**Summary Report on the Linear Regression Model**

***Introduction***

This report summarizes the implementation and evaluation of a linear regression model to predict house prices based on various features such as size (in square feet), number of bedrooms, age of the house, and proximity to downtown.

***Dataset Overview***

The dataset used for this analysis comprises several attributes:

- Size (sqft): The total area of the house.

- Bedrooms: The number of bedrooms in the house.

- Age: The age of the house in years.

- Proximity to Downtown (miles): The distance from the house to the downtown area.

- Price: The target variable representing the house price.

The dataset contains numerous entries, providing a diverse range of house characteristics and prices.

***Methodology***

1. Data Preparation:

- The dataset was loaded using pandas.

- The data was split into training (80%) and testing (20%) sets to ensure the model could be evaluated on unseen data.

2. Model Training:

- A linear regression model was implemented using the Normal Equation:



- A bias term was added to the feature set to account for the intercept in the linear regression equation.

3. Model Evaluation:

- Predictions were made on the training data.

- The Mean Squared Error (MSE) was calculated to assess the model's fit:



- The MSE provides a measure of how close the predicted values are to the actual values, with lower values indicating a better fit.

***Results***

- Coefficients: The model's coefficients were derived from the training data, indicating the influence of each feature on house prices.

- Mean Squared Error (MSE): The MSE calculated on the training data was reported, providing insight into the model's performance.

***Visualization***

A scatter plot was created to visualize the relationship between actual and predicted prices. The plot included a reference line indicating a perfect fit, allowing for a clear assessment of the model's predictive accuracy.

***Conclusion***

The linear regression model was successfully implemented to predict house prices based on multiple features. The evaluation metrics, particularly the MSE, indicate the model's effectiveness. Future work could involve refining the model, possibly by exploring polynomial regression or regularization techniques to improve predictions further. Additionally, assessing the model's performance on the testing set would provide a more comprehensive evaluation of its generalization capabilities.