University Admit Eligibility Predictor

>>Import the Libraries

In [1]:

```
import numpy as np
import pandas as pd
import matplotlib.pyplot as plt
import seaborn as sns
%matplotlib inline

import scipy.stats
import statsmodels.api as sm
import statsmodels.stats.api as sms
import statsmodels.formula.api as smf
from statsmodels.stats.stattools import jarque_bera

from sklearn.preprocessing import OneHotEncoder, StandardScaler
from sklearn.decomposition import PCA
from sklearn.pipeline import Pipeline
from sklearn.compose import ColumnTransformer, make_column_selector
from sklearn.model_selection import train_test_split, cross_val_score, GridSearchCV, Ran

from sklearn.neighbors import KNeighborsRegressor
from sklearn.linear_model import Ridge, LogisticRegression
from sklearn.svm import SVR
from sklearn.tree import DecisionTreeRegressor
from sklearn.ensemble import RandomForestRegressor, GradientBoostingRegressor
from xgboost import XGBRegressor

from sklearn.metrics import mean_absolute_error, mean_squared_error, r2_score

import warnings
warnings.filterwarnings('ignore')

sns.set(font_scale=1.5)
```

>>Reading the Dataset

In [2]:

```
# read_csv()>>reads the dataset from the csv file.
data = pd.read_csv(r'Dataset/Admission_Predict.csv')
data
```

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Out[2]:

	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
...	...	...	...	...	...	...	...	...	...
395	396	324	110	3	3.5	3.5	9.04	1	0.82
396	397	325	107	3	3.0	3.5	9.11	1	0.84
397	398	330	116	4	5.0	4.5	9.45	1	0.91
398	399	312	103	3	3.5	4.0	8.78	0	0.67
399	400	333	117	4	5.0	4.0	9.66	1	0.95

400 rows × 9 columns

>>Analyze The Data

In [3]:

```
# head() function used to view the first five csv file data.
data.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

In [4]:

```
# Serial number column is unwanted data for prediction of data.
# drop() function delete the Serial No. column from data.

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

In [5]:

```
# describe() function computes a summary of statistics like count, mean, standard deviat
data.describe()
```

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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

In [6]:

```
# info() function gives information about the data.
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
dtypes: float64(4), int64(4)
memory usage: 25.1 KB
```

>>Handling Missing Values

In [7]:

```
# isnull().any() function used to find null values or NaN values in the given dataset by
data.isnull().any()
```

Out[7]:

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

In [8]:

```
# isnull().sum() function to check the number of null values present in the columns.
data.isnull().sum()
```

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Out[8]:
```
GRE Score            0
TOEFL Score          0
University Rating    0
SOP                  0
LOR                  0
CGPA                 0
Research             0
Chance of Admit      0
dtype: int64
```

>>Data Visualization

1.Univariate Analysis

I) Histogram

In [9]:
```
cols = 3
rows = 4
num_cols = data.select_dtypes(exclude='object').columns
fig = plt.figure( figsize=(cols*5, rows*5))
for i, col in enumerate(num_cols):

    ax=fig.add_subplot(rows,cols,i+1)

    sns.histplot(x = data[col], ax = ax, data=data)

fig.tight_layout()
plt.show()
```

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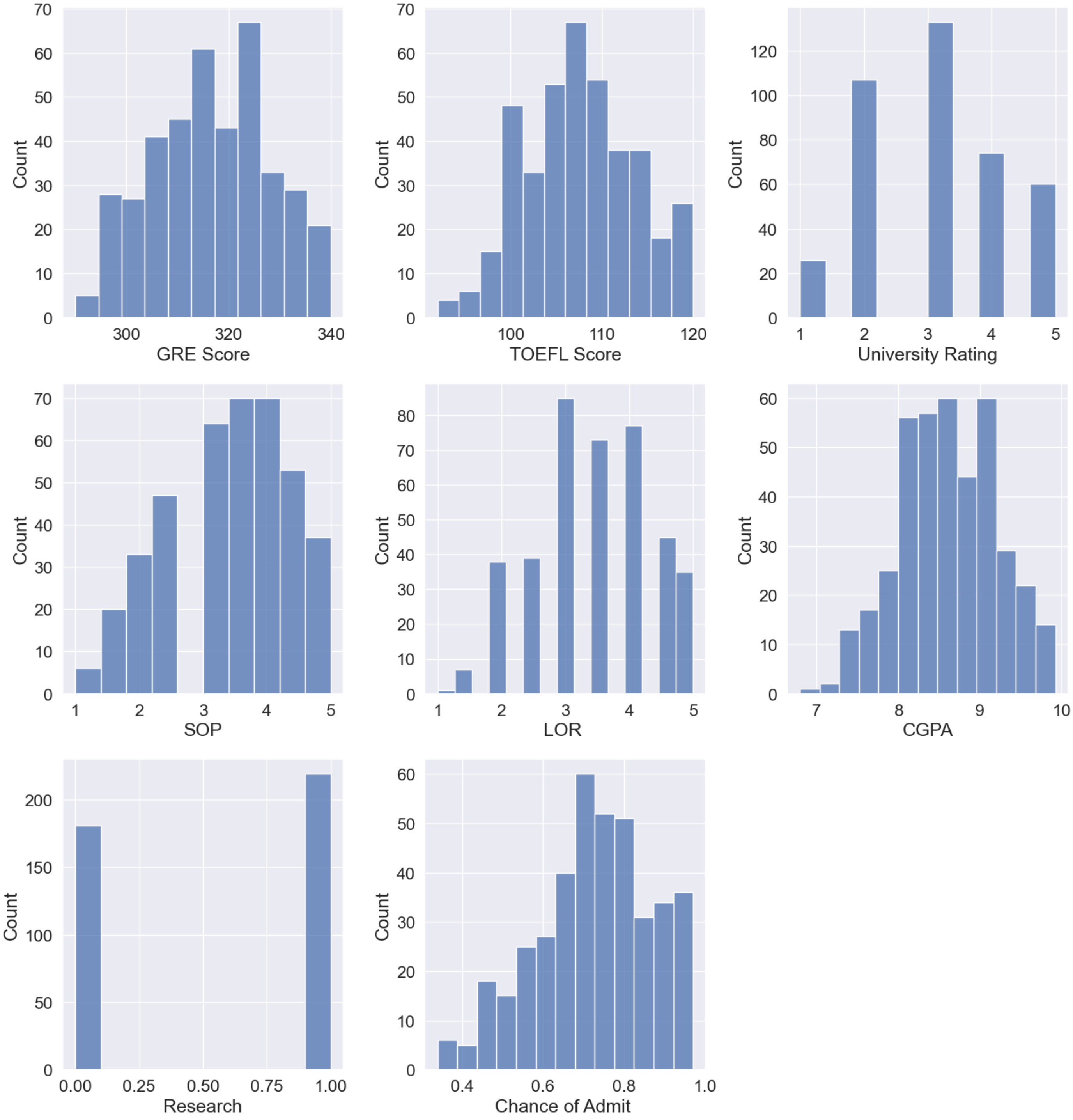

II) Distplot

In [10]:
```
cols = 3
rows = 4
num_cols = data.select_dtypes(exclude='object').columns
fig = plt.figure( figsize=(cols*5, rows*5))
for i, col in enumerate(num_cols):

    ax=fig.add_subplot(rows,cols,i+1)

    sns.histplot(x = data[col], ax = ax, data=data, kde='True')

fig.tight_layout()
plt.show()
```

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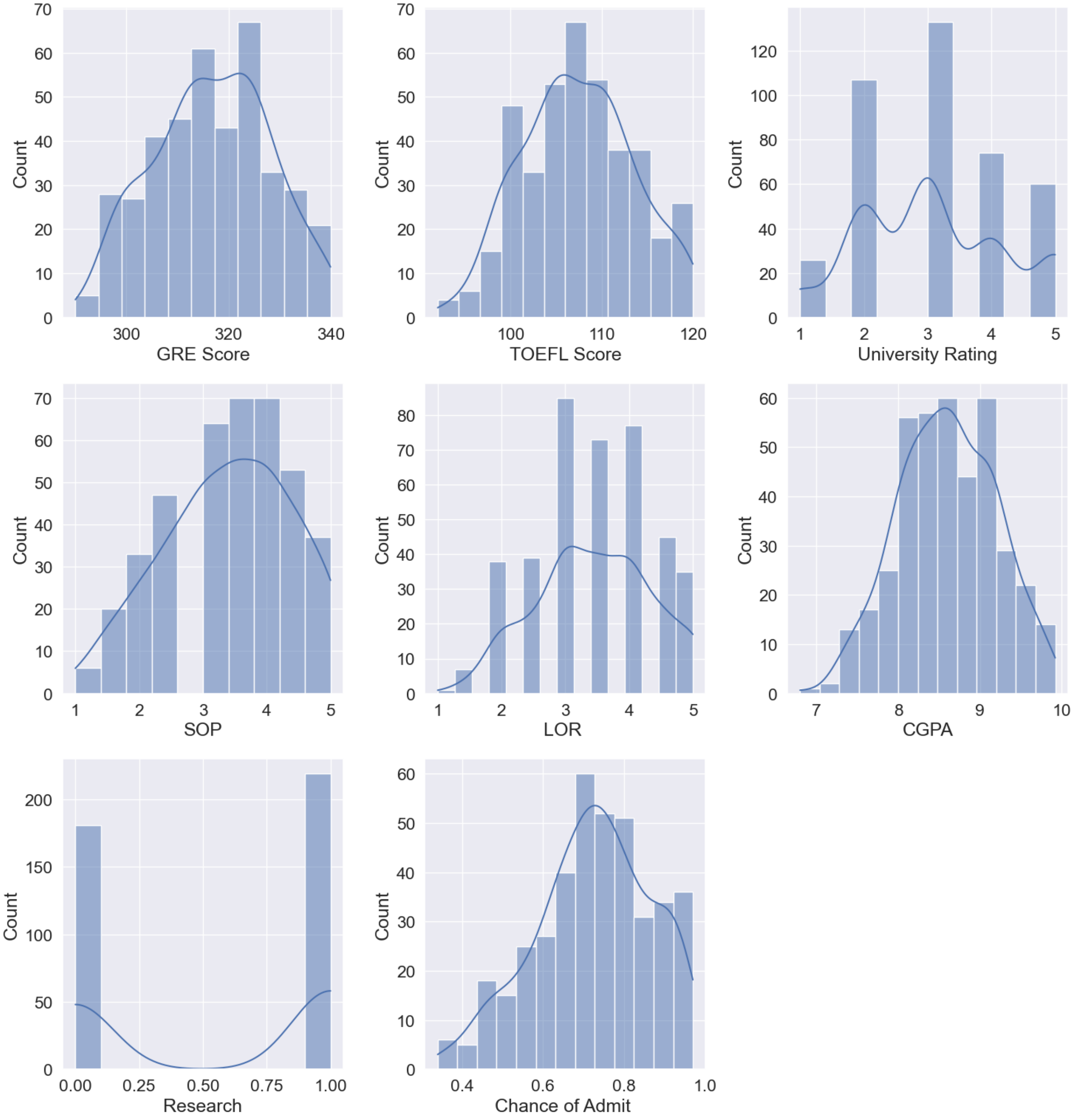

III) Boxplot

In [11]:

```
cols = 3
rows = 4
num_cols = data.select_dtypes(exclude='object').columns
fig = plt.figure( figsize=(cols*5, rows*5))
for i, col in enumerate(num_cols):

    ax=fig.add_subplot(rows,cols,i+1)

    sns.boxplot(x = data[col], ax = ax)

fig.tight_layout()
plt.show()
```

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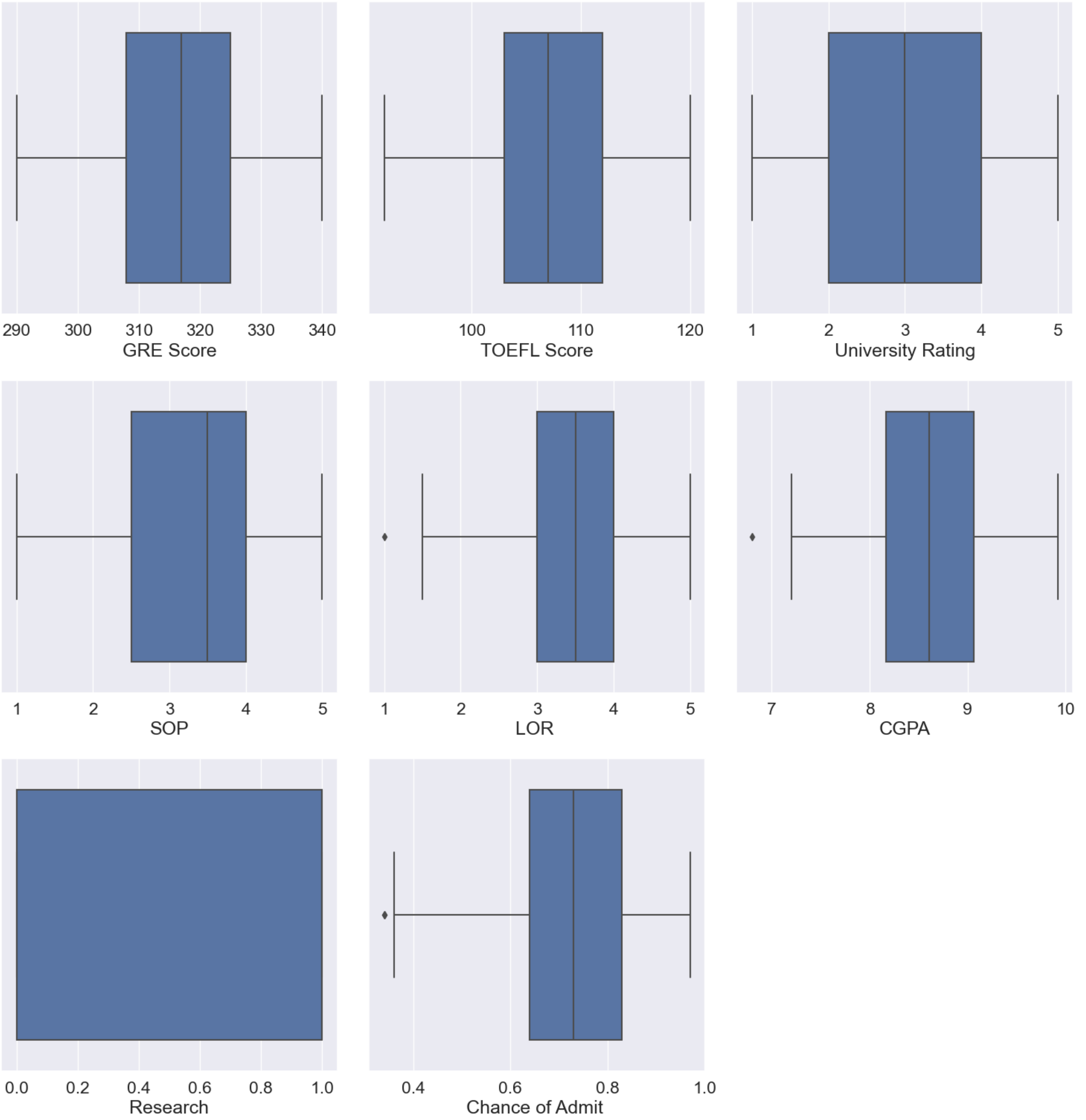

2.Bivariate Analysis

I) Scatterplot

In [12]:

```
sns.scatterplot(x='GRE Score', y='TOEFL Score', data = data, color="plum")
plt.show()
```

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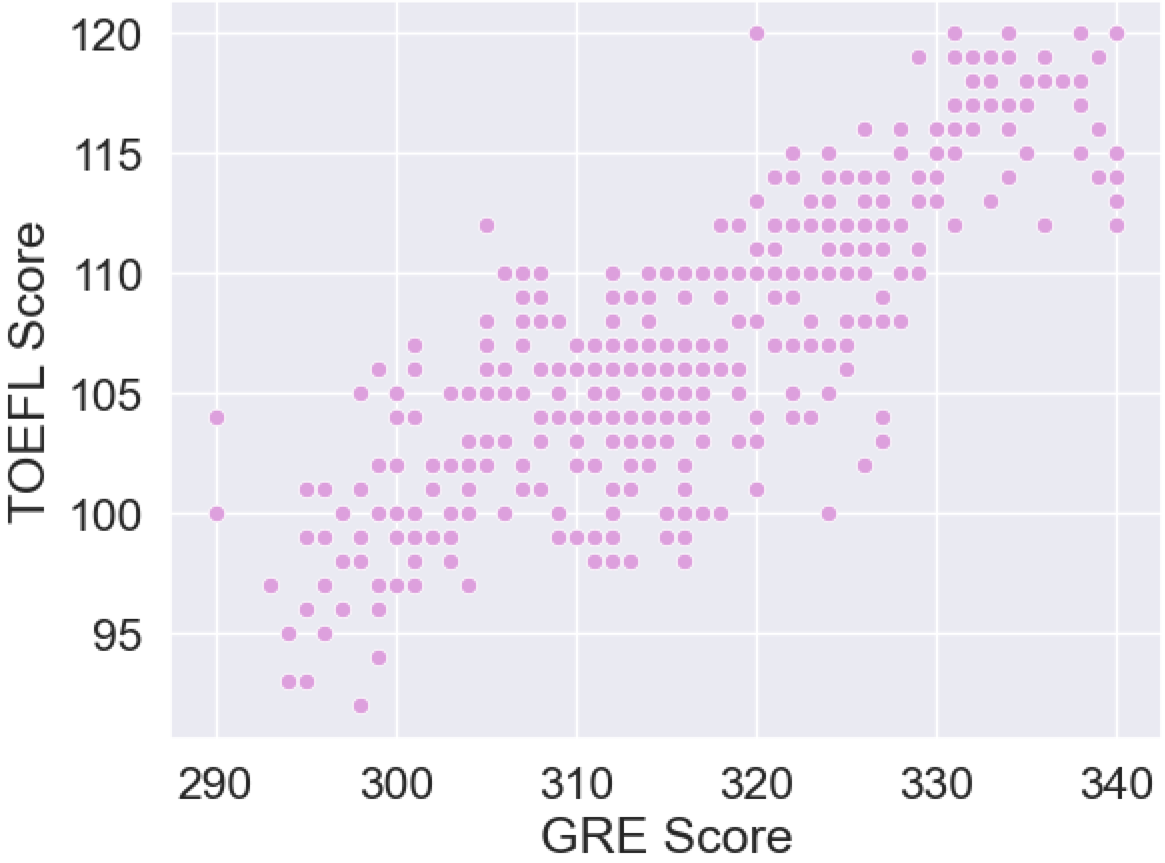
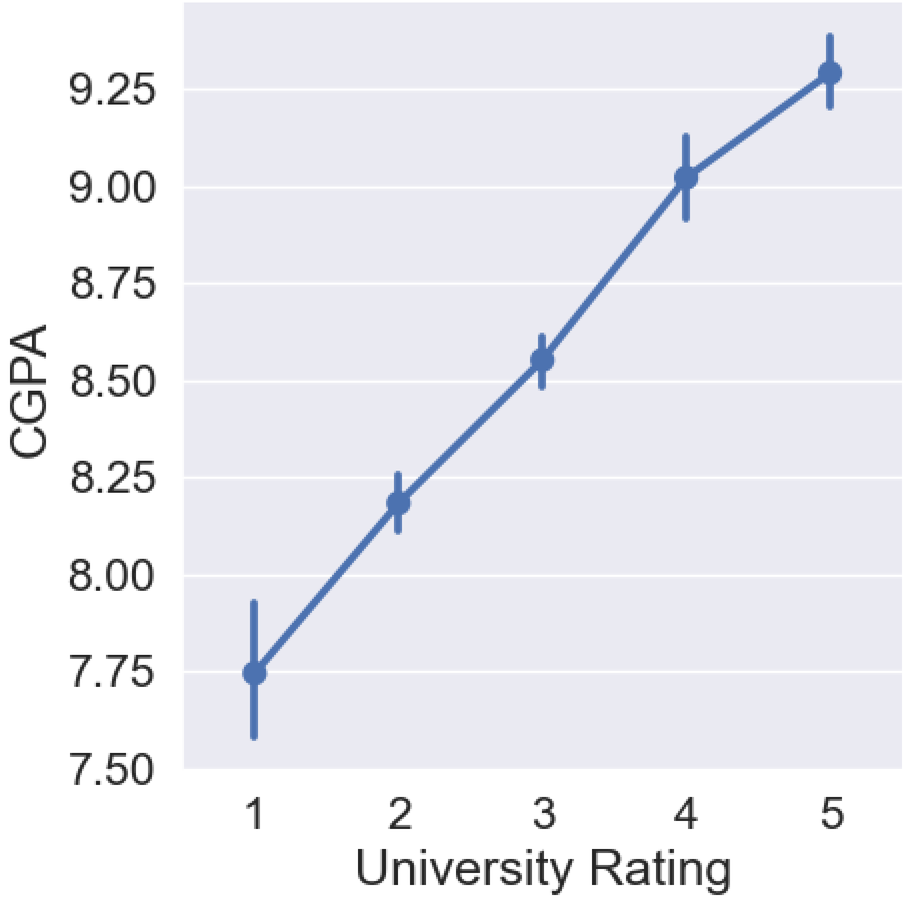


II) Catplot

In [13]:

```
sns.catplot(x='University Rating', y='CGPA', data=data, kind='point')
plt.show()
```



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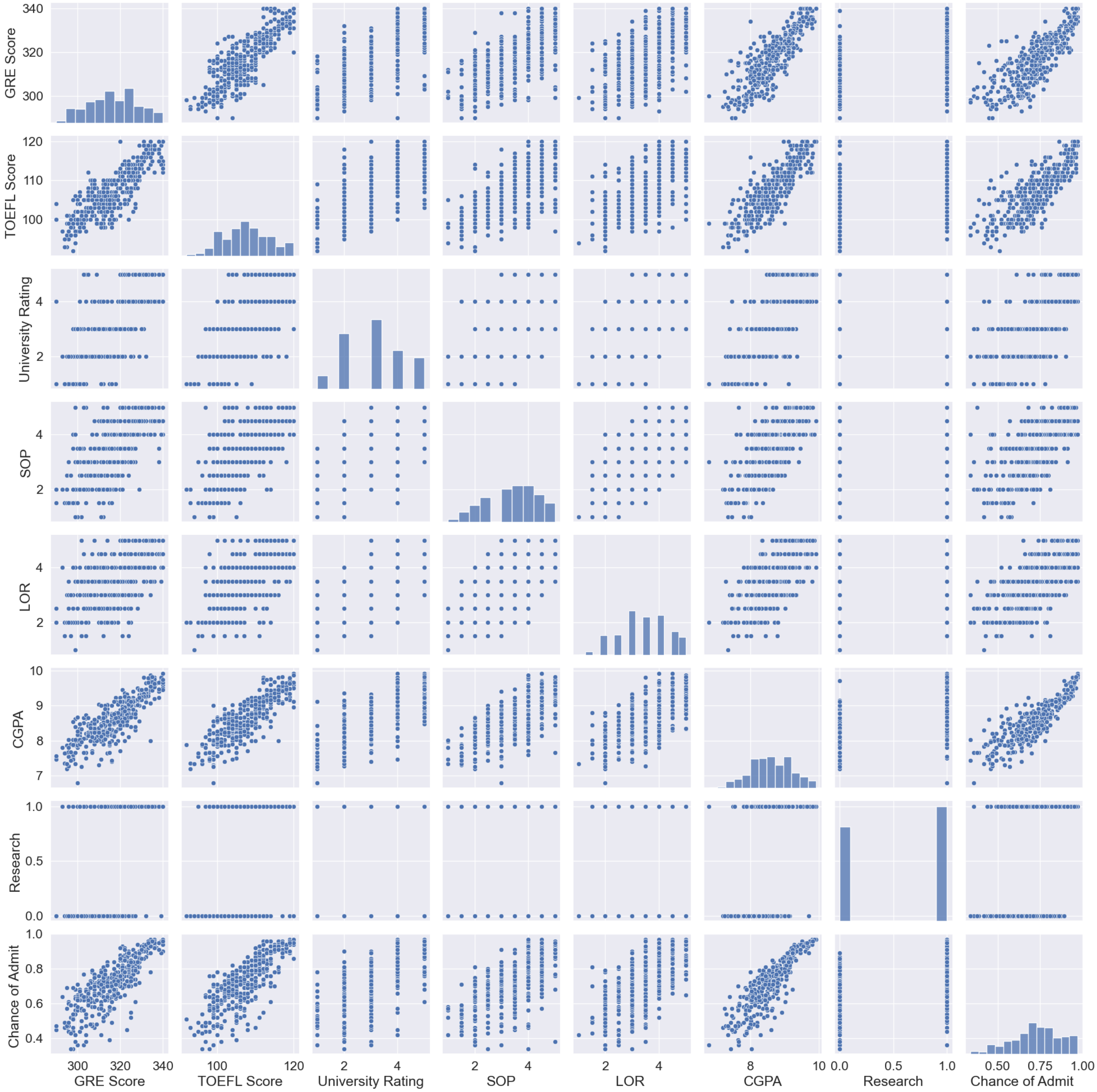
2.Multivariate Analysis

I) Pairplot

In [14]:
```
sns.pairplot(data=data, palette = 'Dark2')
```

Out[14]:
```
<seaborn.axisgrid.PairGrid at 0x1b38595b430>
```



>> Splitting Dependent And Independent Columns

In [15]:
```
x = data.iloc[:,0:7].values
x
```

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```
Out[15]: 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 [16]: y = data.iloc[:,7:].values
         y
```

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```
Out[16]: array([[0.92],
                [0.76],
                [0.72],
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```

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```

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       [0.95]])
```

In [17]:

```
x.shape
```

Out[17]:

```
(400, 7)
```

In [18]:

```
y.shape
```

Out[18]:

```
(400, 1)
```

>>Splitting The Data Into Train And Test

In [19]:

```
X_train,X_test,Y_train,Y_test = train_test_split(x, y, test_size = 0.2,random_state = 10
```

In [20]:

```
Y_train = (Y_train>0.5)
Y_train
```

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```
Out[20]: array([[ True],
                [ True],
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```

```
In [21]: Y_test = (Y_test>0.5)
         Y_test
```

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```
Out[21]: array([[ True],
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```

>>Model Building

1. Training And Testing The Model

In [22]:
```
cls = LogisticRegression(random_state = 0)
```

In [23]:
```
cls.fit(X_train,Y_train)
```

Out[23]:
```
▼       LogisticRegression
LogisticRegression(random_state=0)
```

In [24]:
```
y_pred = cls.predict(X_test)
y_pred
```

Out[24]:
```
array([ 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,  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,  True,  True,  True,  True,  True,  True,  True,  True,
        True,  True,  True,  True,  True,  True,  True,  True])
```

2. Model Evaluation

In [25]:
```
from sklearn.metrics import accuracy_score,recall_score,roc_auc_score,confusion_matrix
```

In [26]:
```
print("\nAccuracy score:%f" %(accuracy_score(Y_test,y_pred)*100))
print("Recall score:%f" %(recall_score(Y_test,y_pred)*100))
print("ROC score : %f\n" %(roc_auc_score(Y_test,y_pred)*100))
print(confusion_matrix(Y_test,y_pred))
```

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```
Accuracy score:91.250000
Recall score:97.333333
ROC score : 48.666667

[[ 0  5]
 [ 2 73]]
```

3. Save The Model

In [28]:

```
import pickle
pickle.dump(cls,open('university.pkl','wb'))
model=pickle.load(open('university.pkl','rb'))
```

In [ ]:

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