Summary Table: Model Performance Metrics

Regression	Error Type	Error Value
Linear Regression (Test Set)	R Squared (R^2)	40.79%
Linear Regression (Test Set)	Root Mean Squared Error (RMSE)	0.33
Lasso Regression (Test Set)	R Squared (R^2)	39.81%
Lasso Regression (Test Set)	Root Mean Squared Error (RMSE)	0.58
CART Regressor Decision Tree (Test Set)	R Squared (R^2)	49.34%
CART Regressor Decision Tree (Test Set)	Root Mean Squared Error (RMSE)	0.53
Random Forest Regression (Test Set)	R Squared (R^2)	64.43%
Random Forest Regression (Test Set)	Root Mean Squared Error (RMSE)	0.44

Recommendations

The summary table shows that the Random Forest Regression Model has the highest R^2 value and the second-lowest RMSE value among all models. Additionally, the graph comparing the true values vs. predicted values in the code file also demonstrates that many of the points are situated near the diagonal line, verifying that Random Forest gives an accurate result in most cases.

The CART decision tree model has the second-highest R^2 value, which is within our expectation because the Random Forest algorithm usually performs better than single tree predictions by averaging the results of all tree samples. It is also noted that the R^2 values of linear regression and Lasso regression models are very close to each other, which is probably due to the similarity between the two algorithms, as Lasso regression functions as an upgraded version of linear regression by selecting only a subset of the variables.

We choose Random Forest Model as our final price prediction model for Airbnb host listings. The higher the R^2 is, and the lower the RMSE is, the better an ML model is likely to perform. Among all models, RF shows the best balancing of both evaluation metrics and thus is suggested to have the highest predictive power. In practice, Airbnb hosts can utilize our Random Forest Model to assist their pricing decision-making, which is calculated from various feature inputs of the properties they own. They can also explore the most important features as provided by the algorithm, focusing on certain aspects to make improvements, and thus providing better services that naturally charge a higher rental price.