



Data Glacier

Your Deep Learning Partner

Model Deployment Flask

Predict acceptance chance of university admission

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Agenda

Background

Model

Flask API

Implementation

Background

In this project, a regression model is developed to predict the probability of being accepted for Graduate school.

- Data Source: <https://www.kaggle.com/mohansacharya/graduate-admissions>

- The dataset contains the following parameters:

- 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)

- Create Flask API.



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```
admission_df.columns
```

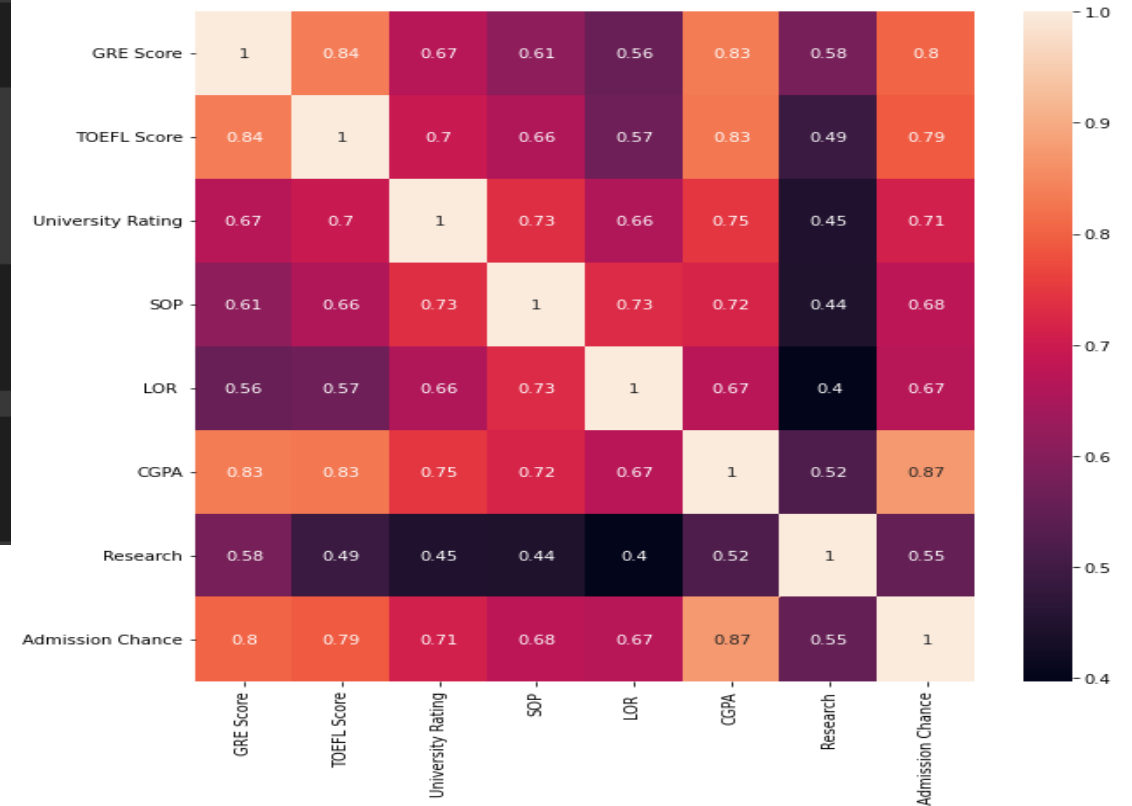
```
Index(['GRE Score', 'TOEFL Score', 'University Rating', 'SOP', 'LOR ', 'CGPA',  
      'Research', 'Admission Chance'],  
      dtype='object')
```

```
X = admission_df[['GRE Score', 'TOEFL Score', 'University Rating', 'CGPA']]  
y = admission_df['Admission Chance']
```

```
from sklearn.model_selection import train_test_split  
X_train, X_test, y_train, y_test = train_test_split(X, y, test_size = 0.2)
```

```
from sklearn.linear_model import LinearRegression  
regressor = LinearRegression(fit_intercept = True)  
regressor.fit(X_train, y_train)
```

```
LinearRegression()
```



- Se creó un modelo de regresión lineal.
- Se seleccionaron 'GRE Score', 'TOEFL Score', 'University Rating', 'CGPA' debido a su fuerte correlación.

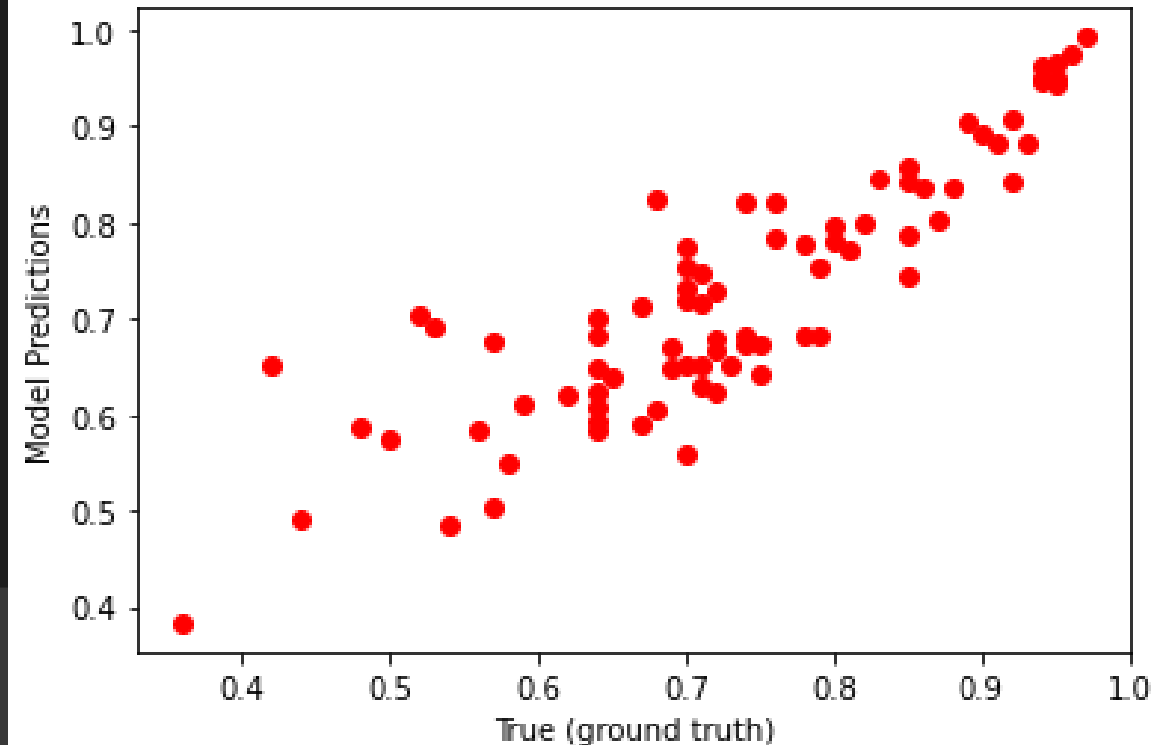
Model

```
from sklearn.metrics import r2_score, mean_absolute_error, mean_squared_error
from math import sqrt

k = X_test.shape[1]
n = len(X_test)
RMSE = float(format(np.sqrt(mean_squared_error(y_test, y_predict)) , '.3f'))
MSE = mean_squared_error(y_test, y_predict)
MAE = mean_absolute_error(y_test, y_predict)
r2 = r2_score(y_test, y_predict)
adj_r2 = 1-(1-r2)*(n-1)/(n-k-1)
MAPE = np.mean( np.abs((y_test - y_predict) /y_test ) ) * 100

print('RMSE =',RMSE, '\nMSE =',MSE, '\nMAE =',MAE, '\nR2 =', r2,
      '\nAdjusted R2 =', adj_r2, '\nMean Absolute Percentage Error =', MAPE, '%')

RMSE = 0.067
MSE = 0.004502224607420019
MAE = 0.0506245957804314
R2 = 0.7638417284842514
Adjusted R2 = 0.7512466206700781
Mean Absolute Percentage Error = 7.771715973144319 %
```



- Se obtuvo un R2 del 76%.
- Se guardó el modelo en un archivo 'finalized_model.pkl'

```
import pickle

[ ] filename = 'finalized_model.pkl'
    pickle.dump(regressor, open(filename, 'wb'))
```

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Flask API - CODE

```
import numpy as np
from flask import Flask, request, render_template
import pickle

app = Flask(__name__)
model = pickle.load(open('finalized_model.pkl', 'rb'))

@app.route('/')
def home():
    return render_template('index.html')

@app.route('/predict', methods=['POST'])
def predict():
    """
    For rendering results on HTML GUI
    """
    int_features = [int(x) for x in request.form.values()]
    final_features = [np.array(int_features)]
    prediction = model.predict(final_features)

    output = round(prediction[0], 2)
    if output < 0:
        return render_template('index.html',
                               prediction_text = "Predicted is negative, not admitted")
    elif output >= 0:
        return render_template('index.html',
                               prediction_text = 'Probability admission is: {}'.format(output))

if __name__ == "__main__":
    app.run(debug=True)
```

- El modelo cargado tiene formato pickle.
- La predicción tiene un adicional por si es negativa.

Flask API - HTML

```
<!DOCTYPE html>
<html >
<head>
  <meta charset="UTF-8">
  <title>ML API</title>
  <link href='https://fonts.googleapis.com/css?family=Pacifico' rel='stylesheet' type='text/css'>
  <link href='https://fonts.googleapis.com/css?family=Arimo' rel='stylesheet' type='text/css'>
  <link href='https://fonts.googleapis.com/css?family=Hind:300' rel='stylesheet' type='text/css'>
  <link href='https://fonts.googleapis.com/css?family=Open+Sans+Condensed:300' rel='stylesheet' type='text/css'>
  <link rel="stylesheet" href="{{ url_for('static', filename='css/style.css') }}">
</head>
<body>
  <div class="login">
    <h1>Predict University Admission</h1>
    <!-- Main Input For Receiving Query to our ML -->
    <form action="{{ url_for('predict')}}" method="post">
      <input type="text" name="GRE Scores" placeholder="GRE Scores (out of 340)"
required="required" />
      <input type="text" name="TOEFL Scores" placeholder="TOEFL Scores (out of 120)" required="required" />
      <input type="text" name="University Rating" placeholder="University Rating (out
of 5)" required="required" />
      <input type="text" name="CGPA" placeholder="Undergraduate GPA (out of 10)" required="required" />

      <button type="submit" class="btn btn-primary btn-block btn-large">Predict</button>
    </form>
    <br>
    <br>
    {{ prediction_text }}
  </div>
  
</body>
</html>
```

➤ El formato HTML utilizado fue proporcionado por DATA GLACIER.

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Predict University Admission

120


100

4

10

Predict

Probability admission is: 0.54

 Data Glacier

- Se desarrolló una web-app donde se implementó el modelo de machine learning.

Thank You