Graduate Admission Prediction

This dataset is created for prediction of Graduate Admission from an Indian Perspective.This dataset is inspired by the UCLA Graduate Dataset. The test scores and GPA are in the older format.The dataset is owned by Mohan S Acharya.This dataset was built with the purpose of helping students in shortlisting universities with their profiles. The predicted output gives them a fair idea about their chances for a particular university.

Context

The dataset contains several parameters which are considered important during the application for Masters Programs. The parameters included are :

- GRE Scores (out of 340)
- TOEFL Scores (out of 120)
- University Rating (out of 5)
- Statement of Purpose and Letter of Recommendation Strength (out of 5)
- Undergraduate GPA (out of 10)
- Research Experience (either 0 or 1)
- Chance of Admit (ranging from 0 to 1)

Source

Mohan S Acharya, Asfia Armaan, Aneeta S Antony : A Comparison of Regression Models for Prediction of Graduate Admissions, IEEE International Conference on Computational Intelligence in Data Science 2019

Let's Dive into it

Import necessary libraries

In [1]:
```
import numpy as np
import pandas as pd
import matplotlib.pyplot as plt
import seaborn as sns
```

Read 'admission_predict.csv' and store it in a DataFrame

In [2]:
```
df = pd.read_csv('admission_predict.csv')
```

View the top 5 rows

In [3]:
```
df.head()
```

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

View the bottom 5 rows

In [4]:
```
df.tail()
```

Out[4]:

	Serial No.	GRE Score	TOEFL Score	University Rating	SOP	LOR	CGPA	Research	Chance of Admit
495	496	332	108	5	4.5	4.0	9.02	1	0.87
496	497	337	117	5	5.0	5.0	9.87	1	0.96
497	498	330	120	5	4.5	5.0	9.56	1	0.93
498	499	312	103	4	4.0	5.0	8.43	0	0.73
499	500	327	113	4	4.5	4.5	9.04	0	0.84

Check info of the dataset

In [5]:
```
df.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 500 entries, 0 to 499
Data columns (total 9 columns):
 #   Column             Non-Null Count  Dtype  
---  ------             --------------  -----  
 0   Serial No.         500 non-null    int64  
 1   GRE Score          500 non-null    int64  
 2   TOEFL Score        500 non-null    int64  
 3   University Rating  500 non-null    int64  
 4   SOP                500 non-null    float64
 5   LOR                500 non-null    float64
 6   CGPA               500 non-null    float64
 7   Research           500 non-null    int64  
 8   Chance of Admit    500 non-null    float64
dtypes: float64(4), int64(5)
memory usage: 35.3 KB
```

View the basic statistical information about the dataset

In [6]:
```
df.describe()
```

Out[6]:

	Serial No.	GRE Score	TOEFL Score	University Rating	SOP	LOR	CGPA	Res
count	500.000000	500.000000	500.000000	500.000000	500.000000	500.00000	500.000000	500.(
mean	250.500000	316.472000	107.192000	3.114000	3.374000	3.48400	8.576440	0.5
std	144.481833	11.295148	6.081868	1.143512	0.991004	0.92545	0.604813	0.4
min	1.000000	290.000000	92.000000	1.000000	1.000000	1.00000	6.800000	0.(
25%	125.750000	308.000000	103.000000	2.000000	2.500000	3.00000	8.127500	0.(
50%	250.500000	317.000000	107.000000	3.000000	3.500000	3.50000	8.560000	1.(
75%	375.250000	325.000000	112.000000	4.000000	4.000000	4.00000	9.040000	1.(
max	500.000000	340.000000	120.000000	5.000000	5.000000	5.00000	9.920000	1.(

Check for any null values

In [7]:
```
df.isna().sum()
```

Out[7]:
```
Serial No.           0
GRE Score            0
TOEFL Score          0
University Rating    0
SOP                  0
LOR                  0
CGPA                 0
Research             0
Chance of Admit      0
dtype: int64
```

Note: Currently our target variable ranges form 0 to 1. We need to make this a classification problem. Create a new variable named 'Admission' which has values 0 and 1. If Chance of admin < 0.5, Admission = 0. If chance of admit > 0.5, Admission = 1

In [38]:
```
# Create a function which converts values less than 0.5 to 0 and rest to 1
def zeroone(x):
    if x <= 0.5:
        return 0
    elif x > 0.5:
        return 1
```

In [39]:
```
df['Admission'] = df['Chance of Admit '].apply(zeroone)
```

In [40]:
```
df.head()
```

Out[40]:

	Serial No.	GRE Score	TOEFL Score	University Rating	SOP	LOR	CGPA	Research	Chance of Admit	Admission
0	1	337	118	4	4.5	4.5	9.65	1	0.92	1
1	2	324	107	4	4.0	4.5	8.87	1	0.76	1
2	3	316	104	3	3.0	3.5	8.00	1	0.72	1
3	4	322	110	3	3.5	2.5	8.67	1	0.80	1
4	5	314	103	2	2.0	3.0	8.21	0	0.65	1

Drop Chance of Admit and Serial No. column

In [41]:
```
df.drop(columns = ['Chance of Admit ', 'Serial No.'], inplace = True)
df.head()
```

Out[41]:

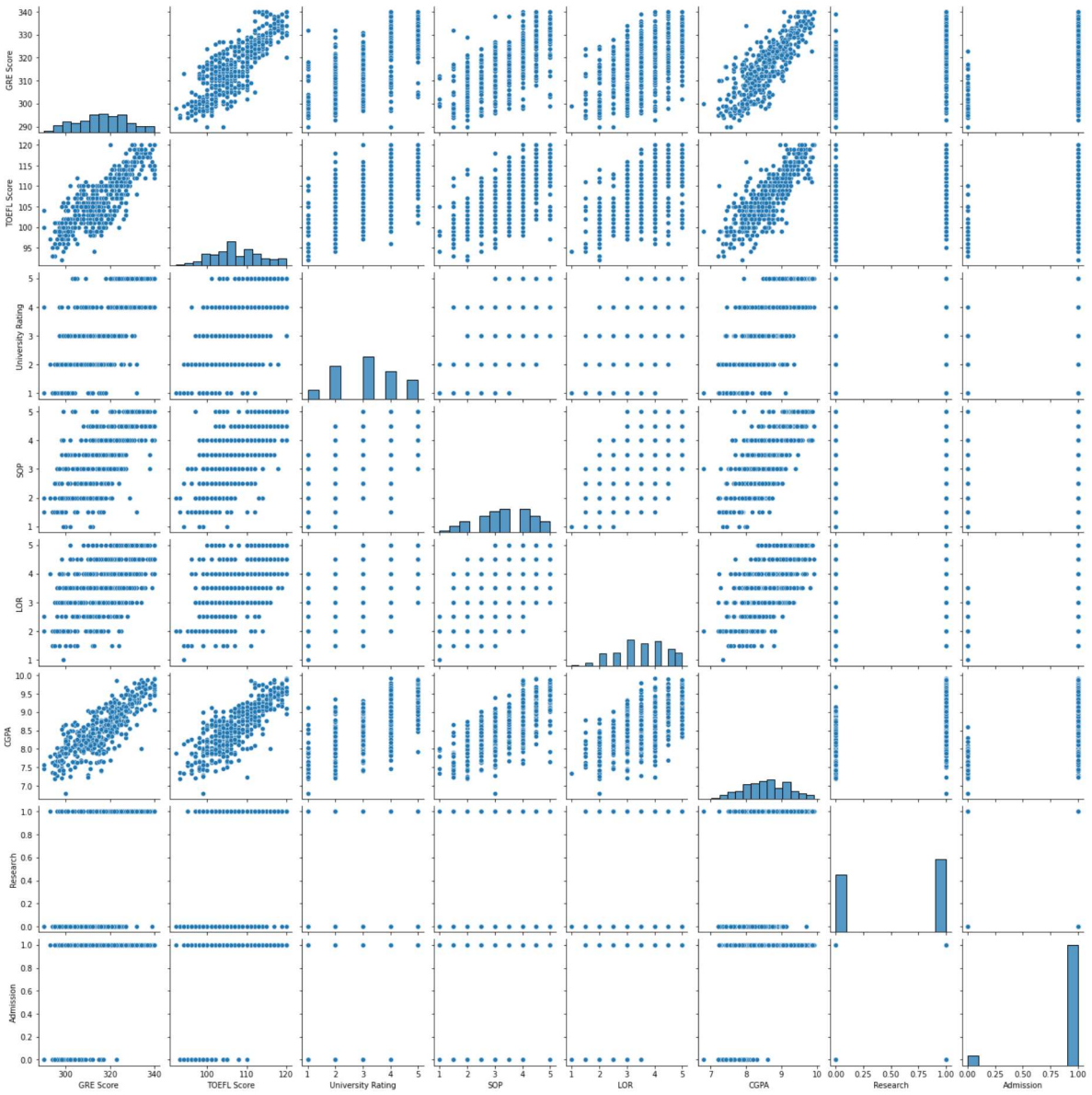
	GRE Score	TOEFL Score	University Rating	SOP	LOR	CGPA	Research	Admission
0	337	118	4	4.5	4.5	9.65	1	1
1	324	107	4	4.0	4.5	8.87	1	1
2	316	104	3	3.0	3.5	8.00	1	1
3	322	110	3	3.5	2.5	8.67	1	1
4	314	103	2	2.0	3.0	8.21	0	1

Visualization

Plot a pairplot of the dataset

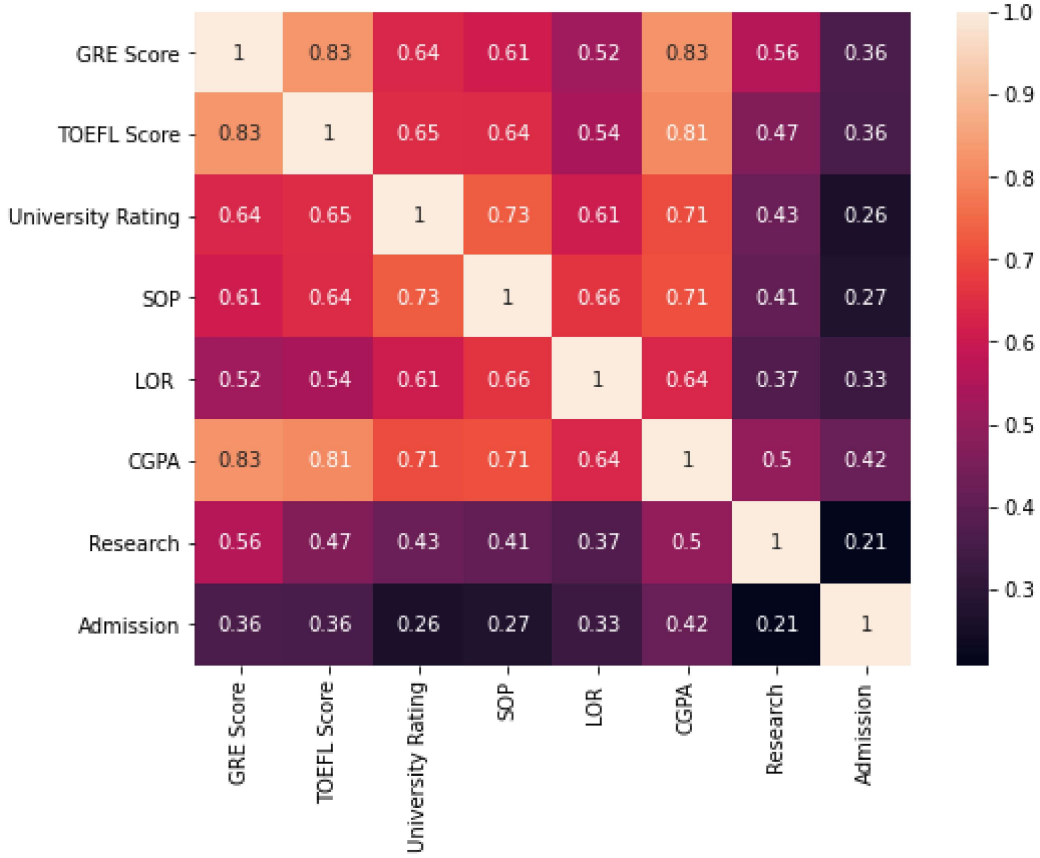
In [42]:
```
sns.pairplot(df)
plt.plot()
```

Out[42]:
```
[]
```



Plot a heatmap to view correlation between the features

In [43]:
```
plt.figure(figsize = (8,6))
sns.heatmap(df.corr(), annot = True)
plt.show()
```



Split the columns into Input and Target variables

In [44]:
```
X = df.drop(columns = ['Admission'])
y = df['Admission']
```

Standardise the data using StandardScaler

In [45]:
```
from sklearn.preprocessing import StandardScaler
```

In [46]:
```
scaler = StandardScaler()
```

In [47]:
```
xcolumns = X.columns
```

In [48]:
```
X = scaler.fit_transform(X)
```

In [49]:
```
X = pd.DataFrame(X, columns = xcolumns)
```

In [50]:
```
X.head()
```

Out[50]:

	GRE Score	TOEFL Score	University Rating	SOP	LOR	CGPA	Research
0	1.819238	1.778865	0.775582	1.137360	1.098944	1.776806	0.886405
1	0.667148	-0.031601	0.775582	0.632315	1.098944	0.485859	0.886405
2	-0.041830	-0.525364	-0.099793	-0.377773	0.017306	-0.954043	0.886405
3	0.489904	0.462163	-0.099793	0.127271	-1.064332	0.154847	0.886405
4	-0.219074	-0.689952	-0.975168	-1.387862	-0.523513	-0.606480	-1.128152

Split the dataset into Training and Testing setL

In [51]:
```
from sklearn.model_selection import train_test_split
```

In [52]:
```
X_train, X_test, y_train, y_test = train_test_split(X,y, test_size = 0.2, rand
```

Check the shape of X_train and X_test

In [53]:
```
X_train.shape
```

Out[53]:
```
(400, 7)
```

In [54]:
```
X_test.shape
```

Out[54]:
```
(100, 7)
```

Create a Decision Tree model and Train it

In [56]:
```
from sklearn.tree import DecisionTreeClassifier
```

In [57]:
```
model = DecisionTreeClassifier()
```

In [58]:
```
# Train the model
```

In [59]:
```
model.fit(X_train, y_train)
```

Out[59]:
```
DecisionTreeClassifier()
```

Check the score of our model

In [60]:
```
model.score(X_train, y_train)
```

Out[60]:
```
1.0
```

Make predictions with X_test

In [61]:
```
y_pred = model.predict(X_test)
```

Check the accuracy of our model

In [62]:
```
from sklearn import metrics
```

In [63]:
```
metrics.accuracy_score(y_test, y_pred)
```

Out[63]:
```
0.91
```

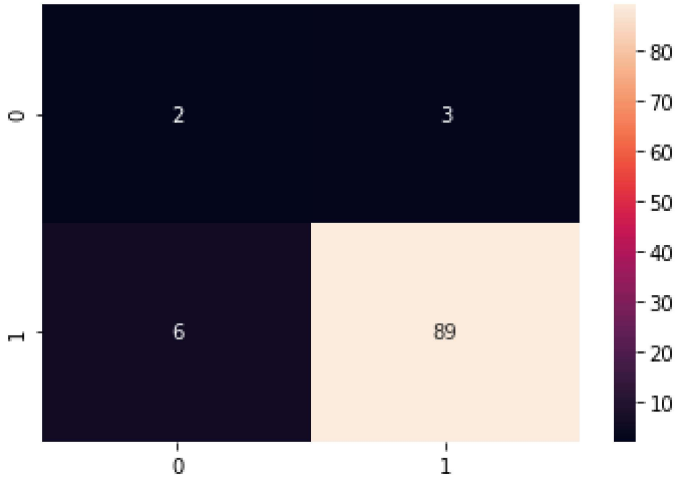
Create confusion matrix

In [64]:
```
metrics.confusion_matrix(y_test, y_pred)
```

Out[64]:
```
array([[ 2,  3],
       [ 6, 89]], dtype=int64)
```

Plot confusion matrix on heatmap

In [72]:
```
sns.heatmap(metrics.confusion_matrix(y_test, y_pred), annot = True)
plt.show()
```



Create classification report

In [73]:
```
print(metrics.classification_report(y_test, y_pred))
```

```
              precision    recall  f1-score   support

           0       0.25      0.40      0.31         5
           1       0.97      0.94      0.95        95

    accuracy                           0.91       100
   macro avg       0.61      0.67      0.63       100
weighted avg       0.93      0.91      0.92       100
```