Model Optimization and Tuning Phase

Date	07 July 2024
Team ID	739824
Project Title	SmartLender – Envisioning Success: Predicting University Scores With Machine Learning
Maximum Marks	2Marks

Performance Metrics Comparison Report (2 Marks):

A Performance Metrics Comparison Report systematically evaluates the effectiveness of various machine learning models or algorithms by comparing key metrics such as MAE,MSE,R-Square. This report highlights the strengths and weaknesses of each model, providing insights into their performance on different datasets or tasks. By presenting a clear, detailed analysis, the report aids in selecting the most suitable model for deployment, ensuring optimal performance in real-world applications.

```
[56] # Assuming 'x_test' is available in the environment and is a pandas DataFrame or a NumPy array.
     y_pred = linReg.predict(x_test)  # Predict on the entire x_test dataset

     print("Prediction Evaluation using Linear Regression")
     print('Mean Absolute Error:', mean_absolute_error(y_test, y_pred))
     print('Mean Squared Error:', mean_squared_error(y_test, y_pred))
     print('Root Mean Squared Error:', np.sqrt(mean_squared_error(y_test, y_pred)))
     print('R-squared:', r2_score(y_test, y_pred))
```

```
Prediction Evaluation using Linear Regression
Mean Absolute Error: 0.9264657671450711
Mean Squared Error: 1.7890643253785259
Root Mean Squared Error: 1.337559092294066
R-squared: 0.7439493774592185
```

```
y_pred = lassoReg.predict(x_test)
print("Prediction Evaluation using lasso Regression")
print('Mean Absolute Error:', mean_absolute_error(y_test, y_pred))
print('Mean Squared Error:', mean_squared_error(y_test, y_pred))
print('Root Mean Squared Error:', np.sqrt(mean_squared_error(y_test, y_pred)))
print('R-squared:', r2_score(y_test, y_pred))
```

```
Prediction Evaluation using lasso Regression
Mean Absolute Error: 0.9352851280381133
Mean Squared Error: 1.7857764808364731
Root Mean Squared Error: 1.3363294806433303
R-squared: 0.7444199332854502
```

```
y_pred = svr.predict(x_test)
print("Prediction Evaluation using  support vector Regression")
print('Mean Absolute Error:', mean_absolute_error(y_test, y_pred))
print('Mean Squared Error:', mean_squared_error(y_test, y_pred))
print('Root Mean Squared Error:', np.sqrt(mean_squared_error(y_test, y_pred)))
print('R-squared:', r2_score(y_test, y_pred))
```

```
Prediction Evaluation using  support vector Regression
Mean Absolute Error: 0.5454340693726399
Mean Squared Error: 1.2411917299771091
Root Mean Squared Error: 1.1140878466158355
R-squared: 0.8223608225568596
```

+ Code + Text

```
[59] y_pred = dt.predict(x_test)
     print("Prediction Evaluation using Decision Regression ")
     print('Mean Absolute Error:', mean_absolute_error(y_test, y_pred))
     print('Mean Squared Error:', mean_squared_error(y_test, y_pred))
     print('Root Mean Squared Error:', np.sqrt(mean_squared_error(y_test, y_pred)))
     print('R-squared:', r2_score(y_test, y_pred))
```

```
Prediction Evaluation using Decision Regression
Mean Absolute Error: 5.264475724040743e-15
Mean Squared Error: 2.7561365735867205e-28
Root Mean Squared Error: 1.6601616106833456e-14
R-squared: 1.0
```

```
y_pred = rf.predict(x_test)
print("Prediction Evaluation using Random Regression")
print('Mean Absolute Error:', mean_absolute_error(y_test, y_pred))
print('Mean Squared Error:', mean_squared_error(y_test, y_pred))
print('Root Mean Squared Error:', np.sqrt(mean_squared_error(y_test, y_pred)))
print('R-squared:', r2_score(y_test, y_pred))
```

```
Prediction Evaluation using Random Regression
Mean Absolute Error: 0.010686590909099649
Mean Squared Error: 0.0009053592244319952
Root Mean Squared Error: 0.0300891878327082
R-squared: 0.9998704251212489
```