# LINEAR REGRESSION MODEL

**Description:** This document demonstrates the process of visualizing a linear regression model using the training data and testing data from the House_price_prediction dataset. The purpose is to understand the relationship between the Area and price by fitting a linear model and visualizing the regression line.

## 1. Importing Libraries

```
import numpy as np
from sklearn.model_selection import train_test_split
from sklearn.linear_model import LinearRegression
import seaborn as sns
import matplotlib.pyplot as plt
```

### Explanation:

This section imports the necessary libraries:

- numpy for numerical operations.
- train_test_split from sklearn for splitting the dataset.
- LinearRegression from sklearn for building the linear regression model.
- seaborn for loading and visualizing datasets.
- matplotlib.pyplot for plotting graphs.

## 2. Loading the Dataset

```
data_set=pd.read_csv('house_predict.csv')
data_set
```

### Explanation:

To load a dataset using pandas, you can use the pd.read_csv() function. This function reads a CSV (Comma-Separated Values) file and creates a DataFrame, which is a 2-dimensional labeled data structure with columns of potentially different types.

**Output:**

| | area | price |
|---|---|---|
| 0 | 8450 | 208500 |
| 1 | 9600 | 181500 |
| 2 | 11250 | 223500 |
| 3 | 9550 | 140000 |
| 4 | 14260 | 250000 |
| ... | ... | ... |
| 1455 | 7917 | 175000 |
| 1456 | 13175 | 210000 |
| 1457 | 9042 | 266500 |
| 1458 | 9717 | 142125 |
| 1459 | 9937 | 147500 |

1460 rows × 2 columns

## 4. Selecting Relevant Columns

```
data_set=data_set[['area','price']]
✓ 0.0s
```

## Explanation:

This filters the dataset to include only the columns "area" and "price" which are the features used for this analysis.

## 5. Defining Features and Target Variables

```
x=data_set[['area']]
y=data_set[['price']]
```
✓ 0.0s

# Explanation:

Here, x represents the feature variable (area), and y represents the target variable (price).

## Output:

| | area |
|---|---|
| 0 | 8450 |
| 1 | 9600 |
| 2 | 11250 |
| 3 | 9550 |
| 4 | 14260 |
| ... | ... |
| 1455 | 7917 |
| 1456 | 13175 |
| 1457 | 9042 |
| 1458 | 9717 |
| 1459 | 9937 |

1460 rows × 1 columns

| | price |
|---|---|
| 0 | 208500 |
| 1 | 181500 |
| 2 | 223500 |
| 3 | 140000 |
| 4 | 250000 |
| ... | ... |
| 1455 | 175000 |
| 1456 | 210000 |
| 1457 | 266500 |
| 1458 | 142125 |
| 1459 | 147500 |

1460 rows × 1 columns

## 6. Plotting the Data Points

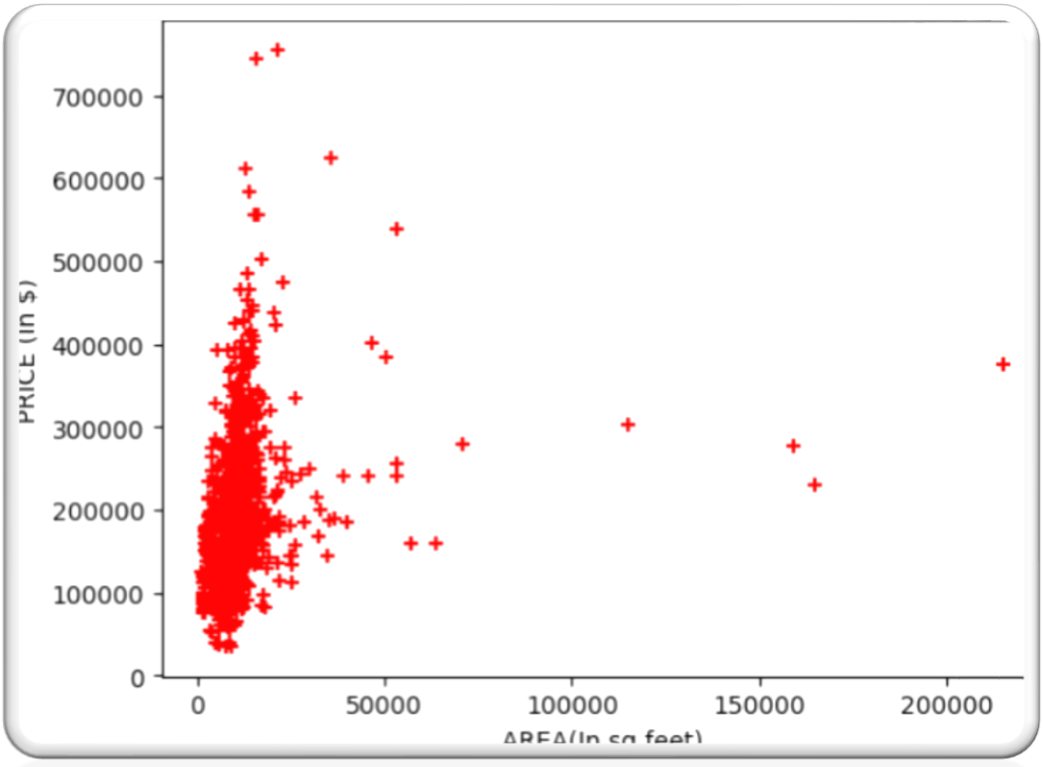
```
plt.scatter(x,y,color='red',marker='+')
plt.xlabel('AREA(In sq feet)')
plt.ylabel('PRICE (In $)')
```

✓ 0.2s

## Explanation:

This section creates a scatter plot to visualize the relationship between area and price. plt.scatter() generates the plot, while plt.xlabel() and plt.ylabel() label the axes.

## Output:



## 7. Splitting the Dataset

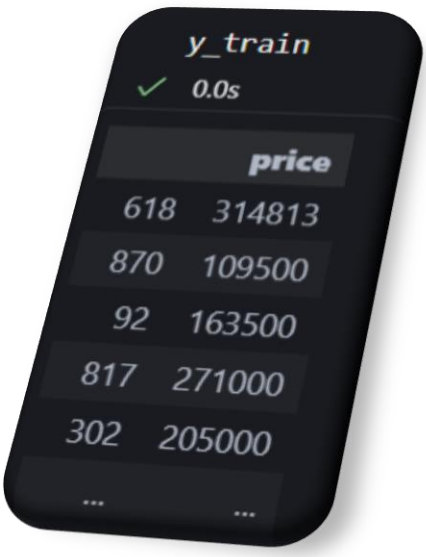
```
x_train,x_test,y_train,y_test=train_test_split(x,y,test_size=0.2,random_state=0)
```

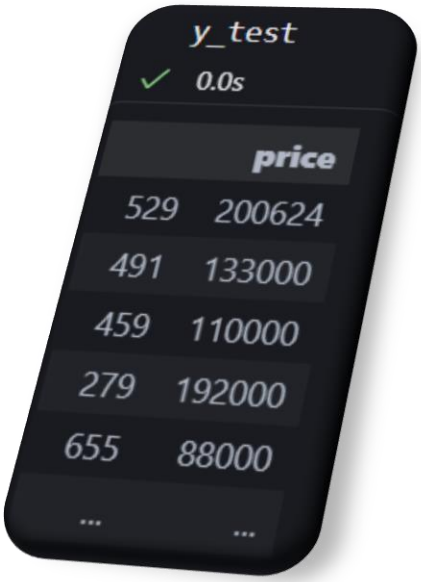
✓ 0.0s

## Explanation:

The dataset is split into training and test sets. 80% of the data is used for training, and 20% is used for testing





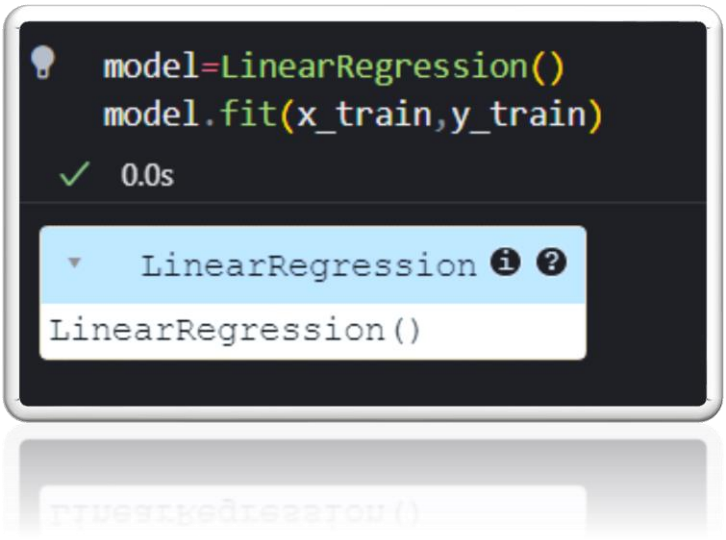
## 8. Reshaping Data

```
x_train=np.array(x_train).reshape(len(x_train),1)
x_test=np.array(x_test).reshape(len(x_test),1)
y_train=np.array(y_train).reshape(len(y_train),1)
y_test=np.array(y_test).reshape(len(y_test),1)
```

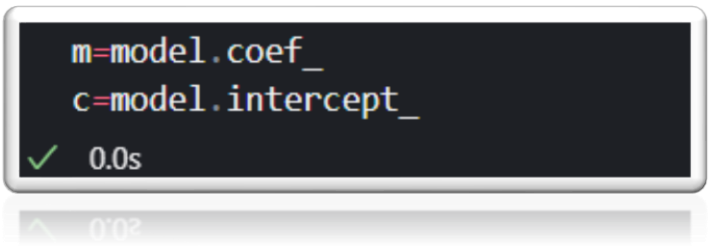
### Explanation:

The data is reshaped to ensure it meets the input requirements for the linear regression model.

## 9. Creating and Training the Linear Regression Model




## 10. Extracting Model Parameters




### Explanation:

The model coefficients (slope) and intercept are extracted from the trained model.

## 11. Making Predictions

```
y_pred=m*x_train+c
y_pred
```
✓ 0.0s

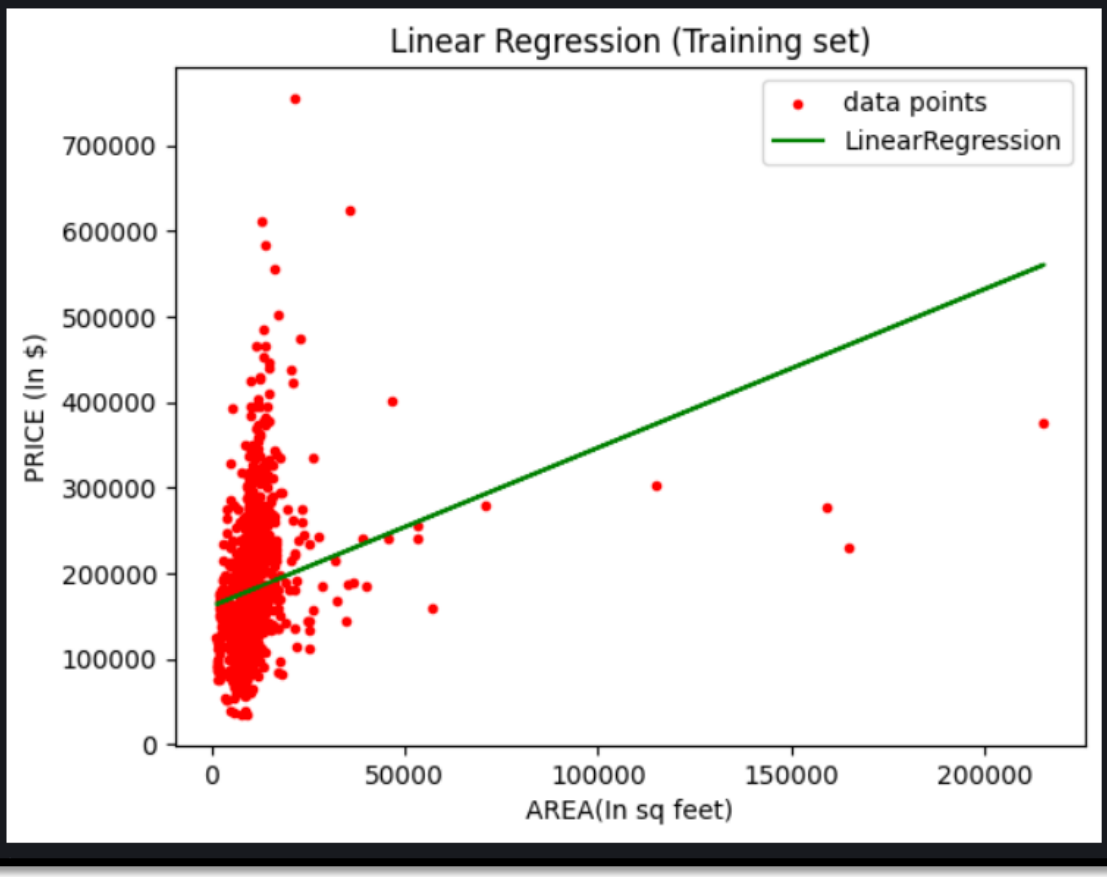
```
y_pred=m*x_test+c
y_pred
```
✓ 0.0s

## Explanation:

Predicted values for the training and testing are calculated using the linear model.

## 12. Plotting Predictions(Training set)

```
plt.scatter(x_train,y_train,color='r',marker='.',label='data points')
plt.plot(x_train,y_pred,color='g',label='LinearRegression')
plt.xlabel('AREA(In sq feet)')
plt.ylabel('PRICE (In $)')
plt.title('Linear Regression (Training set)')
plt.legend()
plt.show()
```
✓ 0.1s



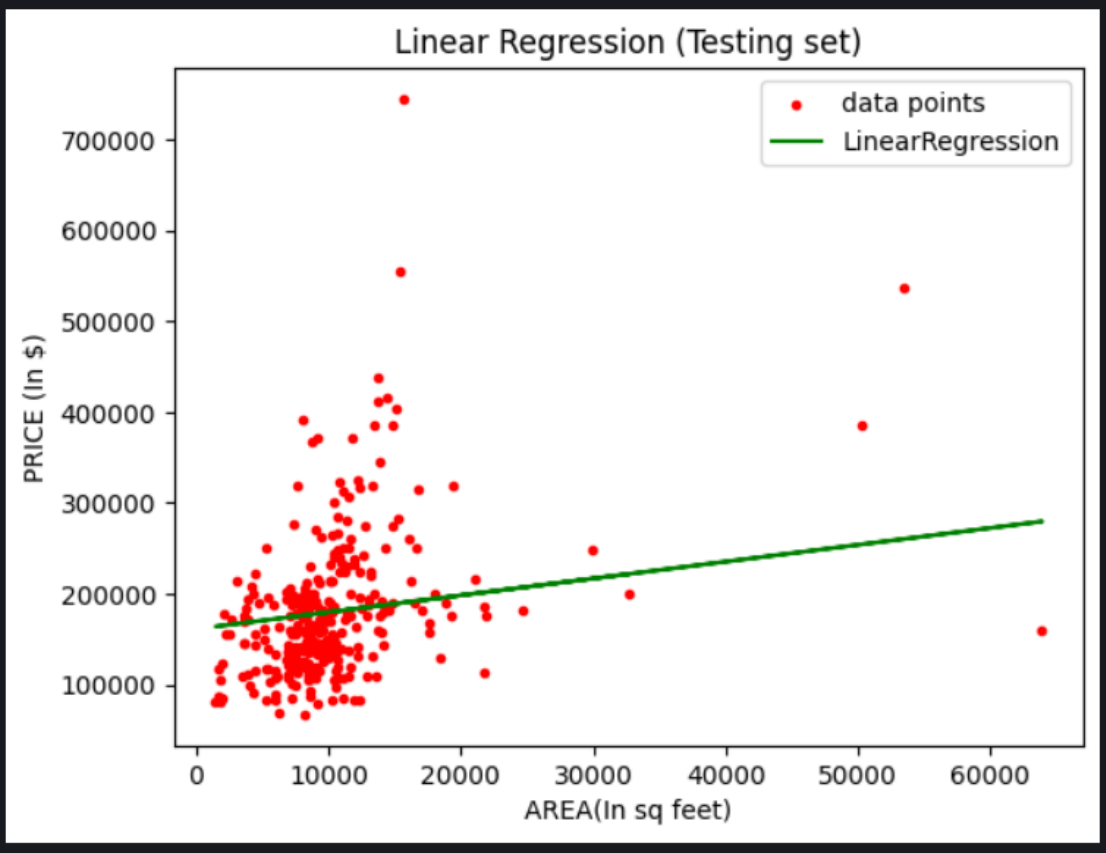
## Explanation:

Finally, a scatter plot of the training data is created along with a regression line to visualize the linear relationship.

### 13. Plotting Predictions(Testing set)

```
plt.scatter(x_test,y_test,color='r',marker='.',label='data points')
plt.plot(x_test,y_pred,color='g',label='LinearRegression')
plt.xlabel('AREA(In sq feet)')
plt.ylabel('PRICE (In $)')
plt.title('Linear Regression (Testing set)')
plt.legend()
plt.show()
```

✓ 0.1s




## Explanation:

Finally, a scatter plot of the testing data is created along with a regression line to visualize the linear relationship.

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