```
import pandas as pd
import numpy as np
import matplotlib.pyplot as plt
import seaborn as sns
```

Load dataset

```
data = pd.read_csv('Housing.csv')
```

Dataset Overview:

```
data.head()
```

	price	area	bedrooms	bathrooms	stories	mainroad	guestroom	basement	hotwaterheating	airconditioning	parking	prefarea
0	13300000	7420	4	2	3	yes	no	no	no	yes	2	yes
1	12250000	8960	4	4	4	yes	no	no	no	yes	3	no
2	12250000	9960	3	2	2	yes	no	yes	no	no	2	yes
3	12215000	7500	4	2	2	yes	no	yes	no	yes	3	yes
4	11410000	7420	4	1	2	yes	yes	yes	no	yes	2	no

Next steps: Generate code with data | View recommended plots | New interactive sheet

```
data.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 545 entries, 0 to 544
Data columns (total 13 columns):
 #   Column            Non-Null Count  Dtype
---  ------            --------------  -----
 0   price             545 non-null    int64
 1   area              545 non-null    int64
 2   bedrooms          545 non-null    int64
 3   bathrooms         545 non-null    int64
 4   stories           545 non-null    int64
 5   mainroad          545 non-null    object
 6   guestroom         545 non-null    object
 7   basement          545 non-null    object
 8   hotwaterheating   545 non-null    object
 9   airconditioning   545 non-null    object
 10  parking           545 non-null    int64
 11  prefarea          545 non-null    object
 12  furnishingstatus  545 non-null    object
dtypes: int64(6), object(7)
memory usage: 55.5+ KB
```

There are no missing values.

```
data.describe()
```

	price	area	bedrooms	bathrooms	stories	parking
count	5.450000e+02	545.000000	545.000000	545.000000	545.000000	545.000000
mean	4.766729e+06	5150.541284	2.965138	1.286239	1.805505	0.693578
std	1.870440e+06	2170.141023	0.738064	0.502470	0.867492	0.861586
min	1.750000e+06	1650.000000	1.000000	1.000000	1.000000	0.000000
25%	3.430000e+06	3600.000000	2.000000	1.000000	1.000000	0.000000
50%	4.340000e+06	4600.000000	3.000000	1.000000	2.000000	0.000000
75%	5.740000e+06	6360.000000	3.000000	2.000000	2.000000	1.000000
max	1.330000e+07	16200.000000	6.000000	4.000000	4.000000	3.000000

```
# Handle missing values
numerical_features = data.select_dtypes(include=['int64', 'float64']).columns
categorical_features = data.select_dtypes(include=['object']).columns
```

```
# Define preprocessing steps
from sklearn.compose import ColumnTransformer
from sklearn.pipeline import Pipeline
from sklearn.impute import SimpleImputer
from sklearn.preprocessing import StandardScaler, OneHotEncoder

num_imputer = SimpleImputer(strategy='median')  # Handling missing numerical values
cat_imputer = SimpleImputer(strategy='most_frequent')  # Handling missing categorical values
encoder = OneHotEncoder(handle_unknown='ignore')  # Encoding categorical features
scaler = StandardScaler()  # Scaling numerical features


# Preprocessing pipeline
preprocessor = ColumnTransformer([
    ('num', Pipeline([('imputer', num_imputer), ('scaler', scaler)]), numerical_features),
    ('cat', Pipeline([('imputer', cat_imputer), ('encoder', encoder)]), categorical_features)
])



from sklearn.model_selection import train_test_split
from sklearn.linear_model import LinearRegression
from sklearn.metrics import mean_absolute_error, mean_squared_error, r2_score

x = data.drop('price', axis=1)
y = data['price']


# Splitting 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)


model = LinearRegression()


df_encoded = x_train.copy()
for col in categorical_features:
    df_encoded[col] = df_encoded[col].astype('category').cat.codes



x_train = df_encoded.copy()


model.fit(x_train,y_train)
```

```
▾ LinearRegression
LinearRegression()
```

```
df_encoded = x_test.copy()
for col in categorical_features:
    df_encoded[col] = df_encoded[col].astype('category').cat.codes

x_test = df_encoded.copy()


results=[]
y_pred = model.predict(x_test)
mae = mean_absolute_error(y_test, y_pred)
rmse = np.sqrt(mean_squared_error(y_test, y_pred))
r2 = r2_score(y_test, y_pred)
print(f"Logistic Regression:")
print(f"MAE: {mae:.2f}")
print(f"RMSE: {rmse:.2f}")
print(f"R² Score: {r2:.2f}")
results.append(["Logistic Regression", mae, rmse, r2])
```

```
Logistic Regression:
MAE: 979679.69
RMSE: 1331071.42
R² Score: 0.65
```

```
from sklearn.tree import DecisionTreeRegressor

model = DecisionTreeRegressor()


model.fit(x_train,y_train)
```

```
DecisionTreeRegressor
DecisionTreeRegressor()
```

```
y_pred = model.predict(x_test)
mae = mean_absolute_error(y_test, y_pred)
rmse = np.sqrt(mean_squared_error(y_test, y_pred))
r2 = r2_score(y_test, y_pred)
print(f"DecisionTree Regressor:")
print(f"MAE: {mae:.2f}")
print(f"RMSE: {rmse:.2f}")
print(f"R² Score: {r2:.2f}")
results.append(["DecisionTree Regressor", mae, rmse, r2])
```

```
DecisionTree Regressor:
MAE: 1257110.09
RMSE: 1710758.39
R² Score: 0.42
```

```
# Convert results to DataFrame for easy viewing
results_df = pd.DataFrame(results, columns=["Model", "MAE", "RMSE", "R² Score"])
print("\nModel Performance Summary:")
print(results_df)
```

```
Model Performance Summary:
                      Model           MAE          RMSE  R² Score
0     Logistic Regression  9.796797e+05  1.331071e+06  0.649475
1  DecisionTree Regressor  1.257110e+06  1.710758e+06  0.420981
```

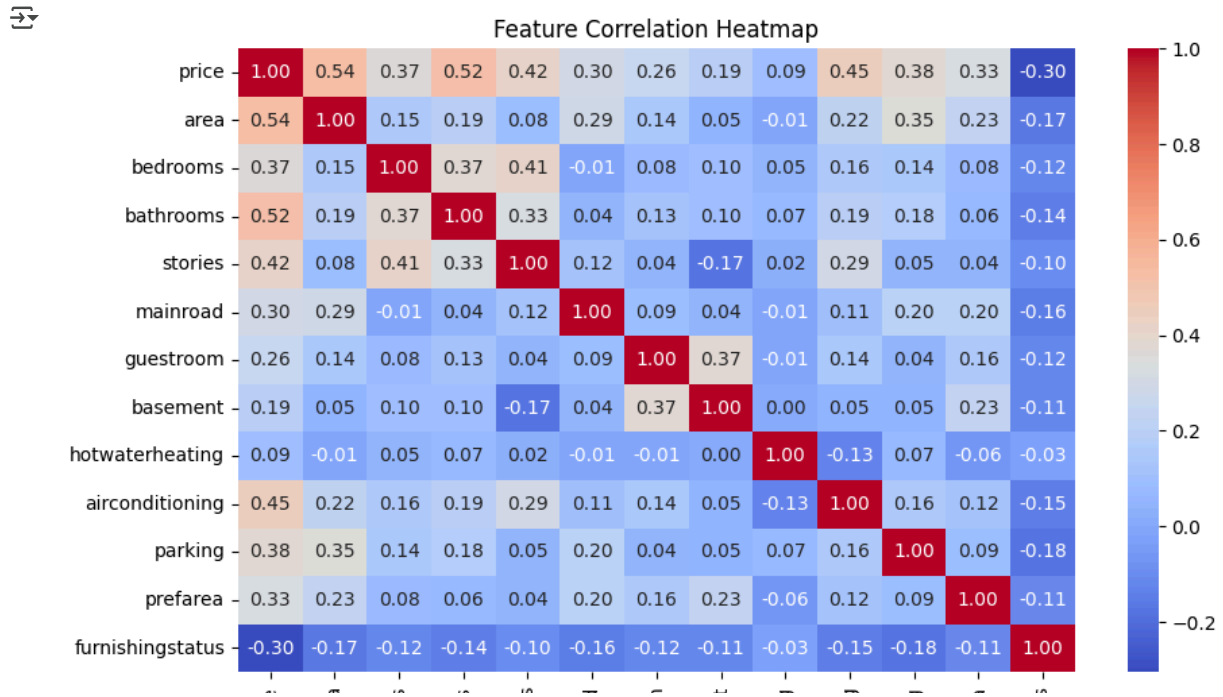
```
sns.pairplot(data)
plt.show()
```


```
# Save results to CSV
results_df.to_csv("model_performance.csv", index=False)
print("Model performance saved to 'model_performance.csv'")
```

```
Model performance saved to 'model_performance.csv'
```

```
train_data = data.copy()
df_encoded = train_data.copy()
for col in categorical_features:
    df_encoded[col] = df_encoded[col].astype('category').cat.codes
train_data = df_encoded.copy()

plt.figure(figsize=(10, 6))
sns.heatmap(train_data.corr(), annot=True, cmap='coolwarm', fmt='.2f')
plt.title("Feature Correlation Heatmap")
plt.show()
```




```
train_data['hotwaterheating_bathrooms_ratio'] = train_data['hotwaterheating'] / train_data['bathrooms']
train_data['airconditioning_bedrooms_ratio'] = train_data['airconditioning'] / train_data['bedrooms']
```

```
plt.figure(figsize=(10, 6))
sns.heatmap(train_data.corr(), annot=True, cmap='coolwarm', fmt='.2f')
plt.title("Feature Correlation Heatmap")
plt.show()
```