# Final Report: House Price Prediction Using Machine Learning

## Objective

The objective of this project was to predict house prices using supervised machine learning regression techniques. Multiple regression models were implemented and evaluated to determine the most effective approach for this dataset.

## Models Implemented

- Linear Regression
- Random Forest Regressor
- Decision Tree Regressor
- K-Nearest Neighbors (KNN) Regressor

## Evaluation Metrics

Model performance was evaluated using Mean Squared Error (MSE), Mean Absolute Error (MAE), and R-Squared ($R^2$) score.

## Model Performance Summary

| Model | MSE | MAE | $R^2$ |
|---|---|---|---|
| Linear Regression | 41,194,072,741.06 | 139,590.96 | 0.448 |
| Random Forest | 44,186,308,125.30 | 141,811.79 | 0.408 |
| KNN | 54,270,710,864.73 | 155,957.75 | 0.272 |
| Decision Tree | 73,020,339,854.87 | 184,562.71 | 0.021 |

## Key Findings

Linear Regression achieved the best overall performance with the highest $R^2$ score and lowest MAE, indicating a largely linear relationship between features and house prices. Random Forest showed competitive results, while Decision Tree demonstrated poor generalization.

## Conclusion

Linear Regression emerged as the most suitable model for this dataset. Future improvements may include feature engineering, hyperparameter tuning, and cross-validation for enhanced performance.