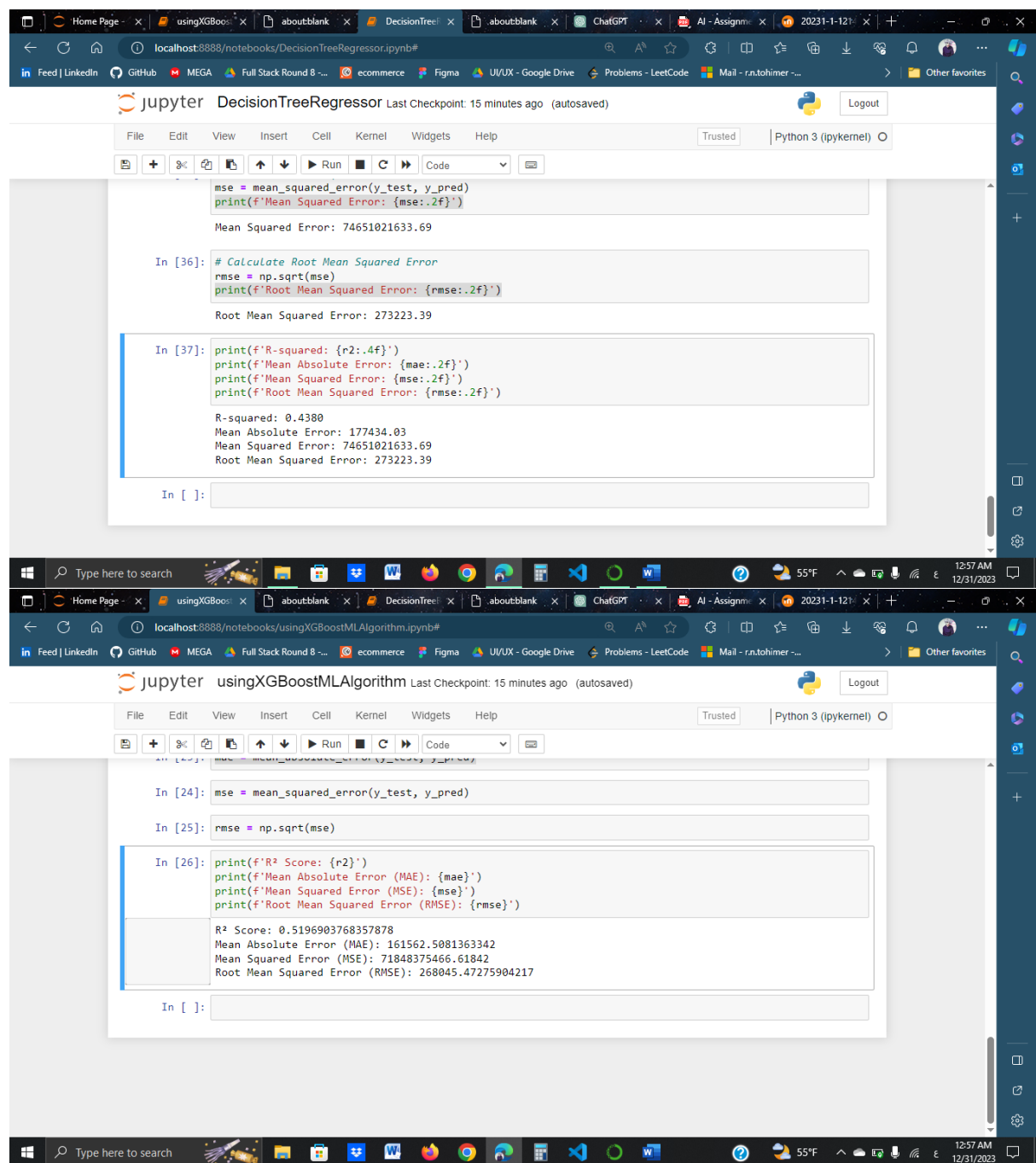


Student Name: Razan Tuhaimer

Student Number: 202010121



The image displays two screenshots of Jupyter notebooks. The top notebook, titled 'DecisionTreeRegressor', shows the calculation of Mean Squared Error (MSE), Root Mean Squared Error (RMSE), and R-squared. The bottom notebook, titled 'usingXGBoostMLAlgorithm', shows the calculation of R-squared Score, Mean Absolute Error (MAE), Mean Squared Error (MSE), and Root Mean Squared Error (RMSE).

DecisionTreeRegressor Notebook:

```
mse = mean_squared_error(y_test, y_pred)
print(f'Mean Squared Error: {mse:.2f}')

Mean Squared Error: 74651021633.69

In [36]: # Calculate Root Mean Squared Error
rmse = np.sqrt(mse)
print(f'Root Mean Squared Error: {rmse:.2f}')

Root Mean Squared Error: 273223.39

In [37]: print(f'R-squared: {r2:.4f}')
print(f'Mean Absolute Error: {mae:.2f}')
print(f'Mean Squared Error: {mse:.2f}')
print(f'Root Mean Squared Error: {rmse:.2f}')

R-squared: 0.4380
Mean Absolute Error: 177434.03
Mean Squared Error: 74651021633.69
Root Mean Squared Error: 273223.39

In [ ]:
```

usingXGBoostMLAlgorithm Notebook:

```
In [24]: mse = mean_squared_error(y_test, y_pred)

In [25]: rmse = np.sqrt(mse)

In [26]: print(f'R² Score: {r2}')
print(f'Mean Absolute Error (MAE): {mae}')
print(f'Mean Squared Error (MSE): {mse}')
print(f'Root Mean Squared Error (RMSE): {rmse}')

R² Score: 0.5196903768357878
Mean Absolute Error (MAE): 161562.5081363342
Mean Squared Error (MSE): 71848375466.61842
Root Mean Squared Error (RMSE): 268045.47275904217

In [ ]:
```

Decision Tree Regressor Results:

- R-squared (R^2) Score: 0.4380
- Mean Absolute Error (MAE): 177434.03
- Mean Squared Error (MSE): 74651021633.69
- Root Mean Squared Error (RMSE): 273223.39

XGBoost Results:

- R-squared (R^2) Score: 0.5197
- Mean Absolute Error (MAE): 161562.51
- Mean Squared Error (MSE): 71848375466.62
- Root Mean Squared Error (RMSE): 268045.47

Comparison and Discussion:

1. R-squared (R^2) Score:

- XGBoost has a higher R-squared score (0.5197) compared to the Decision Tree Regressor (0.4380). A higher R-squared indicates a better fit to the data.

2. Mean Absolute Error (MAE):

- XGBoost has a lower MAE (161562.51) compared to the Decision Tree Regressor (177434.03). A lower MAE suggests that XGBoost is making predictions that are, on average, closer to the actual values.

3. Mean Squared Error (MSE) and Root Mean Squared Error (RMSE):

- XGBoost has a lower MSE (71848375466.62) and RMSE (268045.47) compared to the Decision Tree Regressor (MSE: 74651021633.69, RMSE: 273223.39). Again, lower values indicate better performance.

Conclusion:

- XGBoost outperforms the Decision Tree Regressor in terms of R-squared, MAE, MSE, and RMSE.
- XGBoost's ability to ensemble weak learners and its sophisticated regularization techniques contribute to its superior performance over a single Decision Tree Regressor.
- The Decision Tree Regressor has higher errors (MAE, MSE, and RMSE) and a lower R-squared, indicating that it might not capture the underlying patterns in the data as effectively as XGBoost.

In summary, based on these metrics, XGBoost appears to be a more effective model for predicting house prices in this dataset compared to a single Decision Tree Regressor.