[9]:

```
import pandas as pd
import numpy as np
import matplotlib.pyplot as plt
import seaborn as sns
from sklearn.model_selection import train_test_split
from sklearn.linear_model import LinearRegression
from sklearn.metrics import mean_squared_error, r2_score

#load the dataset
data = pd.read_csv('house_prices.csv')
print("First 5 rows of the dataset;")
print(data.head())

#dataset info
print("\nDataset Information:")
print(data.info())

#check for missing values
print("\nMissing Values:")
print(data.isnull().sum())

#fill missing values
data.fillna({'Size': data['Size'].median(), 'Number of Rooms': data['Number of Rooms'].median()}, inplace=True)


#handle outliers
upper_limit = data['Price'].quantile(0.95)
data['Price'] = np.where(data['Price'] > upper_limit, upper_limit, data['Price'])
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#encoding the 'location' column using one-hot encoding
data= pd.get_dummies(data, columns=['Location'], drop_first=True)
print("Dataset after encoding:")
print(data.head())

from sklearn.preprocessing import MinMaxScaler

#normalize numerical columns
scaler= MinMaxScaler()
data[['Size', 'Number of Rooms']] = scaler.fit_transform(data[['Size', 'Number of Rooms']])

#define features and target variable
X= data.drop('Price', axis=1)
Y= data['Price']

#split the dataset into training and testing sets
X_train, X_test, Y_train, Y_test = train_test_split(X,Y, test_size=0.2, random_state=42)
print(f"Training set size: {X_train.shape}")
print(f"Testing set size: {X_test.shape}")

#initialize and train the model
model= LinearRegression()
model.fit(X_train, Y_train)

#display coefficients
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#display coefficients
print("Model Coefficients:", model.coef_)
print("Intercept:", model.intercept_)

#make predictions on the test set
Y_pred= model.predict(X_test)

#evaluate the model
rmse= np.sqrt(mean_squared_error(Y_test,Y_pred))
r2= r2_score(Y_test,Y_pred)
print(f"RMSE: {rmse:.2f}")
print(f"R2: {r2:.2f}")

#scatter plot of actual vs predicted prices
plt.figure(figsize=(8,6))
plt.scatter(Y_test, Y_pred, alpha=0.7)
plt.title("Actual vs Predicted Prices")
plt.xlabel("Actual Prices")
plt.ylabel("predicted Prices")
plt.show()

#Residual plot
residuals= Y_test - Y_pred
plt.figure(figsize=(8,6))
sns.histplot(residuals, kde=True, bins=30, color='blue')
plt.title("Distribution of Residuals")
plt.xlabel("Residuals")
plt.show()
```

```
First 5 rows of the dataset;
     Size  Location  Number of Rooms   Price
0  1536.0     rural              6.0  459069
1  1990.0  suburban              3.0  144995
2   730.0     urban              6.0  393243
3   635.0  suburban              2.0  213217
4  2414.0     rural              4.0  453589

Dataset Information:
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 30 entries, 0 to 29
Data columns (total 4 columns):
 #   Column           Non-Null Count  Dtype
---  ------           --------------  -----
 0   Size             29 non-null     float64
 1   Location         30 non-null     object
 2   Number of Rooms  27 non-null     float64
 3   Price            30 non-null     int64
dtypes: float64(2), int64(1), object(1)
memory usage: 1.1+ KB
None

Missing Values:
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Missing Values:
Size              1
Location          0
Number of Rooms    3
Price             0
dtype: int64
Dataset after encoding:
     Size  Number of Rooms     Price  Location_suburban  Location_urban
0  1536.0              6.0  459069.0              False           False
1  1990.0              3.0  144995.0               True           False
2   730.0              6.0  393243.0              False            True
3   635.0              2.0  213217.0               True           False
4  2414.0              4.0  453589.0              False           False
Training set size: (24, 4)
Testing set size: (6, 4)
Model Coefficients: [-104445.47999958   91385.13278454 -150554.07771396  -79810.36538031]
Intercept: 429085.00250769965
RMSE: 147422.57
R2: -5.15
```
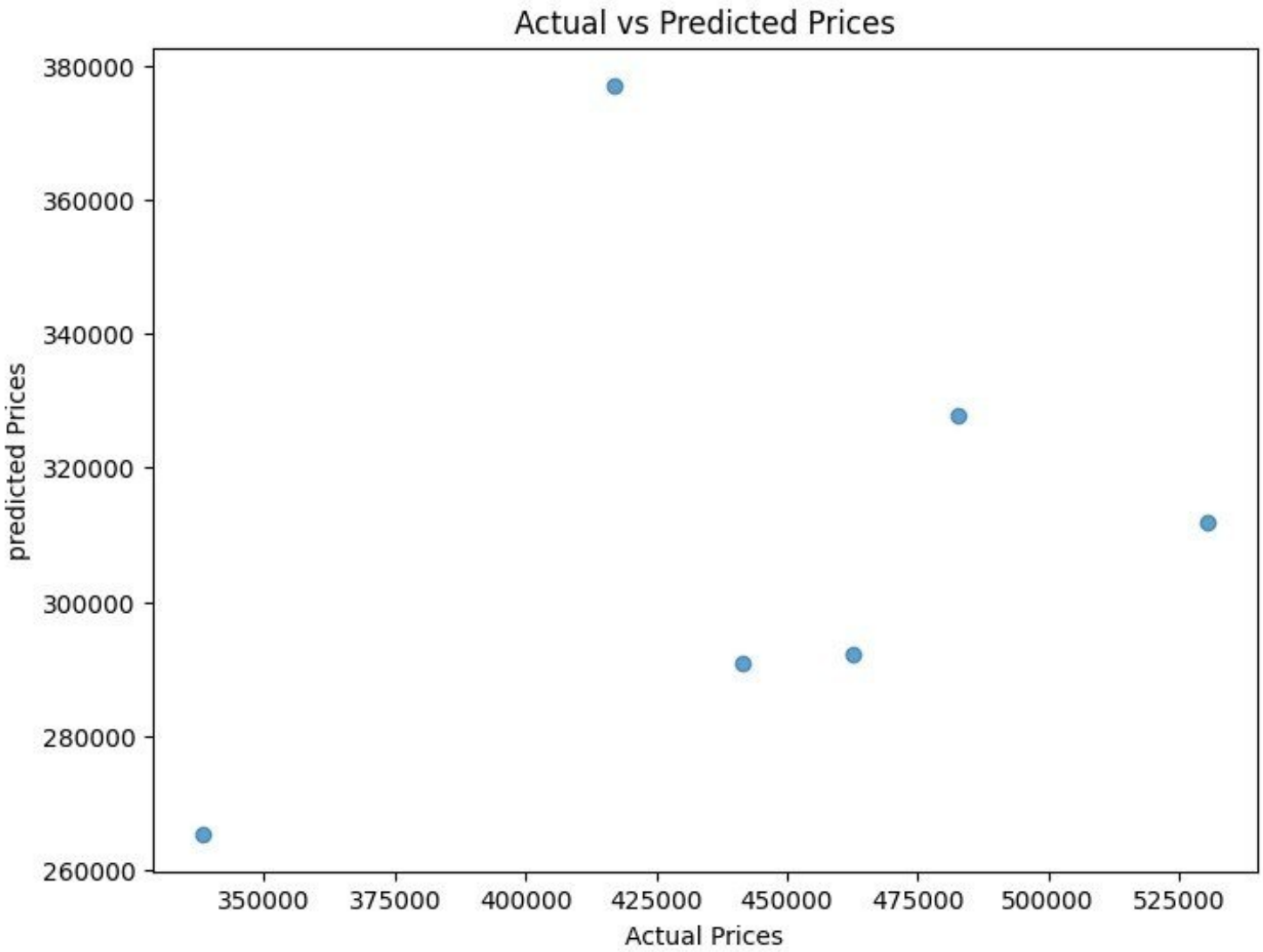
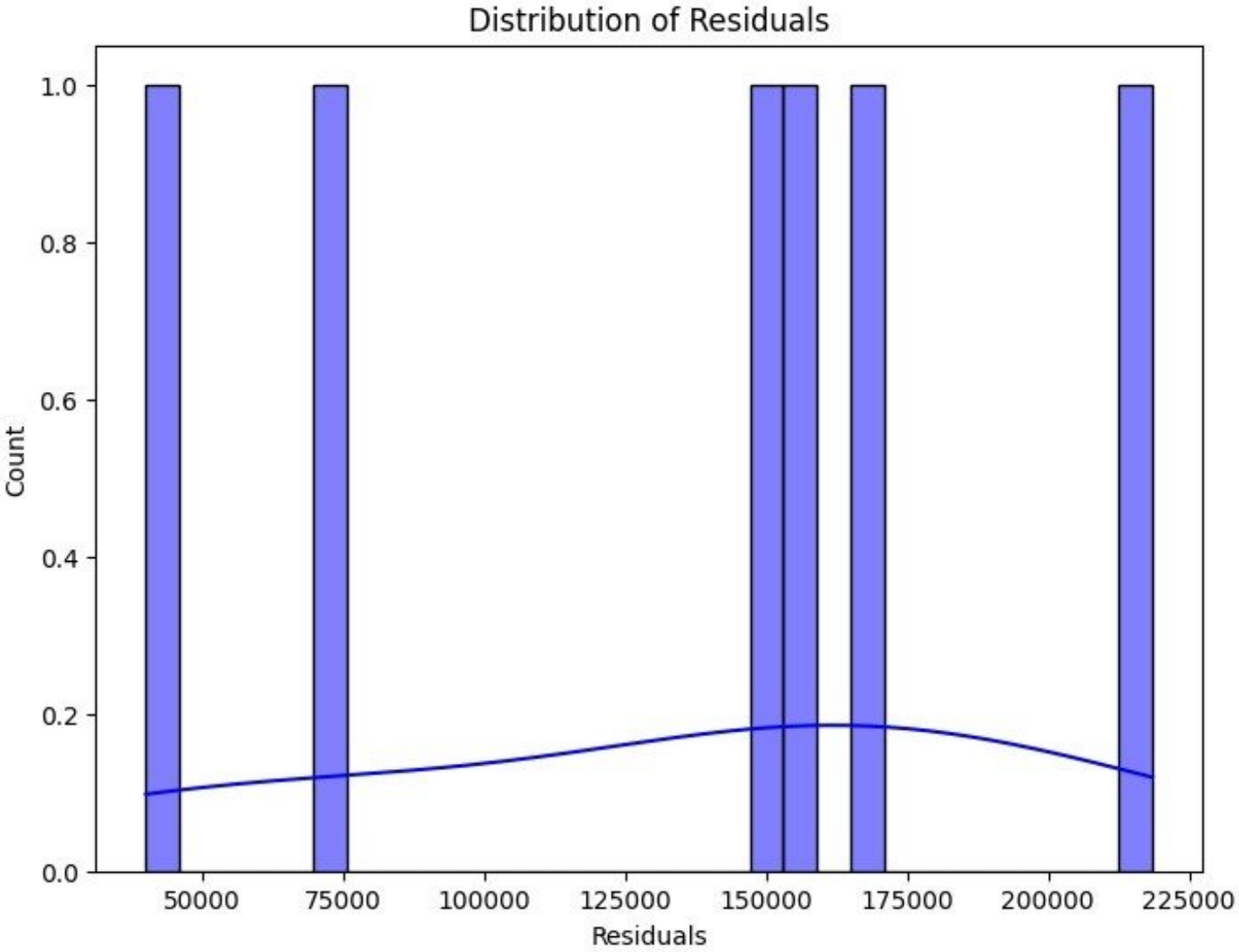


Actual vs Predicted Prices
380000
360000
340000
320000
300000
280000
260000
predicted Prices
350000
375000
400000
425000
450000
475000
500000
525000
Actual Prices


Distribution of Residuals
Count
Residuals
0.0
0.2
0.4
0.6
0.8
1.0
50000
75000
100000
125000
150000
175000
200000
225000