🎓 Project: Chance of Admission Prediction

🎯** Objective** To build a machine learning model that predicts the probability of a student getting admitted to a university based on academic and profile features like GRE, TOEFL, CGPA, etc.

🔗 **Data Source** Dataset: Admission Chance CSV (YBI Foundation) link text

* 📄 *Dataset Overview* *This dataset is designed to help predict a student's likelihood of being accepted into a graduate program based on various academic and profile-related attributes. Each record in the dataset represents an individual applicant and includes the following features:

GRE Score – Graduate Record Examination score, a standardized test often required for graduate admissions.

TOEFL Score – Test of English as a Foreign Language score, assessing English language proficiency.

University Rating – A numerical indicator of the university's quality or prestige (typically rated from 1 to 5).

SOP – Strength of the applicant's Statement of Purpose, rated on a scale.

LOR – Quality of Letters of Recommendation, rated similarly.

CGPA – Cumulative Grade Point Average, measuring overall academic performance.

Research – A binary value (0 or 1) indicating whether the applicant has prior research experience.

Chance of Admit – The target variable representing the estimated probability of admission, ranging between 0 and 1.

This dataset is often used in machine learning tasks related to regression and prediction modeling in educational analytics.

📚 Import Libraries

```
# importing the libraries required

import pandas as pd     # it handles and anlayzes structured data
import numpy as np      # it is used for numerical operations
import matplotlib.pyplot as plt   # used to visualize the data
import seaborn as sns            # more advanced visualization

from sklearn.model_selection import train_test_split   # it helps in splittting the data into training and test sets
from sklearn.linear_model import LinearRegression      # it is a linear regression algorithm
from sklearn.metrics import mean_squared_error, r2_score    # it evaluates model performance

```

📥 Import Data

```
url = "https://github.com/ybifoundation/Dataset/raw/main/Admission%20Chance.csv"
df = pd.read_csv(url)
```

📊 Describe Data

```
# Clean column names
df.columns = df.columns.str.strip()

# Drop unnamed column if it exists
df = df.loc[:, ~df.columns.str.contains('^Unnamed')]

# View first few rows
df.head()
```

```
   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
```

```
# Basic info
df.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 400 entries, 0 to 399
Data columns (total 9 columns):
 #   Column             Non-Null Count  Dtype
---  ------             --------------  -----
```

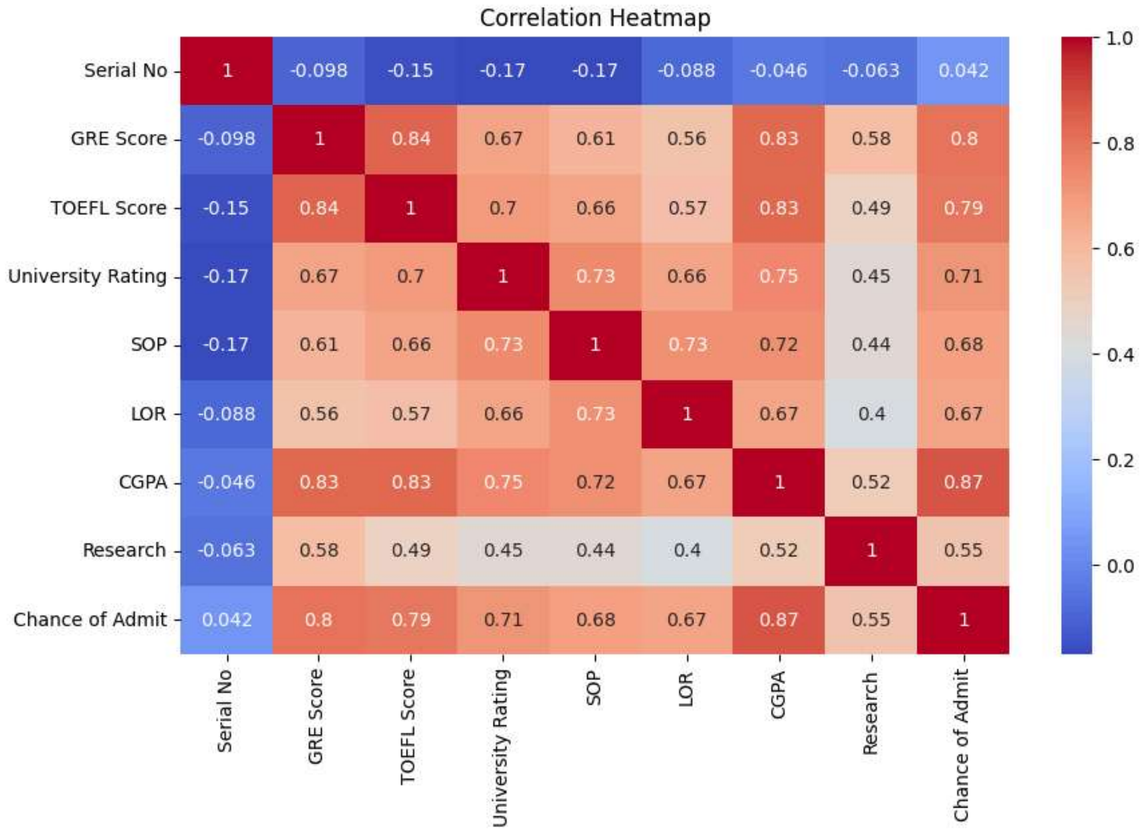
```
 0   Serial No          400 non-null    int64
 1   GRE Score          400 non-null    int64
 2   TOEFL Score        400 non-null    int64
 3   University Rating  400 non-null    int64
 4   SOP                400 non-null    float64
 5   LOR                400 non-null    float64
 6   CGPA               400 non-null    float64
 7   Research           400 non-null    int64
 8   Chance of Admit    400 non-null    float64
dtypes: float64(4), int64(5)
memory usage: 28.3 KB
```

```
# Summary statistics
df.describe()
```

	Serial No	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	400.000000
mean	200.500000	316.807500	107.410000	3.087500	3.400000	3.452500	8.598925	0.547500	0.724350
std	115.614301	11.473646	6.069514	1.143728	1.006869	0.898478	0.596317	0.498362	0.142609
min	1.000000	290.000000	92.000000	1.000000	1.000000	1.000000	6.800000	0.000000	0.340000
25%	100.750000	308.000000	103.000000	2.000000	2.500000	3.000000	8.170000	0.000000	0.640000
50%	200.500000	317.000000	107.000000	3.000000	3.500000	3.500000	8.610000	1.000000	0.730000
75%	300.250000	325.000000	112.000000	4.000000	4.000000	4.000000	9.062500	1.000000	0.830000
max	400.000000	340.000000	120.000000	5.000000	5.000000	5.000000	9.920000	1.000000	0.970000

📈 Data Visualization

```
# Correlation heatmap
plt.figure(figsize=(10, 6))
sns.heatmap(df.corr(), annot=True, cmap='coolwarm')
plt.title("Correlation Heatmap")
plt.show()

```



	Serial No	GRE Score	TOEFL Score	University Rating	SOP	LOR	CGPA	Research	Chance of Admit
Serial No	1	-0.098	-0.15	-0.17	-0.17	-0.088	-0.046	-0.063	0.042
GRE Score	-0.098	1	0.84	0.67	0.61	0.56	0.83	0.58	0.8
TOEFL Score	-0.15	0.84	1	0.7	0.66	0.57	0.83	0.49	0.79
University Rating	-0.17	0.67	0.7	1	0.73	0.66	0.75	0.45	0.71
SOP	-0.17	0.61	0.66	0.73	1	0.73	0.72	0.44	0.68
LOR	-0.088	0.56	0.57	0.66	0.73	1	0.67	0.4	0.67
CGPA	-0.046	0.83	0.83	0.75	0.72	0.67	1	0.52	0.87
Research	-0.063	0.58	0.49	0.45	0.44	0.4	0.52	1	0.55
Chance of Admit	0.042	0.8	0.79	0.71	0.68	0.67	0.87	0.55	1

🧹 Data Preprocessing

```
# Check each column to see how many missing (null) values it has
df.isnull().sum()

```

	0
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

🎯 Define Target Variable (y) and Feature Variables (X)

```
# Clean column names again just in case
df.columns = df.columns.str.strip()

X = df.drop('Chance of Admit', axis=1)
y = df['Chance of Admit']
```

🔀 Train Test Split

```
X_train, X_test, y_train, y_test = train_test_split(X, y, test_size=0.2, random_state=42)

```

🤖 Modeling

```
# Create an instance of the Linear Regression model
model = LinearRegression()

# Train the model using the training data
model.fit(X_train, y_train)

```

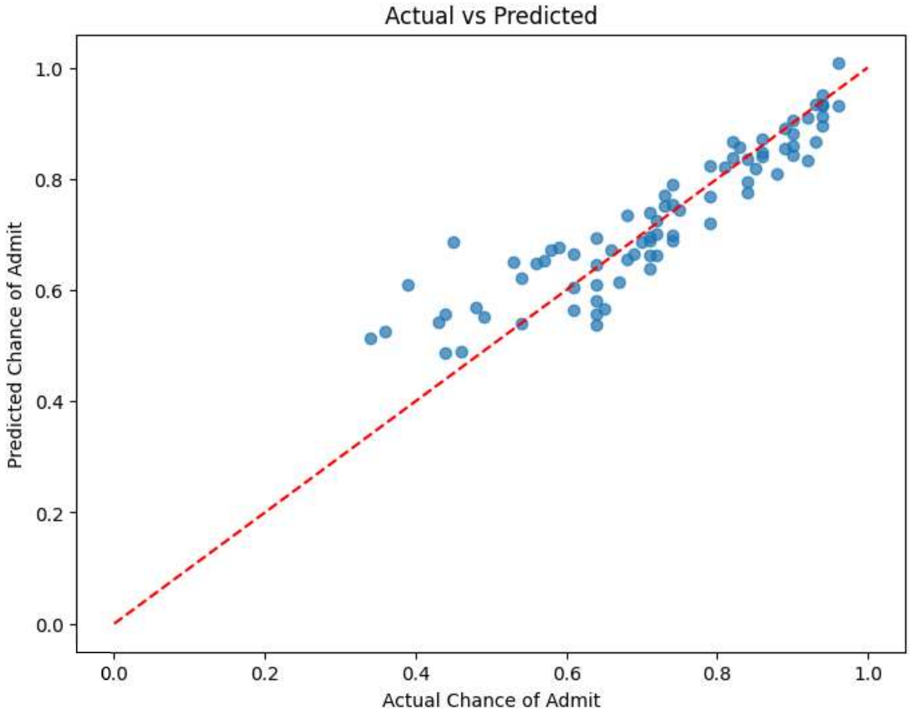
```
▾ LinearRegression ⓘ ?
LinearRegression()
```

📏 Model Evaluation

```
# Make predictions on the test set
y_pred = model.predict(X_test)

# Evaluate the model
r2 = r2_score(y_test, y_pred)      # Measures how well the model fits
mse = mean_squared_error(y_test, y_pred)  # Shows average prediction error

# Print results
print(f"R² Score: {r2:.4f}")
print(f"MSE: {mse:.4f}")

```

```
R² Score: 0.8212
MSE: 0.0046
```

```
# Plot actual vs predicted values to see how well the model did
plt.figure(figsize=(8, 6))
plt.scatter(y_test, y_pred, alpha=0.7)
plt.xlabel("Actual Chance of Admit")
plt.ylabel("Predicted Chance of Admit")
plt.title("Actual vs Predicted")
plt.plot([0, 1], [0, 1], 'r--')  # Reference line for perfect predictions
plt.show()

```



🔮 Prediction

```
# Predict on a sample student profile
sample = pd.DataFrame({
    'Serial No': [0],  # Add a placeholder for Serial No as it was in the training data
    'GRE Score': [325],
    'TOEFL Score': [112],
    'University Rating': [4],
    'SOP': [4.5],
    'LOR': [4],
    'CGPA': [9.1],
    'Research': [1]
})

predicted_chance = model.predict(sample)
print(f"Predicted Chance of Admission: {predicted_chance[0]:.2f}")
```

```
Predicted Chance of Admission: 0.80
```

* 📘 *Explanation* *In this project, we used a Linear Regression model to predict a student's chance of admission by looking at key factors like their academic scores and research background.

The results show that features such as CGPA, GRE, and TOEFL scores have a significant impact on the likelihood of getting admitted. These variables are closely linked to the admission chances, meaning they play an important role in the model's predictions.

The R² Score helps us understand how well the model captures the relationship between these features and the admission probability. A higher R² value means the model does a good job of explaining the variations in the data, giving us confidence in its predictions.