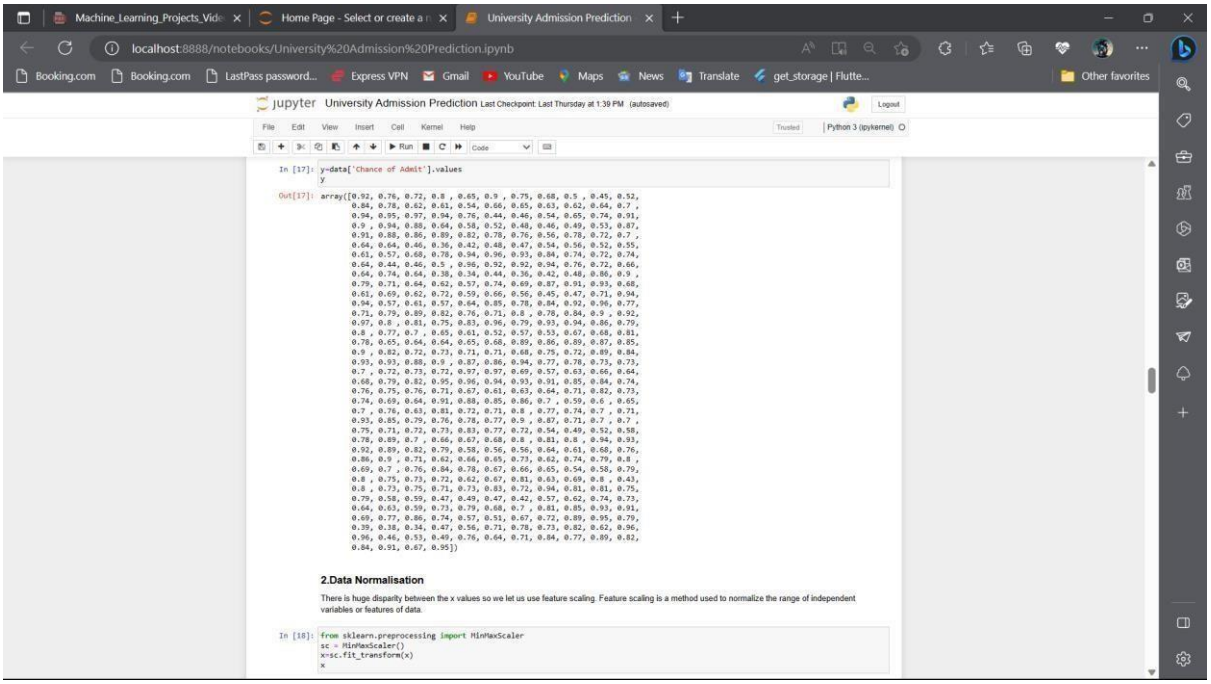
In [14]:
print('Mean CGPA Score is :',int(data['CGPA'].mean()))
print('Mean GRE Score is :',int(data['GRE Score'].mean()))
print('Mean TOEFL Score is :',int(data['TOEFL Score'].mean()))
#print('Mean University rating is :',int(data[data['University Rating']<=500].University Rating.mean()))
Mean CGPA Score is : 8
Mean GRE Score is : 316
Mean TOEFL Score is : 107
The chance of admission is high if the aspirant score more than the above mean values
Machine Learning
1.Let's start by splitting the data into dependent and independent variable
In [15]:
data.head()
Out[15]:
GRE Score TOEFL Score University Rating SOP LOR CGPA Research Chance of Admit
0 337 118 4 4.5 4.5 9.65 1 0.92
1 324 107 4 4.0 4.5 8.87 1 0.76
2 316 104 3 3.0 3.5 8.00 1 0.72
3 322 110 3 3.5 2.5 8.67 1 0.80
4 314 103 2 2.0 3.0 8.21 0 0.65
In [16]:
x=data.iloc[:,0:-1].values
x
Out[16]:
array([[337. , 118. , 4. , ..., 4.5 , 9.65, 1.],
[324. , 107. , 4. , ..., 4.5 , 8.87, 1.],
[316. , 104. , 3. , ..., 3.5 , 8. , 1.],
...,
[330. , 116. , 4. , ..., 4.5 , 9.45, 1.],
[312. , 103. , 3. , ..., 4. , 8.78, 0.],
[333. , 117. , 4. , ..., 4. , 9.66, 1.]])
In [17]:
y=data['Chance of Admit'].values
y
Out[17]:
array([0.92, 0.76, 0.72, 0.8 , 0.65, 0.9 , 0.75, 0.68, 0.5 , 0.45, 0.52,
0.84, 0.78, 0.62, 0.61, 0.54, 0.66, 0.65, 0.63, 0.62, 0.64, 0.7 ,
0.94, 0.95, 0.97, 0.94, 0.76, 0.44, 0.46, 0.54, 0.65, 0.74, 0.91,
0.9 , 0.94, 0.88, 0.64, 0.58, 0.52, 0.48, 0.46, 0.49, 0.53, 0.87,
0.91, 0.88, 0.86, 0.89, 0.82, 0.78, 0.76, 0.56, 0.78, 0.72, 0.7 ,
0.64, 0.64, 0.46, 0.36, 0.42, 0.48, 0.47, 0.54, 0.56, 0.52, 0.55,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Logout
File Edit View Insert Cell Kernel Help
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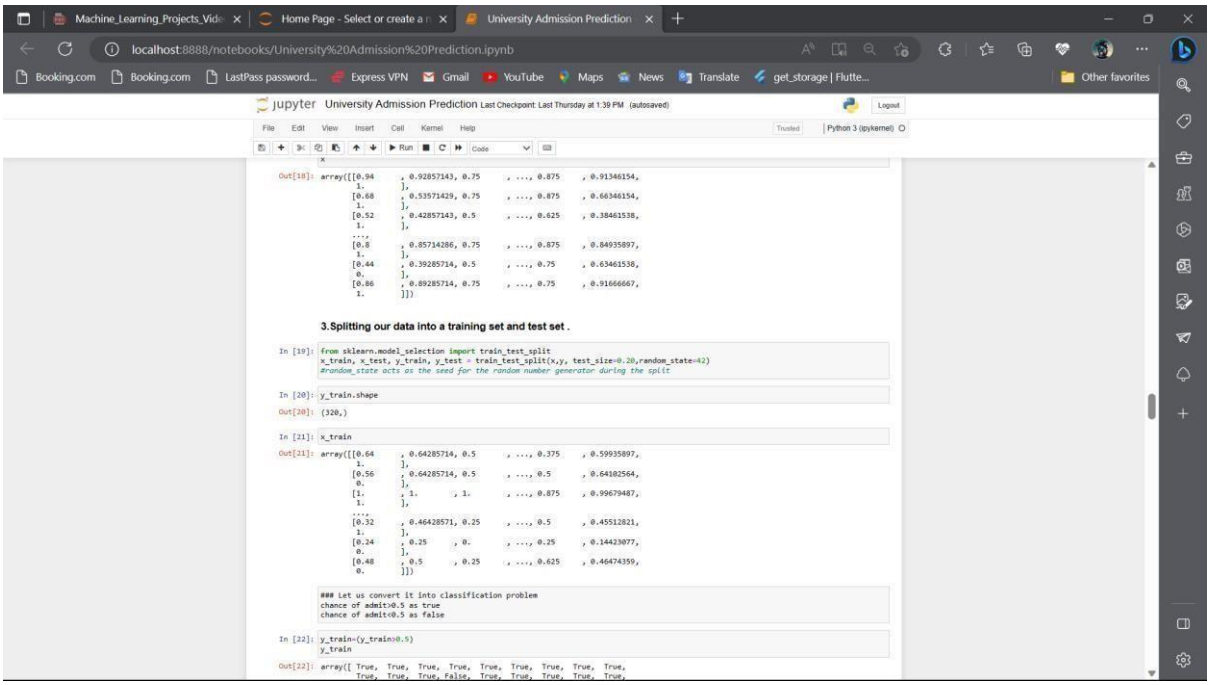
Run
Code
In [17]:
y=data['Chance of Admit'].values
y
Out[17]:
array([0.92, 0.76, 0.72, 0.8 , 0.65, 0.9 , 0.75, 0.68, 0.5 , 0.45, 0.52,
0.84, 0.78, 0.62, 0.61, 0.54, 0.66, 0.65, 0.63, 0.62, 0.64, 0.7 ,
0.94, 0.95, 0.97, 0.94, 0.76, 0.44, 0.46, 0.54, 0.65, 0.74, 0.91,
0.9 , 0.94, 0.88, 0.64, 0.58, 0.52, 0.48, 0.46, 0.49, 0.53, 0.87,
0.91, 0.88, 0.86, 0.89, 0.82, 0.78, 0.76, 0.56, 0.78, 0.72, 0.7 ,
0.64, 0.64, 0.46, 0.36, 0.42, 0.48, 0.47, 0.54, 0.56, 0.52, 0.55,
0.61, 0.57, 0.68, 0.78, 0.94, 0.96, 0.93, 0.84, 0.74, 0.72, 0.74,
0.64, 0.44, 0.46, 0.5 , 0.96, 0.92, 0.92, 0.94, 0.76, 0.72, 0.66,
0.64, 0.74, 0.64, 0.38, 0.34, 0.44, 0.36, 0.42, 0.48, 0.86, 0.9 ,
0.79, 0.71, 0.64, 0.62, 0.57, 0.74, 0.69, 0.87, 0.91, 0.93, 0.68,
0.61, 0.69, 0.62, 0.72, 0.59, 0.66, 0.56, 0.45, 0.47, 0.71, 0.94,
0.94, 0.57, 0.61, 0.57, 0.64, 0.85, 0.78, 0.84, 0.92, 0.96, 0.77,
0.71, 0.79, 0.89, 0.82, 0.76, 0.71, 0.8 , 0.78, 0.84, 0.9 , 0.92,
0.97, 0.8 , 0.81, 0.75, 0.83, 0.96, 0.79, 0.93, 0.94, 0.86, 0.79,
0.8 , 0.77, 0.7 , 0.65, 0.61, 0.52, 0.57, 0.53, 0.67, 0.68, 0.81,
0.78, 0.65, 0.64, 0.64, 0.65, 0.68, 0.89, 0.86, 0.89, 0.87, 0.85,
0.9 , 0.82, 0.72, 0.73, 0.71, 0.71, 0.68, 0.75, 0.72, 0.89, 0.84,
0.93, 0.93, 0.88, 0.8 , 0.87, 0.86, 0.94, 0.77, 0.78, 0.73, 0.73,
0.7 , 0.72, 0.73, 0.72, 0.97, 0.97, 0.69, 0.57, 0.63, 0.66, 0.64,
0.68, 0.79, 0.82, 0.95, 0.96, 0.94, 0.93, 0.91, 0.85, 0.84, 0.74,
0.76, 0.75, 0.76, 0.71, 0.67, 0.61, 0.63, 0.64, 0.71, 0.82, 0.73,
0.74, 0.69, 0.64, 0.91, 0.88, 0.85, 0.86, 0.7 , 0.59, 0.6 , 0.65,
0.7 , 0.76, 0.63, 0.81, 0.72, 0.71, 0.8 , 0.77, 0.74, 0.7 , 0.71,
0.93, 0.85, 0.79, 0.76, 0.78, 0.77, 0.9 , 0.87, 0.71, 0.7 , 0.7 ,
0.75, 0.71, 0.72, 0.73, 0.83, 0.77, 0.72, 0.54, 0.49, 0.52, 0.58,
0.78, 0.89, 0.7 , 0.66, 0.67, 0.68, 0.8 , 0.81, 0.8 , 0.94, 0.93,
0.92, 0.89, 0.82, 0.79, 0.58, 0.56, 0.56, 0.64, 0.61, 0.68, 0.76,
0.86, 0.9 , 0.71, 0.62, 0.66, 0.65, 0.73, 0.62, 0.74, 0.79, 0.8 ,
0.69, 0.7 , 0.76, 0.84, 0.78, 0.67, 0.66, 0.65, 0.54, 0.58, 0.79,
0.8 , 0.75, 0.73, 0.72, 0.62, 0.67, 0.81, 0.63, 0.69, 0.8 , 0.43,
0.8 , 0.73, 0.75, 0.71, 0.73, 0.83, 0.72, 0.94, 0.81, 0.81, 0.75,
0.79, 0.58, 0.59, 0.47, 0.49, 0.47, 0.42, 0.57, 0.62, 0.74, 0.73,
0.64, 0.63, 0.59, 0.73, 0.79, 0.68, 0.7 , 0.81, 0.85, 0.93, 0.91,
0.69, 0.77, 0.86, 0.74, 0.57, 0.51, 0.67, 0.72, 0.89, 0.95, 0.79,
0.39, 0.38, 0.34, 0.47, 0.56, 0.71, 0.78, 0.73, 0.82, 0.62, 0.96,
0.96, 0.46, 0.53, 0.49, 0.76, 0.64, 0.71, 0.84, 0.77, 0.89, 0.82,
0.84, 0.91, 0.67, 0.95])
2.Data Normalisation
There is huge disparity between the x values so we let us use feature scaling. Feature scaling is a method used to normalize the range of independent variables or features of data.
In [18]:
from sklearn.preprocessing import MinMaxScaler
sc = MinMaxScaler()
x=sc.fit_transform(x)
x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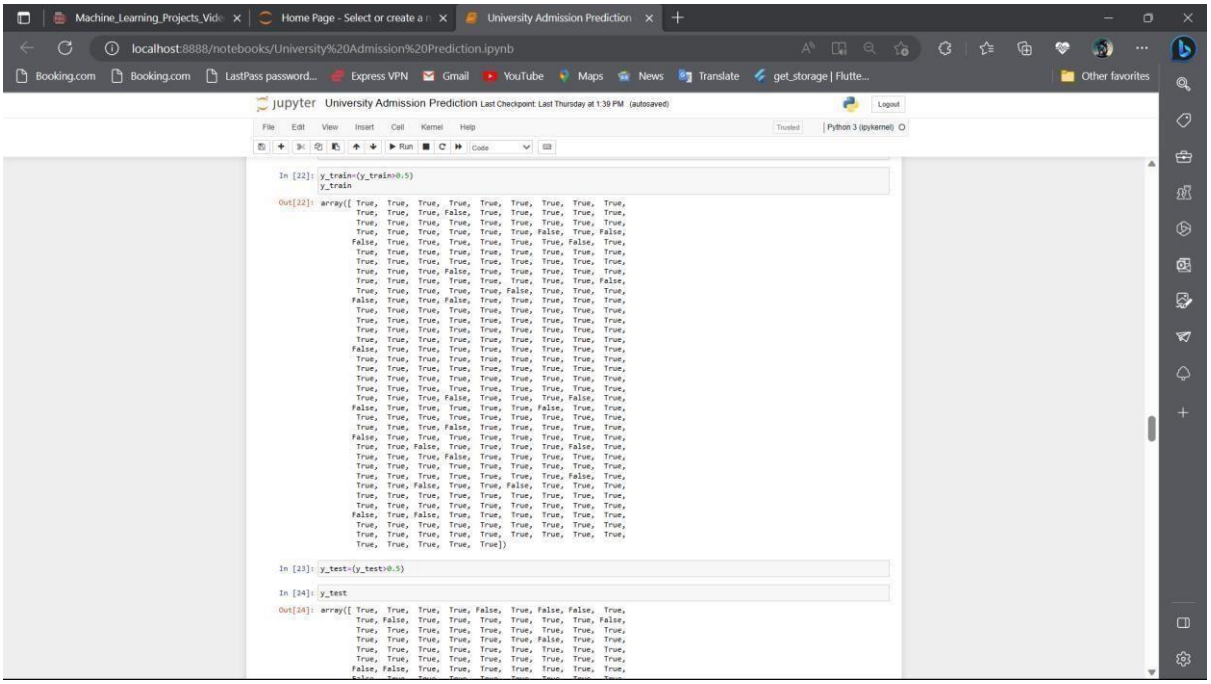
Code
x
Out[18]:
array([[0.94 , 0.92857143, 0.75 , ..., 0.875 , 0.91346154,
1.],
[0.68 , 0.53571429, 0.75 , ..., 0.875 , 0.66346154,
1.],
[0.52 , 0.42857143, 0.5 , ..., 0.625 , 0.38461538,
1.],
...,
[0.8 , 0.85714286, 0.75 , ..., 0.875 , 0.84935897,
1.],
[0.44 , 0.39285714, 0.5 , ..., 0.75 , 0.63461538,
0.],
[0.86 , 0.89285714, 0.75 , ..., 0.75 , 0.91666667,
1.]])
3.Splitting our data into a training set and test set .
In [19]:
from sklearn.model_selection import train_test_split
x_train, x_test, y_train, y_test = train_test_split(x,y, test_size=0.20,random_state=42)
#random_state acts as the seed for the random number generator during the split
In [20]:
y_train.shape
Out[20]:
(320,)
In [21]:
x_train
Out[21]:
array([[0.64 , 0.64285714, 0.5 , ..., 0.375 , 0.59935897,
1.],
[0.56 , 0.64285714, 0.5 , ..., 0.5 , 0.64102564,
0.],
[1. , 1. , 1. , ..., 0.875 , 0.99679487,
1.],
...,
[0.32 , 0.46428571, 0.25 , ..., 0.5 , 0.45512821,
1.],
[0.24 , 0.25 , 0. , ..., 0.25 , 0.14423077,
0.],
[0.48 , 0.5 , 0.25 , ..., 0.625 , 0.46474359,
0.]])
Let us convert it into classification problem
chance of admit>0.5 as true
chance of admit<0.5 as false
In [22]:
y_train=(y_train>0.5)
y_train
Out[22]:
array([True, True, True, True, True, True, True, True, True,
True, True, True, False, True, True, True, True, True,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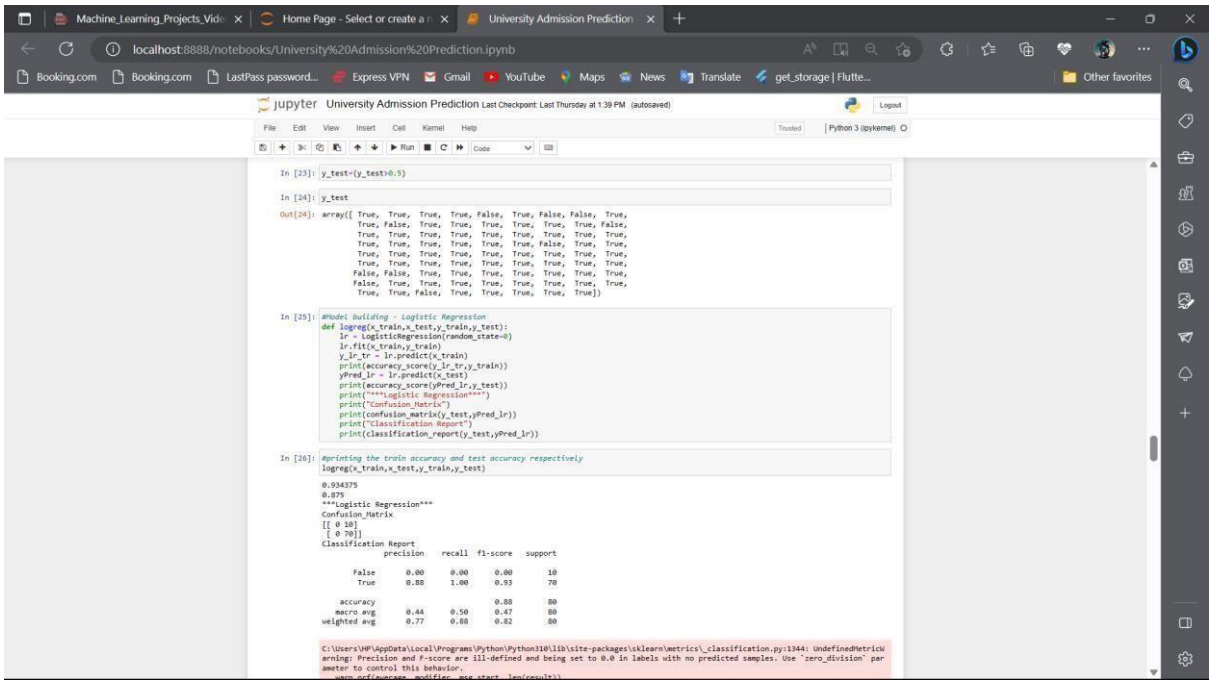
In [22]: y_train=(y_train>0.5)
y_train
Out[22]: array([True, True, True, True, True, True, True, True, True,
True, True, True, False, True, True, True, True, True,
True, True, True, True, True, True, True, True, True,
True, True, True, True, True, True, False, True, False,
False, True, True, True, True, True, True, True, False, True,
True, True, True, True, True, True, True, True, True,
True, True, True, True, True, True, True, True, True,
True, True, True, False, True, True, True, True, True,
True, True, True, True, True, True, True, True, False,
True, True, True, True, True, False, True, True, True,
False, True, True, False, True, True, True, True, True,
True, True, True, True, True, True, True, True, True,
True, True, True, True, True, True, True, True, True,
False, True, True, True, True, True, True, True, True,
True, True, True, True, True, True, True, True, True,
True, True, True, False, True, True, True, False, True,
False, True, True, True, True, True, False, True, True,
True, True, True, False, True, True, True, True, True,
False, True, True, True, True, True, True, True, True,
True, True, True, True, True, True, True, False, True,
True, True, True, False, True, True, True, True, True,
True, True, True, True, True, True, True, False, True,
True, True, False, True, True, True, True, True, True,
True, True, True, True, True, True, True, True, True,
False, False, False, True, True, True, True, True, True,
True, True, True, True, True, True, True, True, True,
True, True, True, True, True])
In [23]: y_test=(y_test>0.5)
In [24]: y_test
Out[24]: array([True, True, True, True, False, True, False, False, True,
True, False, True, True, True, True, True, False,
True, True, True, True, True, True, True, True, True,
True, True, True, True, True, True, True, True, True,
True, True, True, True, True, True, True, True, True,
False, False, True, True, True, True, True, True, True,
False, True, True, True, True, True, True, True, True,
True, True, False, True, True, True, True, True])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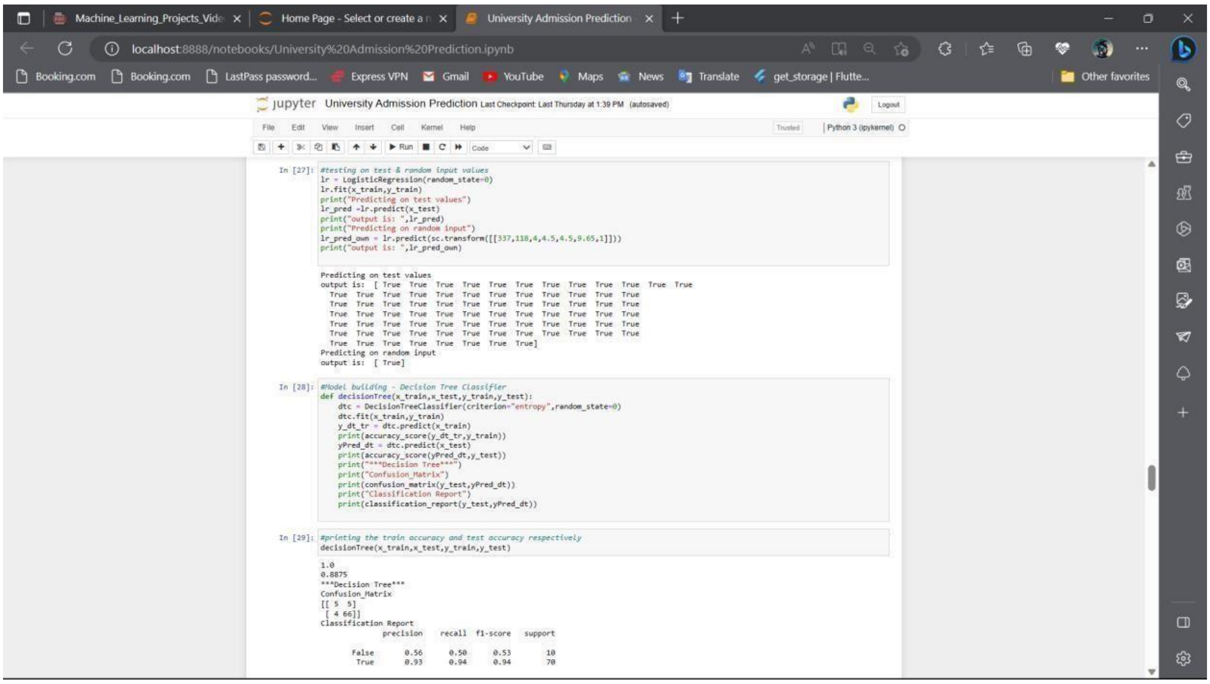
Code
In [23]: y_test=(y_test>0.5)
In [24]: y_test
Out[24]: array([True, True, True, True, False, True, False, False, True,
True, False, True, True, True, True, True, False,
True, True, True, True, True, True, True, True, True,
True, True, True, True, True, True, True, True, True,
True, True, True, True, True, True, True, True, True,
False, False, True, True, True, True, True, True, True,
False, True, True, True, True, True, True, True, True,
True, True, False, True, True, True, True, True])
In [25]: #Model building - Logistic Regression
def logreg(x_train,x_test,y_train,y_test):
lr = LogisticRegression(random_state=0)
lr.fit(x_train,y_train)
y_lr_tr = lr.predict(x_train)
print(accuracy_score(y_lr_tr,y_train))
yPred_lr = lr.predict(x_test)
print(accuracy_score(yPred_lr,y_test))
print("***Logistic Regression***")
print("Confusion_Matrix")
print(confusion_matrix(y_test,yPred_lr))
print("Classification Report")
print(classification_report(y_test,yPred_lr))
In [26]: #printing the train accuracy and test accuracy respectively
logreg(x_train,x_test,y_train,y_test)
0.934375
0.875
Logistic Regression
Confusion_Matrix
[[0 10]
[0 70]]
Classification Report
precision recall f1-score support
False 0.00 0.00 0.00 10
True 0.88 1.00 0.93 70
accuracy 0.88 80
macro avg 0.44 0.50 0.47 80
weighted avg 0.77 0.88 0.82 80
C:\Users\HP\AppData\Local\Programs\Python\Python310\lib\site-packages\sklearn\metrics_classification.py:1344: UndefinedMetricW
arning: Precision and F-score are ill-defined and being set to 0.0 in labels with no predicted samples. Use `zero_division` par
ameter to control this behavior.
_warn_prf(average, modifier, msg_start, len(result))



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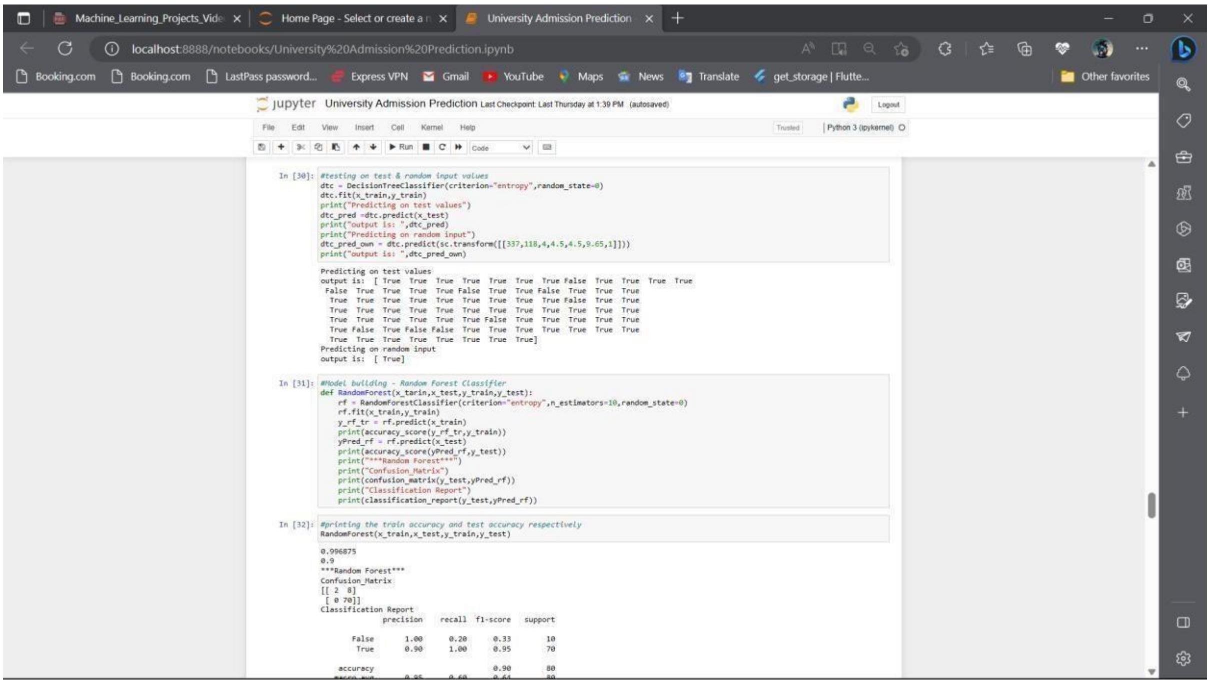
```
In [27]: #testing on test & random input values
lr = LogisticRegression(random_state=0)
lr.fit(x_train,y_train)
print("Predicting on test values")
lr_pred =lr.predict(x_test)
print("output is: ",lr_pred)
print("Predicting on random input")
lr_pred_own = lr.predict(sc.transform([[337,118,4,4.5,4.5,9.65,1]]))
print("output is: ",lr_pred_own)

Predicting on test values
output is:  [ True  True  True  True  True  True  True  True  True  True  True  True
  True  True  True  True  True  True  True  True  True  True  True  True
  True  True  True  True  True  True  True  True  True  True  True  True
  True  True  True  True  True  True  True  True  True  True  True  True
  True  True  True  True  True  True  True  True  True  True  True  True
  True  True  True  True  True  True  True  True  True  True  True  True
  True  True  True  True  True  True  True  True]
Predicting on random input
output is:  [ True]

In [28]: #Model building - Decision Tree Classifier
def decisionTree(x_train,x_test,y_train,y_test):
    dtc = DecisionTreeClassifier(criterion="entropy",random_state=0)
    dtc.fit(x_train,y_train)
    y_dt_tr = dtc.predict(x_train)
    print(accuracy_score(y_dt_tr,y_train))
    yPred_dt = dtc.predict(x_test)
    print(accuracy_score(yPred_dt,y_test))
    print("***Decision Tree***")
    print("Confusion_Matrix")
    print(confusion_matrix(y_test,yPred_dt))
    print("Classification Report")
    print(classification_report(y_test,yPred_dt))

In [29]: #printing the train accuracy and test accuracy respectively
decisionTree(x_train,x_test,y_train,y_test)

1.0
0.8875
***Decision Tree***
Confusion_Matrix
[[ 5  5]
 [ 4 66]]
Classification Report
              precision    recall  f1-score   support

       False       0.56      0.50      0.53        10
        True       0.93      0.94      0.94        70
```



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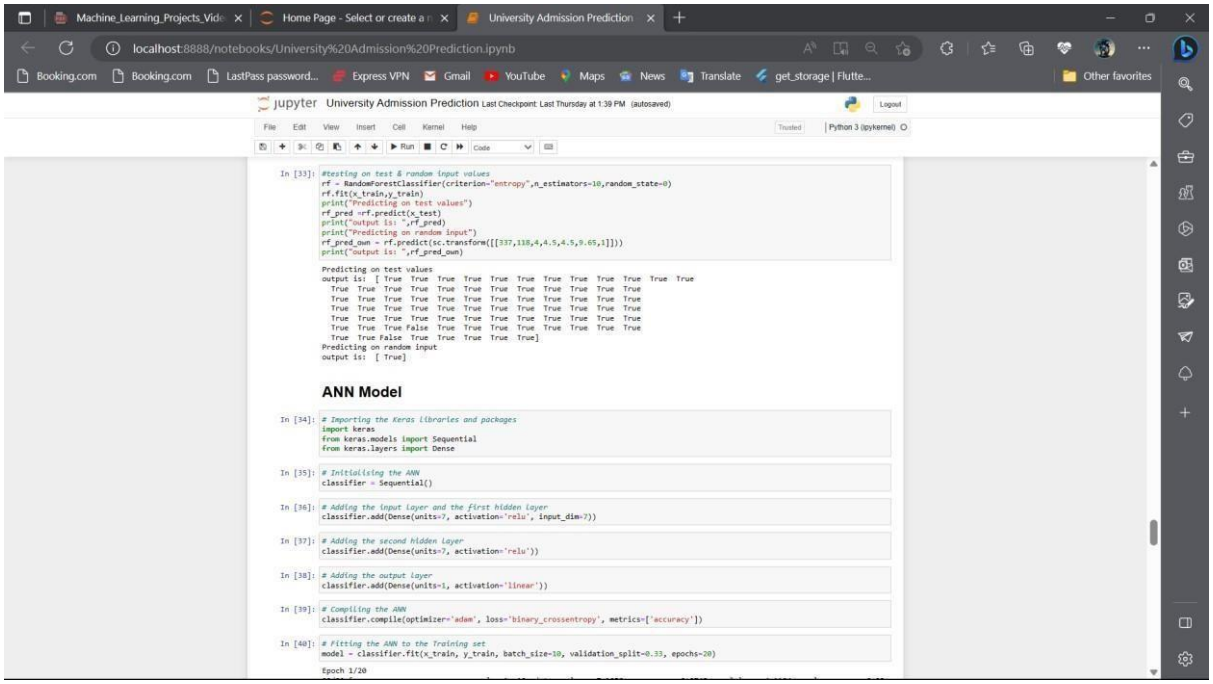
```
In [30]: #testing on test & random input values
dtc = DecisionTreeClassifier(criterion="entropy",random_state=0)
dtc.fit(x_train,y_train)
print("Predicting on test values")
dtc_pred =dtc.predict(x_test)
print("output is: ",dtc_pred)
print("Predicting on random input")
dtc_pred_own = dtc.predict(sc.transform([[337,118,4,4.5,4.5,9.65,1]]))
print("output is: ",dtc_pred_own)

Predicting on test values
output is:  [ True  True  True  True  True  True  True False  True  True  True  True
 False  True  True  True  True False  True  True False  True  True  True
  True  True  True  True  True  True  True  True  True False  True  True
  True  True  True  True  True  True  True  True  True  True  True  True
  True  True  True  True  True  True False  True  True  True  True  True
  True False  True False False  True  True  True  True  True  True  True
  True  True  True  True  True  True  True  True]
Predicting on random input
output is:  [ True]

In [31]: #Model building - Random Forest Classifier
def RandomForest(x_tarin,x_test,y_train,y_test):
    rf = RandomForestClassifier(criterion="entropy",n_estimators=10,random_state=0)
    rf.fit(x_train,y_train)
    y_rf_tr = rf.predict(x_train)
    print(accuracy_score(y_rf_tr,y_train))
    yPred_rf = rf.predict(x_test)
    print(accuracy_score(yPred_rf,y_test))
    print("***Random Forest***")
    print("Confusion_Matrix")
    print(confusion_matrix(y_test,yPred_rf))
    print("Classification Report")
    print(classification_report(y_test,yPred_rf))

In [32]: #printing the train accuracy and test accuracy respectively
RandomForest(x_train,x_test,y_train,y_test)

0.996875
0.9
***Random Forest***
Confusion_Matrix
[[ 2  8]
 [ 0 70]]
Classification Report
              precision    recall  f1-score   support

       False       1.00      0.20      0.33        10
        True       0.90      1.00      0.95        70

    accuracy                           0.90        80
```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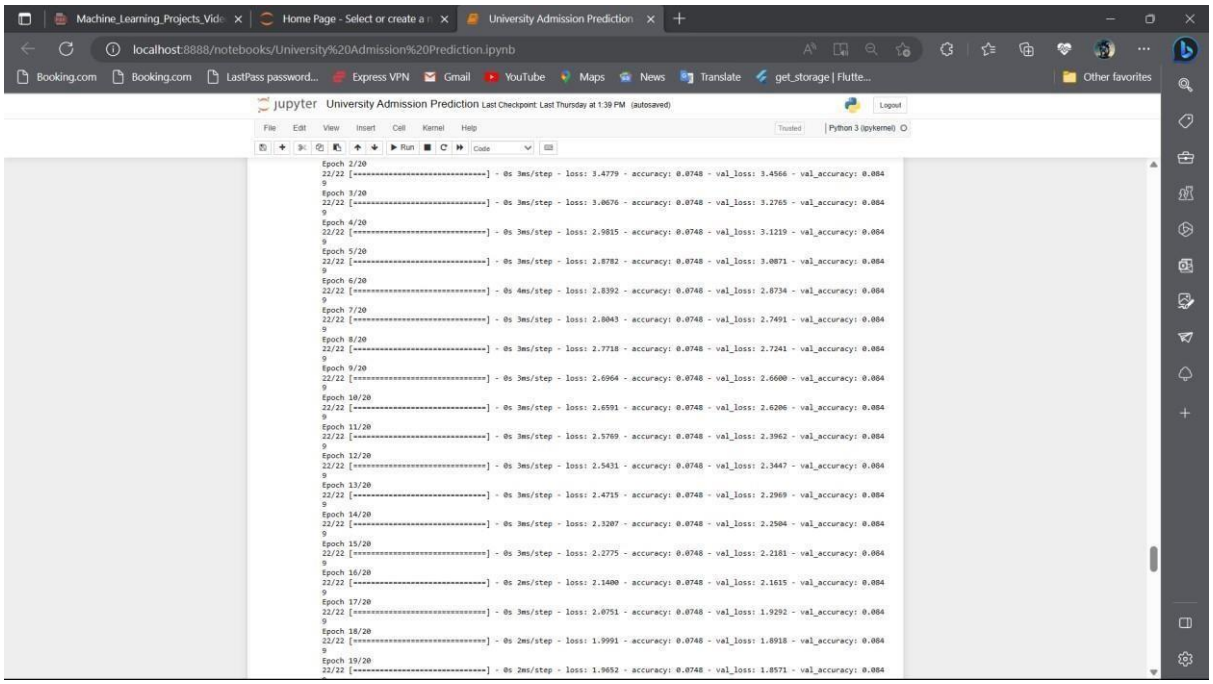
Code
In [33]:
#testing on test & random input values
rf = RandomForestClassifier(criterion="entropy",n_estimators=10,random_state=0)
rf.fit(x_train,y_train)
print("Predicting on test values")
rf_pred =rf.predict(x_test)
print("output is: ",rf_pred)
print("Predicting on random input")
rf_pred_own = rf.predict(sc.transform([[337,118,4,4.5,4.5,9.65,1]]))
print("output is: ",rf_pred_own)
Predicting on test values
output is: [True True True True True True True True True True True True
True True True True True True True True True True True True
True True True True True True True True True True True True
True True True True True True True True True True True True
True True True True True True True True True True True True
True True True False True True True True True True True True
True True False True True True True True]
Predicting on random input
output is: [True]
ANN Model
In [34]:
# Importing the Keras libraries and packages
import keras
from keras.models import Sequential
from keras.layers import Dense
In [35]:
# Initialising the ANN
classifier = Sequential()
In [36]:
# Adding the input layer and the first hidden layer
classifier.add(Dense(units=7, activation='relu', input_dim=7))
In [37]:
# Adding the second hidden layer
classifier.add(Dense(units=7, activation='relu'))
In [38]:
# Adding the output layer
classifier.add(Dense(units=1, activation='linear'))
In [39]:
# Compiling the ANN
classifier.compile(optimizer='adam', loss='binary_crossentropy', metrics=['accuracy'])
In [40]:
# Fitting the ANN to the Training set
model = classifier.fit(x_train, y_train, batch_size=10, validation_split=0.33, epochs=20)
Epoch 1/20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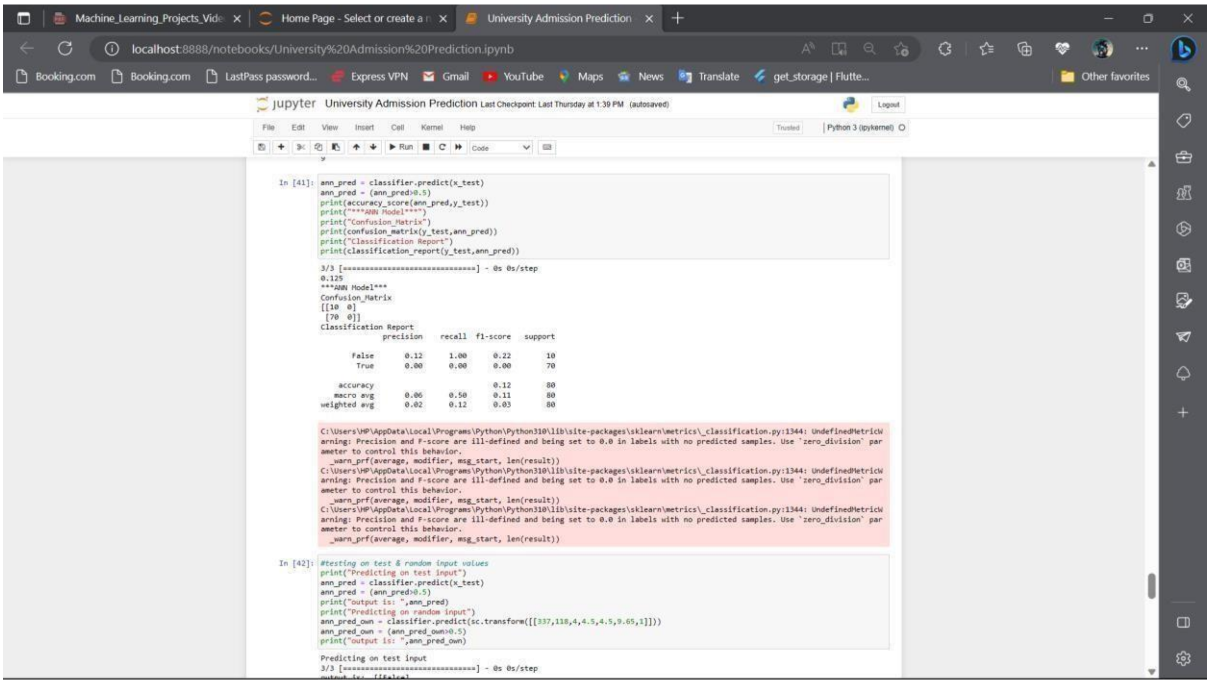
Code
Epoch 2/20
22/22 [==========] - 0s 3ms/step - loss: 3.4779 - accuracy: 0.0748 - val_loss: 3.4566 - val_accuracy: 0.084
9
Epoch 3/20
22/22 [==========] - 0s 3ms/step - loss: 3.0676 - accuracy: 0.0748 - val_loss: 3.2765 - val_accuracy: 0.084
9
Epoch 4/20
22/22 [==========] - 0s 3ms/step - loss: 2.9815 - accuracy: 0.0748 - val_loss: 3.1219 - val_accuracy: 0.084
9
Epoch 5/20
22/22 [==========] - 0s 3ms/step - loss: 2.8782 - accuracy: 0.0748 - val_loss: 3.0871 - val_accuracy: 0.084
9
Epoch 6/20
22/22 [==========] - 0s 4ms/step - loss: 2.8392 - accuracy: 0.0748 - val_loss: 2.8734 - val_accuracy: 0.084
9
Epoch 7/20
22/22 [==========] - 0s 3ms/step - loss: 2.8043 - accuracy: 0.0748 - val_loss: 2.7491 - val_accuracy: 0.084
9
Epoch 8/20
22/22 [==========] - 0s 3ms/step - loss: 2.7718 - accuracy: 0.0748 - val_loss: 2.7241 - val_accuracy: 0.084
9
Epoch 9/20
22/22 [==========] - 0s 3ms/step - loss: 2.6964 - accuracy: 0.0748 - val_loss: 2.6600 - val_accuracy: 0.084
9
Epoch 10/20
22/22 [==========] - 0s 3ms/step - loss: 2.6591 - accuracy: 0.0748 - val_loss: 2.6206 - val_accuracy: 0.084
9
Epoch 11/20
22/22 [==========] - 0s 3ms/step - loss: 2.5769 - accuracy: 0.0748 - val_loss: 2.3962 - val_accuracy: 0.084
9
Epoch 12/20
22/22 [==========] - 0s 3ms/step - loss: 2.5431 - accuracy: 0.0748 - val_loss: 2.3447 - val_accuracy: 0.084
9
Epoch 13/20
22/22 [==========] - 0s 3ms/step - loss: 2.4715 - accuracy: 0.0748 - val_loss: 2.2969 - val_accuracy: 0.084
9
Epoch 14/20
22/22 [==========] - 0s 3ms/step - loss: 2.3207 - accuracy: 0.0748 - val_loss: 2.2504 - val_accuracy: 0.084
9
Epoch 15/20
22/22 [==========] - 0s 3ms/step - loss: 2.2775 - accuracy: 0.0748 - val_loss: 2.2181 - val_accuracy: 0.084
9
Epoch 16/20
22/22 [==========] - 0s 2ms/step - loss: 2.1400 - accuracy: 0.0748 - val_loss: 2.1615 - val_accuracy: 0.084
9
Epoch 17/20
22/22 [==========] - 0s 3ms/step - loss: 2.0751 - accuracy: 0.0748 - val_loss: 1.9292 - val_accuracy: 0.084
9
Epoch 18/20
22/22 [==========] - 0s 2ms/step - loss: 1.9991 - accuracy: 0.0748 - val_loss: 1.8918 - val_accuracy: 0.084
9
Epoch 19/20
22/22 [==========] - 0s 2ms/step - loss: 1.9652 - accuracy: 0.0748 - val_loss: 1.8571 - val_accuracy: 0.084



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In [41]: ann_pred = classifier.predict(x_test)
ann_pred = (ann_pred>0.5)
print(accuracy_score(ann_pred,y_test))
print("***ANN Model***")
print("Confusion_Matrix")
print(confusion_matrix(y_test,ann_pred))
print("Classification Report")
print(classification_report(y_test,ann_pred))
3/3 [==============================] - 0s 0s/step
0.125
ANN Model
Confusion_Matrix
[[10 0]
[70 0]]
Classification Report
precision recall f1-score support
False 0.12 1.00 0.22 10
True 0.00 0.00 0.00 70
accuracy 0.12 80
macro avg 0.06 0.50 0.11 80
weighted avg 0.02 0.12 0.03 80
C:\Users\HP\AppData\Local\Programs\Python\Python310\lib\site-packages\sklearn\metrics_classification.py:1344: UndefinedMetricWarning: Precision and F-score are ill-defined and being set to 0.0 in labels with no predicted samples. Use `zero_division` parameter to control this behavior.
_warn_prf(average, modifier, msg_start, len(result))
C:\Users\HP\AppData\Local\Programs\Python\Python310\lib\site-packages\sklearn\metrics_classification.py:1344: UndefinedMetricWarning: Precision and F-score are ill-defined and being set to 0.0 in labels with no predicted samples. Use `zero_division` parameter to control this behavior.
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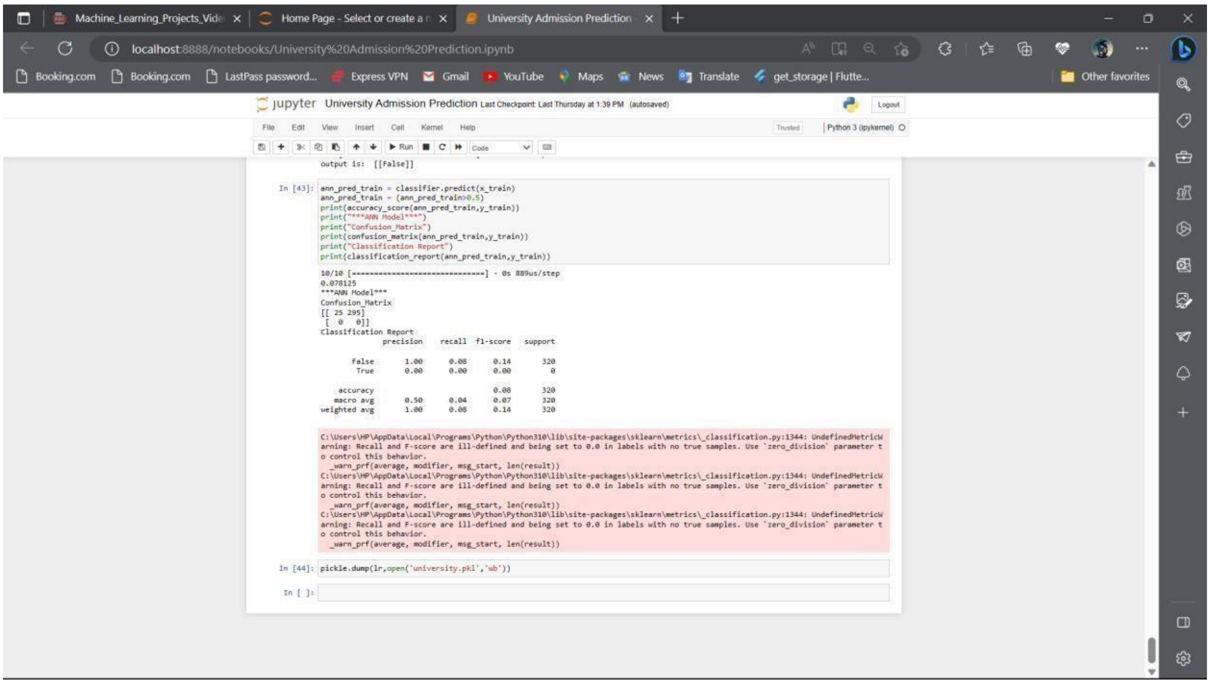
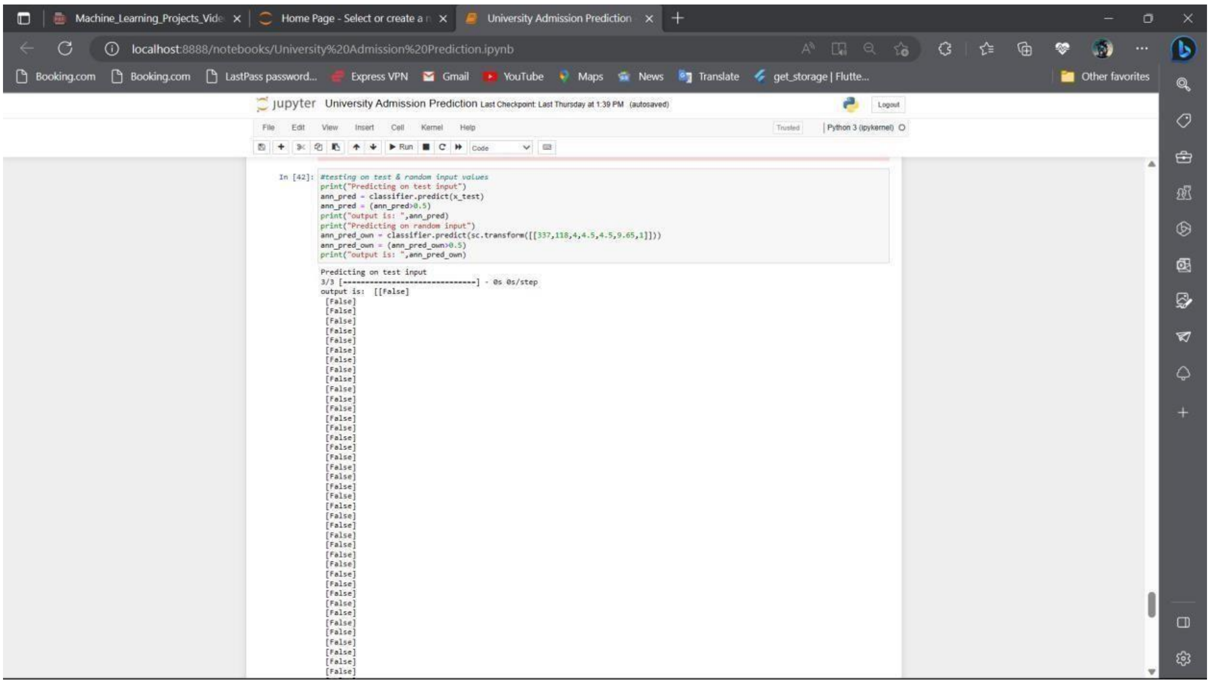
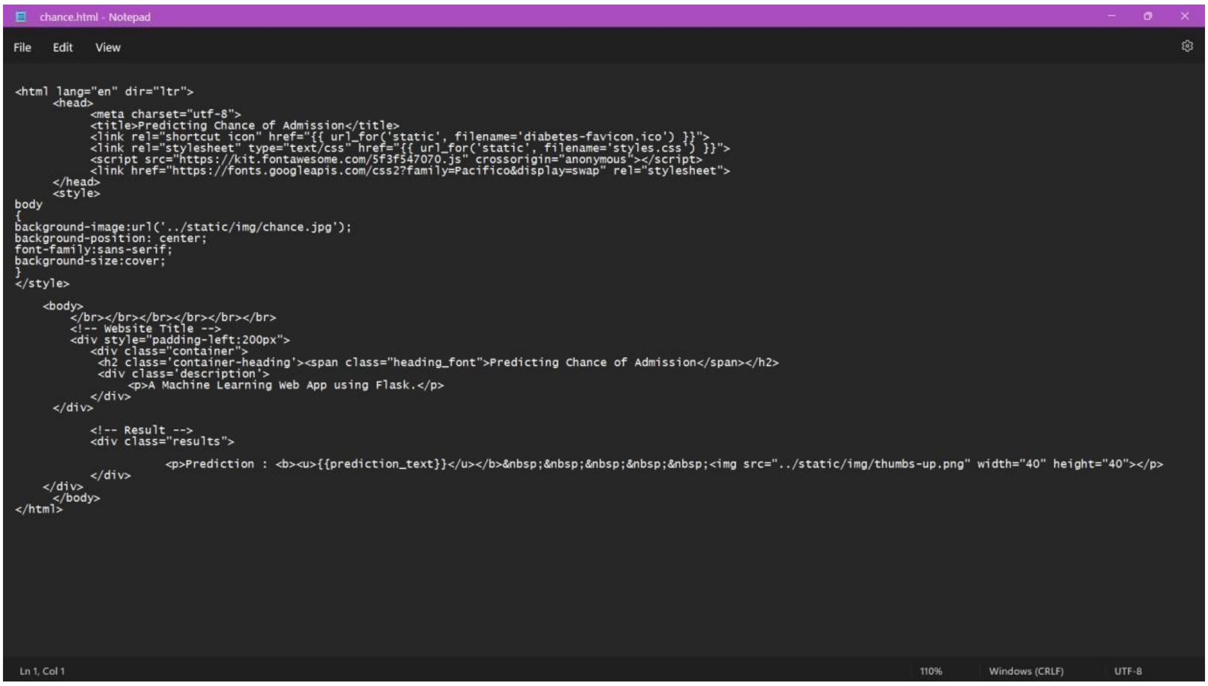
_warn_prf(average, modifier, msg_start, len(result))
In [42]: #testing on test & random input values
print("Predicting on test input")
ann_pred = classifier.predict(x_test)
ann_pred = (ann_pred>0.5)
print("output is: ",ann_pred)
print("Predicting on random input")
ann_pred_own = classifier.predict(sc.transform([[337,118,4,4.5,4.5,9.65,1]]))
ann_pred_own = (ann_pred_own>0.5)
print("output is: ",ann_pred_own)
Predicting on test input
3/3 [==============================] - 0s 0s/step



localhost:8888/notebooks/University%20Admission%20Prediction.ipynb
jupyter University Admission Prediction Last Checkpoint: Last Thursday at 1:39 PM (autosaved)
output is: [[False]]
In [43]: ann_pred_train = classifier.predict(x_train)
ann_pred_train = (ann_pred_train>0.5)
print(accuracy_score(ann_pred_train,y_train))
print("***ANN Model***")
print("Confusion_Matrix")
print(confusion_matrix(ann_pred_train,y_train))
print("Classification Report")
print(classification_report(ann_pred_train,y_train))
10/10 [==============================] - 0s 889us/step
0.078125
ANN Model
Confusion_Matrix
[[25 295]
[0 0]]
Classification Report
precision recall f1-score support
False 1.00 0.08 0.14 320
True 0.00 0.00 0.00 0
accuracy 0.08 320
macro avg 0.50 0.04 0.07 320
weighted avg 1.00 0.08 0.14 320
C:\Users\HP\AppData\Local\Programs\Python\Python310\lib\site-packages\sklearn\metrics_classification.py:1344: UndefinedMetricWarning: Recall and F-score are ill-defined and being set to 0.0 in labels with no true samples. Use `zero_division` parameter to control this behavior.
_warn_prf(average, modifier, msg_start, len(result))
C:\Users\HP\AppData\Local\Programs\Python\Python310\lib\site-packages\sklearn\metrics_classification.py:1344: UndefinedMetricWarning: Recall and F-score are ill-defined and being set to 0.0 in labels with no true samples. Use `zero_division` parameter to control this behavior.
_warn_prf(average, modifier, msg_start, len(result))
C:\Users\HP\AppData\Local\Programs\Python\Python310\lib\site-packages\sklearn\metrics_classification.py:1344: UndefinedMetricWarning: Recall and F-score are ill-defined and being set to 0.0 in labels with no true samples. Use `zero_division` parameter to control this behavior.
_warn_prf(average, modifier, msg_start, len(result))
In [44]: pickle.dump(lr,open('university.pkl','wb'))
In [ ]:

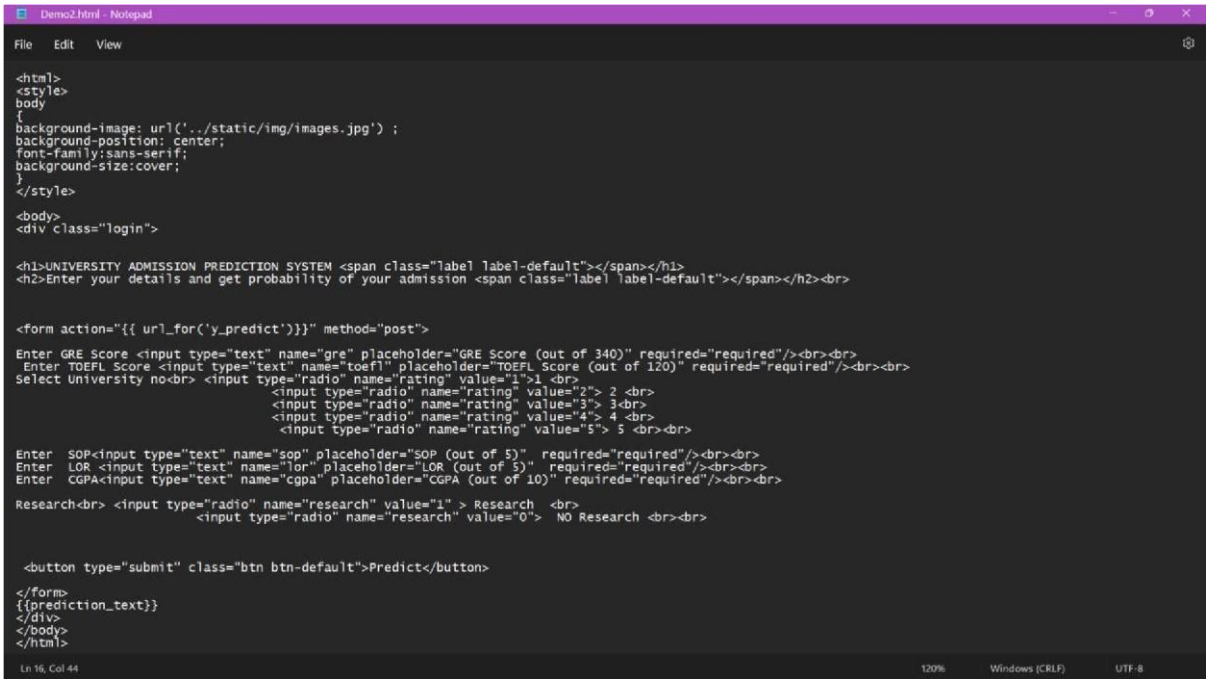


Chance.html

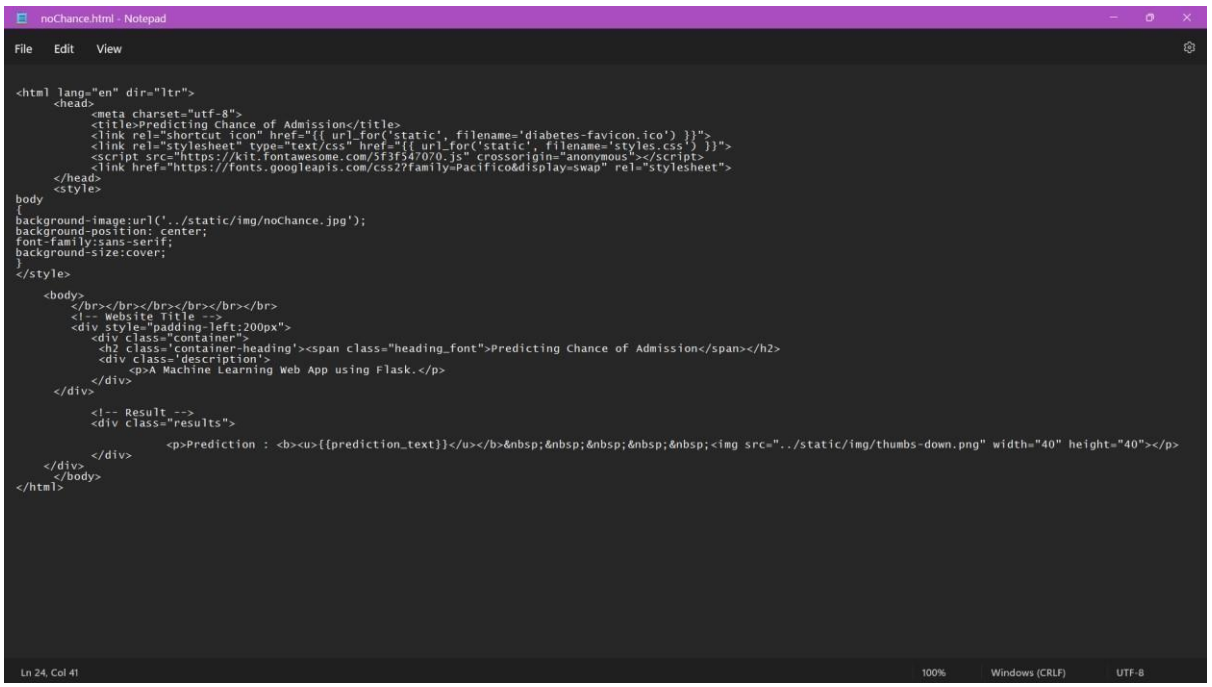


```
<html lang="en" dir="ltr">
      <head>
            <meta charset="utf-8">
            <title>Predicting Chance of Admission</title>
            <link rel="shortcut icon" href="{{ url_for('static', filename='diabetes-favicon.ico') }}">
            <link rel="stylesheet" type="text/css" href="{{ url_for('static', filename='styles.css') }}">
            <script src="https://kit.fontawesome.com/5f3f547070.js" crossorigin="anonymous"></script>
            <link href="https://fonts.googleapis.com/css2?family=Pacifico&display=swap" rel="stylesheet">
      </head>
      <style>
body
{
background-image:url('../static/img/chance.jpg');
background-position: center;
font-family:sans-serif;
background-size:cover;
}
</style>

    <body>
        </br></br></br></br></br></br>
        <!-- Website Title -->
        <div style="padding-left:200px">
           <div class="container">
            <h2 class='container-heading'><span class="heading_font">Predicting Chance of Admission</span></h2>
            <div class='description'>
                <p>A Machine Learning Web App using Flask.</p>
           </div>
      </div>

           <!-- Result -->
           <div class="results">

                <p>Prediction : <b><u>{{prediction_text}}</u></b>     <img src="../static/img/thumbs-up.png" width="40" height="40"></p>
           </div>
    </div>
      </body>
</html>
```

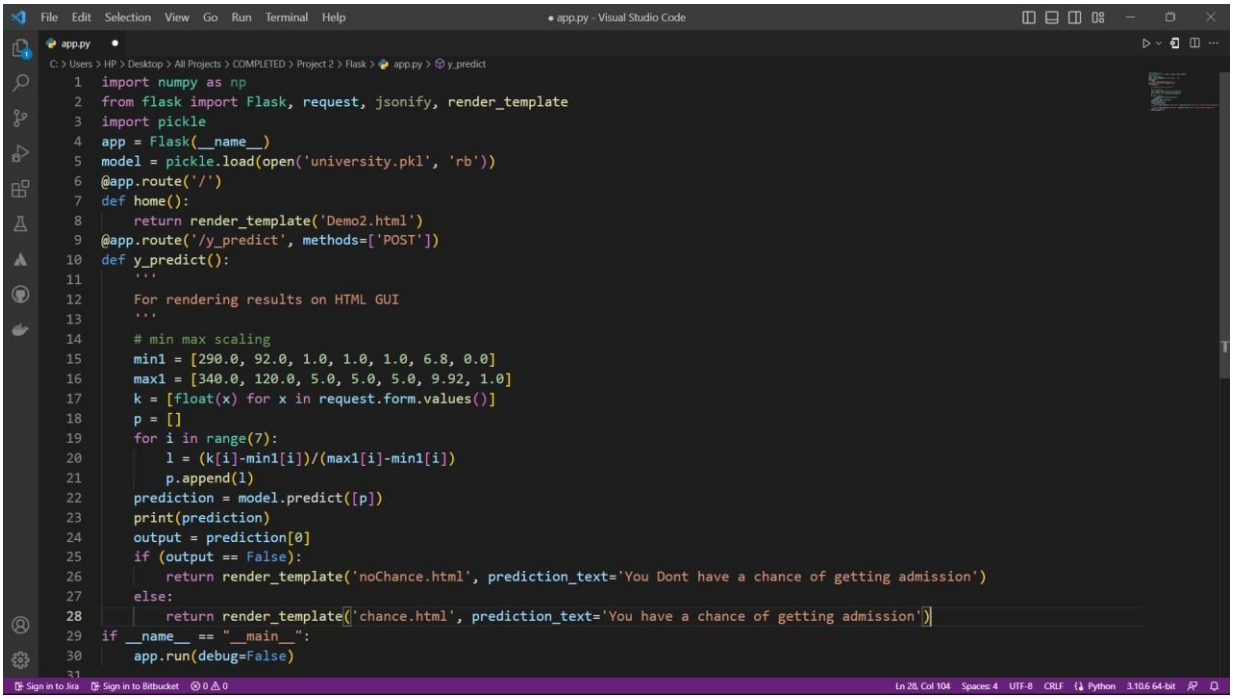
Demo2.html



noChance.html



App.py


File Edit Selection View Go Run Terminal Help
• app.py - Visual Studio Code
app.py
C: > Users > HP > Desktop > All Projects > COMPLETED > Project 2 > Flask > app.py > y_predict
1 import numpy as np
2 from flask import Flask, request, jsonify, render_template
3 import pickle
4 app = Flask(__name__)
5 model = pickle.load(open('university.pkl', 'rb'))
6 @app.route('/')
7 def home():
8 return render_template('Demo2.html')
9 @app.route('/y_predict', methods=['POST'])
10 def y_predict():
11 '''
12 For rendering results on HTML GUI
13 '''
14 # min max scaling
15 min1 = [290.0, 92.0, 1.0, 1.0, 1.0, 6.8, 0.0]
16 max1 = [340.0, 120.0, 5.0, 5.0, 5.0, 9.92, 1.0]
17 k = [float(x) for x in request.form.values()]
18 p = []
19 for i in range(7):
20 l = (k[i]-min1[i])/(max1[i]-min1[i])
21 p.append(l)
22 prediction = model.predict([p])
23 print(prediction)
24 output = prediction[0]
25 if (output == False):
26 return render_template('noChance.html', prediction_text='You Dont have a chance of getting admission')
27 else:
28 return render_template('chance.html', prediction_text='You have a chance of getting admission')
29 if __name__ == "__main__":
30 app.run(debug=False)
31
Sign in to Jira Sign in to Bitbucket 0 0
Ln 28, Col 104 Spaces: 4 UTF-8 CRLF Python 3.10.6 64-bit