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

```
data = pd.read_csv("/content/sample_data/mission 2.csv")
```

```
data.head(10)
```

	Location	Size (sqft)	Bedrooms	Bathrooms	Year Built	Condition	Price
0	Suburban	1295	5	1	2007	5	61023
1	Urban	1163	1	3	1961	1	216619
2	Urban	2020	1	2	1983	5	168012
3	Suburban	1279	2	1	2004	1	206542
4	Urban	2268	1	1	1961	2	316979
5	Urban	3072	2	2	1988	5	418501
6	Rural	1979	2	3	1982	5	433934
7	Rural	2353	3	3	1975	3	172402
8	Urban	1636	4	2	1957	4	215421
9	Urban	1520	2	2	1965	2	325987

```
data.isna().sum()
```

	0
Location	0
Size (sqft)	0
Bedrooms	0
Bathrooms	0
Year Built	0
Condition	0
Price	0

dtype: int64

```
from sklearn.preprocessing import LabelEncoder
le = LabelEncoder()

data['Location'] =  le.fit_transform(data['Location'])
```

```
data.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 1000 entries, 0 to 999
Data columns (total 7 columns):
 #   Column       Non-Null Count  Dtype
---  ------       --------------  -----
 0   Location     1000 non-null   int64
 1   Size (sqft)  1000 non-null   int64
 2   Bedrooms     1000 non-null   int64
 3   Bathrooms    1000 non-null   int64
 4   Year Built   1000 non-null   int64
 5   Condition    1000 non-null   int64
 6   Price        1000 non-null   int64
dtypes: int64(7)
memory usage: 54.8 KB
```

```
from sklearn.preprocessing import StandardScaler
sc = StandardScaler()
```

```
data[['Size (sqft)',  'Bedrooms', 'Bathrooms', 'Year Built', 'Condition']] = sc.fit_transform(
    data[['Size (sqft)',  'Bedrooms', 'Bathrooms', 'Year Built', 'Condition']])
```

```
data.columns
```

```
Index(['Location', 'Size (sqft)', 'Bedrooms', 'Bathrooms', 'Year Built',
       'Condition', 'Price'],
      dtype='object')
```

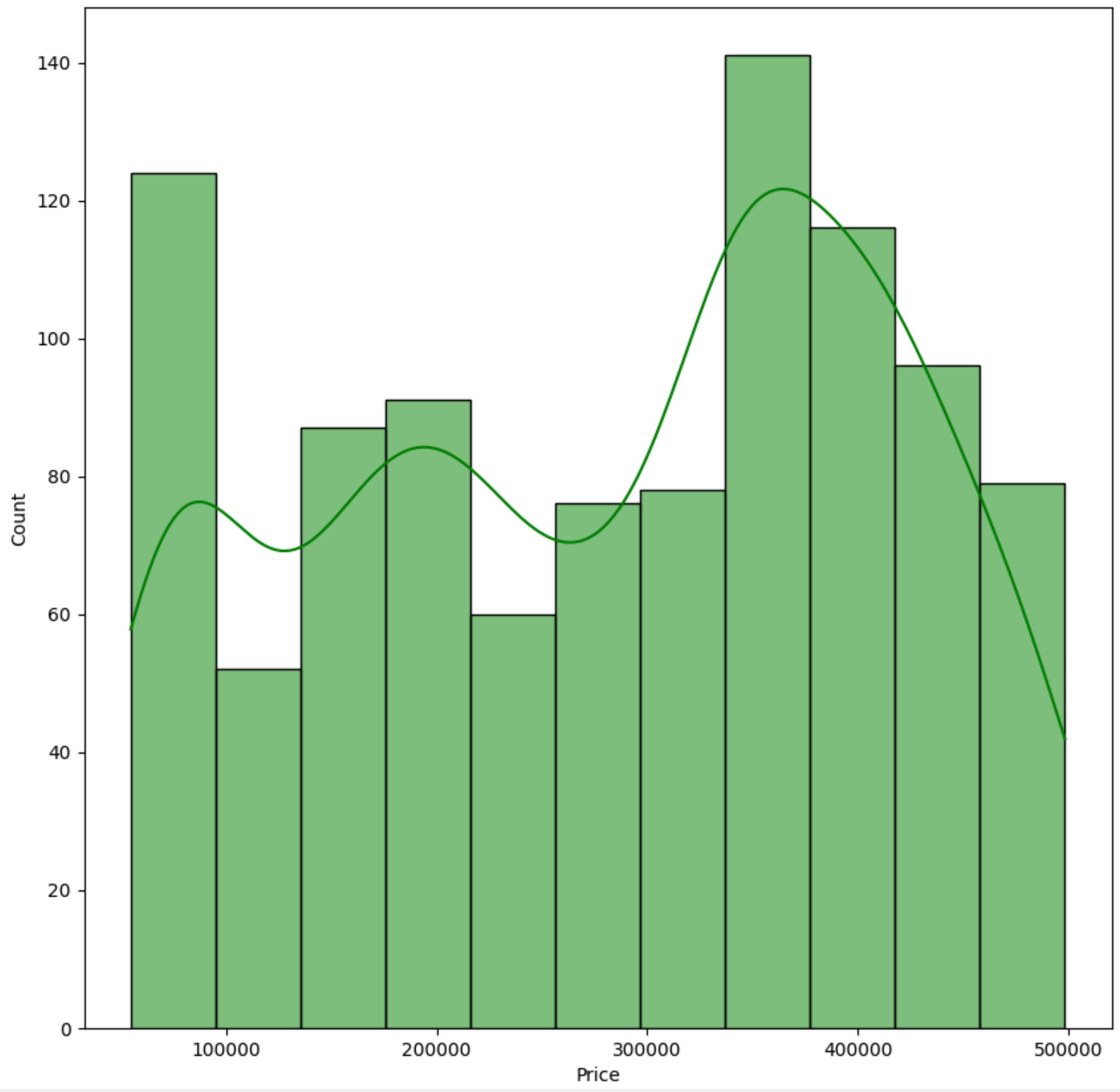
```
data.head()
```

	Location	Size (sqft)	Bedrooms	Bathrooms	Year Built	Condition	Price
0	1	-1.067816	1.729282	-1.231835	1.040608	1.255999	61023
1	2	-1.240099	-1.235625	1.256721	-1.133331	-1.397988	216619
2	2	-0.121569	-1.235625	0.012443	-0.093621	1.255999	168012
3	1	-1.088699	-0.494398	-1.231835	0.898830	-1.397988	206542
4	2	0.202113	-1.235625	-1.231835	-1.133331	-0.734491	316979

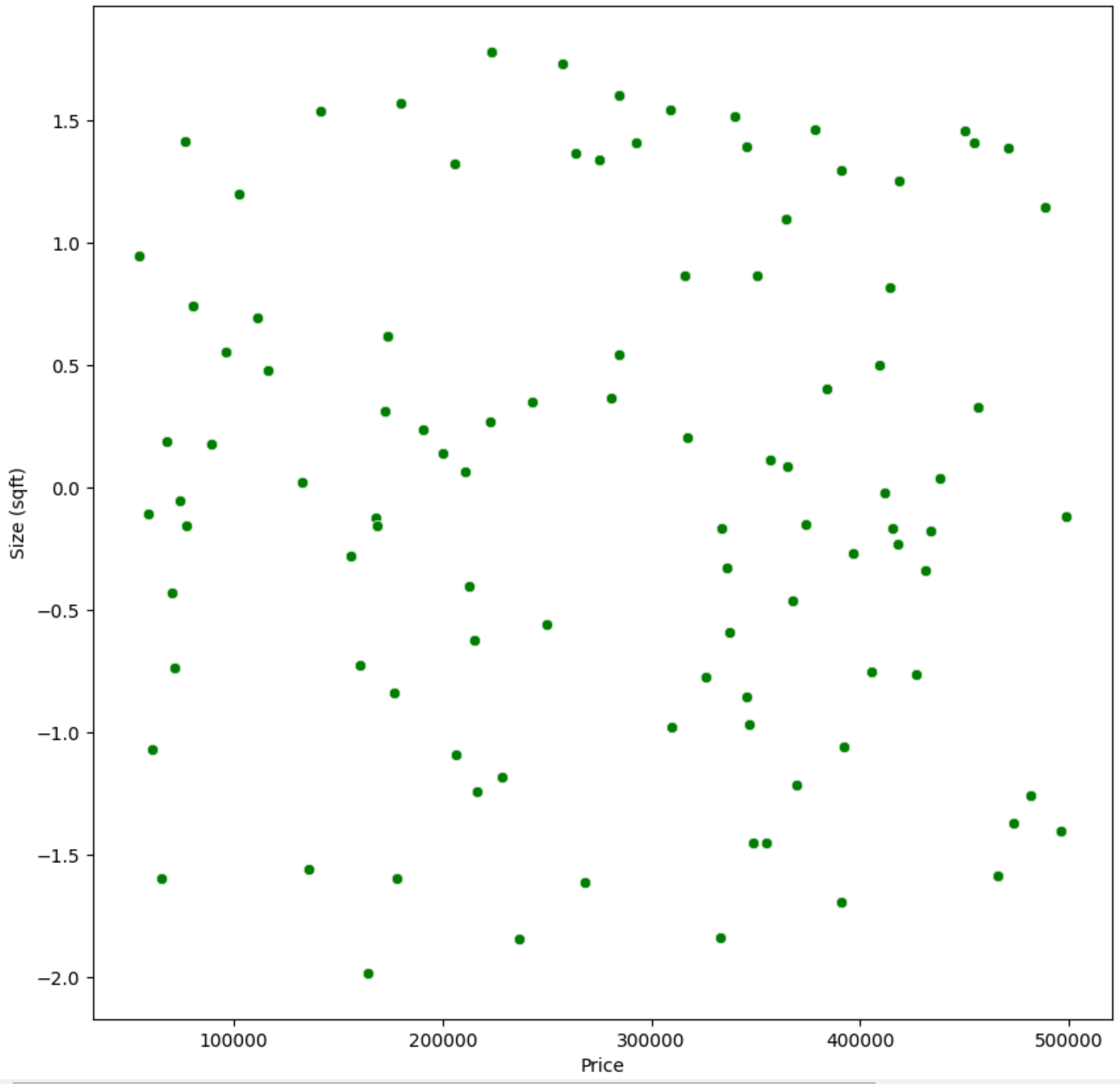
```
data.describe()
```

	Location	Size (sqft)	Bedrooms	Bathrooms	Year Built	Condition	Price
count	1000.000000	1.000000e+03	1.000000e+03	1.000000e+03	1.000000e+03	1.000000e+03	1000.000000
mean	1.020000	2.913225e-16	9.769963e-17	4.618528e-17	2.664535e-16	-6.394885e-17	282989.120000
std	0.815024	1.000500e+00	1.000500e+00	1.000500e+00	1.000500e+00	1.000500e+00	130220.566705
min	0.000000	-1.981435e+00	-1.235625e+00	-1.231835e+00	-1.653187e+00	-1.397988e+00	54748.000000
25%	0.000000	-7.506603e-01	-1.235625e+00	-1.231835e+00	-9.442932e-01	-7.344908e-01	172402.000000
50%	1.000000	-5.631023e-02	2.468285e-01	1.244278e-02	-9.362118e-02	-7.099414e-02	309747.000000
75%	2.000000	8.142377e-01	9.880552e-01	1.256721e+00	8.988295e-01	1.255999e+00	391003.000000
max	2.000000	1.780063e+00	1.729282e+00	1.256721e+00	1.607723e+00	1.255999e+00	498345.000000

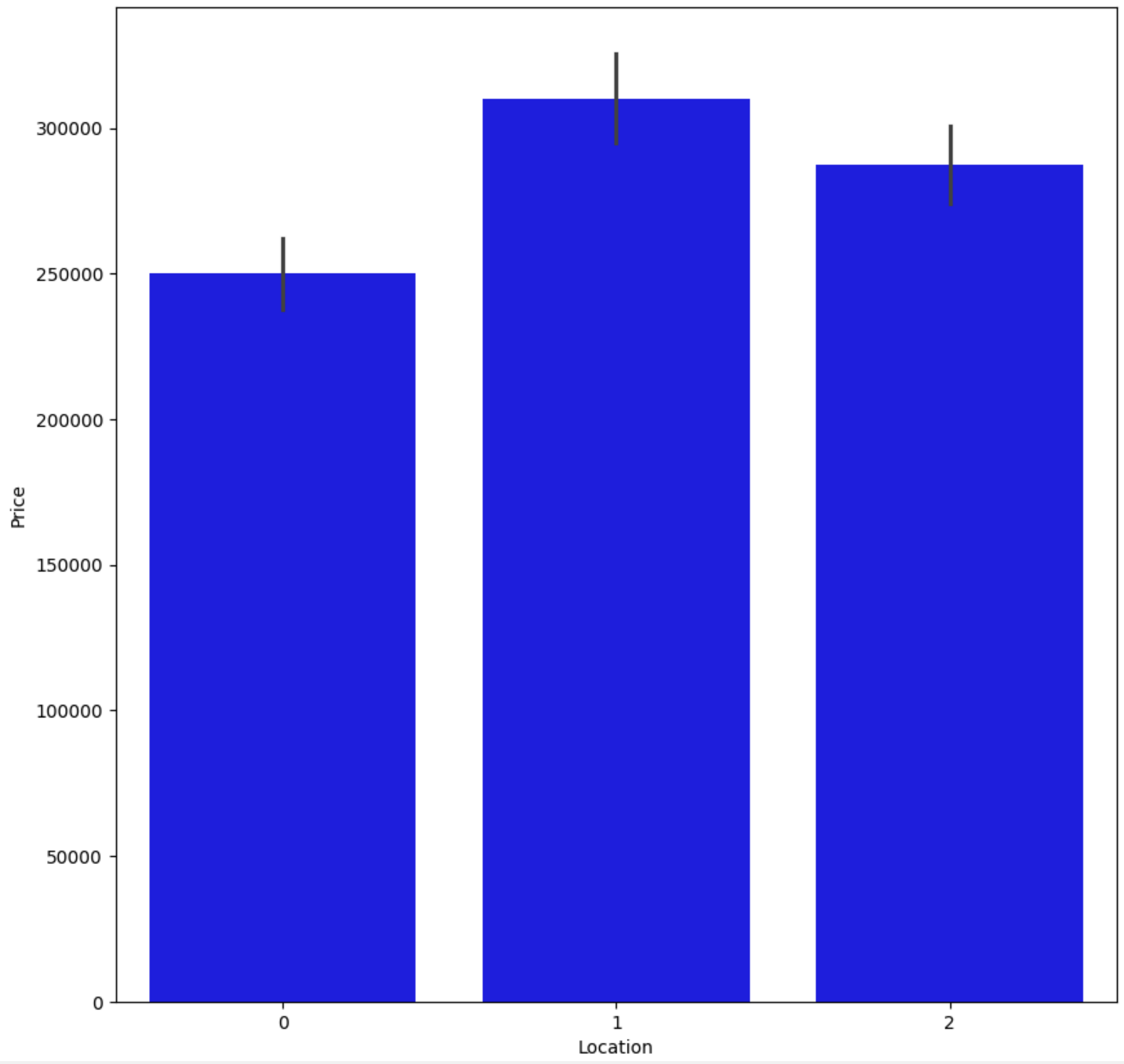
```
plt.figure(figsize=(10,10))
sns.histplot(data['Price'], color="green", kde=True)
plt.title = 'Price Distribution'
plt.xlable = "Price"
plt.ylable= "Frequency"
plt.show()
```



```
plt.figure(figsize=(10,10))
sns.scatterplot(x=data['Price'], y= data['Size (sqft)'], color="green")
plt.title = 'Price & Size Relation'
plt.xlable = "Price"
plt.ylable= "Size"
plt.show()
```



```
plt.figure(figsize=(10,10))
sns.barplot(x=data['Location'],y=data['Price'], color="blue")
plt.title = 'impact of location on price'
plt.xlable = "location"
plt.ylable= "Price"
plt.show()
```



```
from sklearn.model_selection import train_test_split
x = data.drop('Price', axis=1)
y =data['Price']
x_train, x_test, y_train, y_test = train_test_split(x,y, test_size=0.2, random_state=42)
```

```
from sklearn.linear_model import LinearRegression
from sklearn.tree import DecisionTreeRegressor
from sklearn.ensemble import RandomForestRegressor
from sklearn.metrics import mean_squared_error, r2_score,mean_absolute_error
```

```
lr = LinearRegression()
dt = DecisionTreeRegressor()
rf = RandomForestRegressor()
lr.fit(x_train, y_train)
dt.fit(x_train, y_train)
rf.fit(x_train, y_train)
```

```
▾ RandomForestRegressor
RandomForestRegressor()
```

```
y_predict_lr = lr.predict(x_test)
y_predict_dt = dt.predict(x_test)
y_predict_rf = rf.predict(x_test)
```

```
print("Linear Regression MSE:", mean_squared_error(y_test, y_predict_lr))
print("DecisionTreeRegressor MSE:", mean_squared_error(y_test, y_predict_dt))
print("Random Forest MSE:", mean_squared_error(y_test, y_predict_rf))
```

```
Linear Regression MSE: 15770483148.400627
DecisionTreeRegressor MSE: 0.0
Random Forest MSE: 2571279.1743035004
```

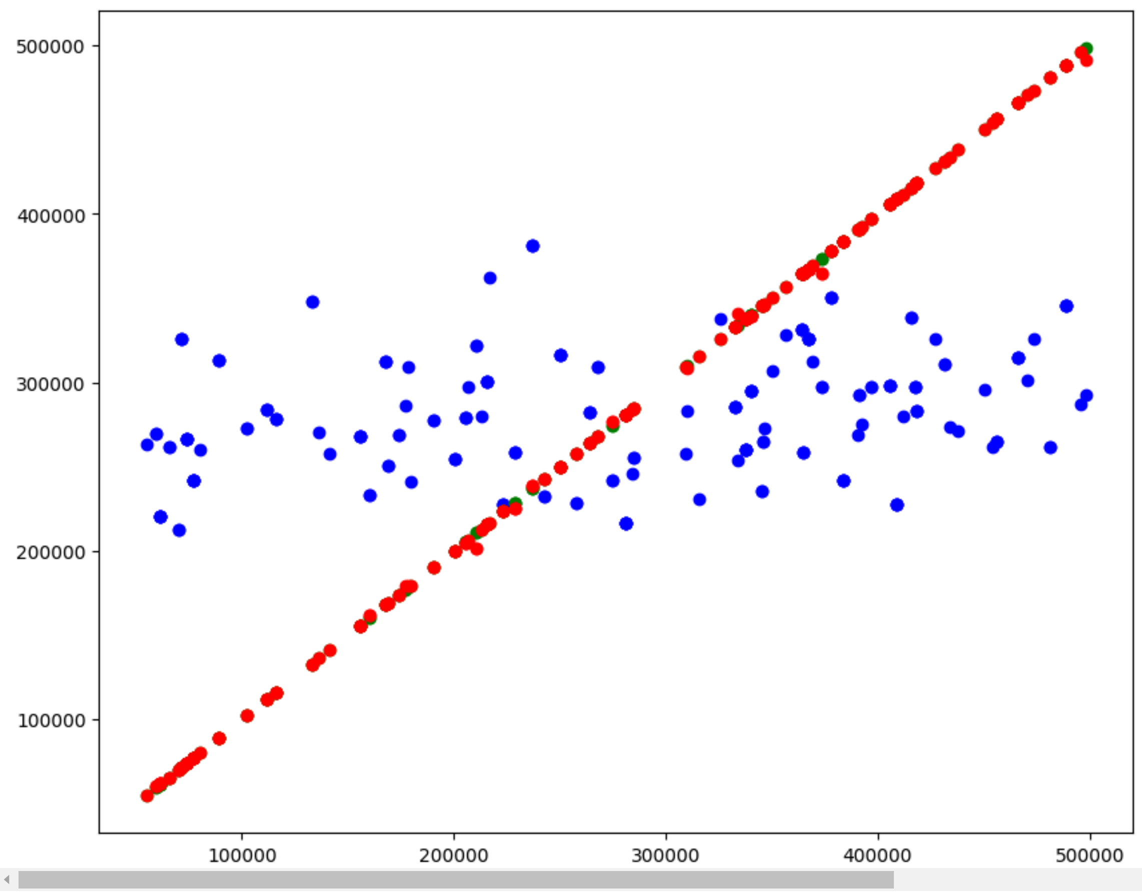
```
print("Linear Regression MSE:", mean_absolute_error(y_test, y_predict_lr))
print("DecisionTreeRegressor MSE:", mean_absolute_error(y_test, y_predict_dt))
print("Random Forest MSE:", mean_absolute_error(y_test, y_predict_rf))
```

```
Linear Regression MSE: 109912.47385351837
DecisionTreeRegressor MSE: 0.0
Random Forest MSE: 467.1923499999997
```

```
print("r2_score Linear Regression:", r2_score(y_test, y_predict_lr))
print("r2_score DecisionTreeRegressor:", r2_score(y_test, y_predict_dt))
print("r2_score Random Forest:", r2_score(y_test, y_predict_rf))
```

```
r2_score Linear Regression: 0.06591055803266965
r2_score DecisionTreeRegressor: 1.0
r2_score Random Forest: 0.9998477025271536
```

```
plt.figure(figsize=(10, 8))
plt.scatter(y_test, y_predict_lr, color='blue', label='Linear Regression')
plt.scatter(y_test, y_predict_dt, color='green', label='Decision Tree')
plt.scatter(y_test, y_predict_rf, color='red', label='Random Forest')
plt.show()
```



```
from sklearn.model_selection import GridSearchCV, RandomizedSearchCV
# using Gridsearch
gird_params = {
    "max_depth": [5,15,10,20,30], "max_leaf_nodes": [10,20,30,50,15,5,7]
}
grid_search_model = GridSearchCV(estimator=DecisionTreeRegressor(), param_grid=gird_params, cv=5)
```

```
grid_search_model.fit(x_train, y_train)
grid_search_model.best_params_
```

```
{'max_depth': 15, 'max_leaf_nodes': 50}
```

```
grid_y_predict = grid_search_model.best_estimator_.predict(x_test)
print("r2_score GridSearch:", r2_score(y_test, grid_y_predict))
print("MSE GridSearch:", mean_squared_error(y_test, grid_y_predict))
print("MAE GridSearch:", mean_absolute_error(y_test, grid_y_predict))
```

```
r2_score GridSearch: 0.9646924910607075
MSE GridSearch: 596106164.7012935
MAE GridSearch: 17223.220838076657
```

```
random_params = {
    'max_depth': [5,15,10,20,30], "n_estimators": [100,200,300,400,500]
}

ranom_model = RandomizedSearchCV(estimator=RandomForestRegressor(), param_distributions=random_params, cv=5)
ranom_model.fit(x_train, y_train)
ranom_model.best_params_
```

```
{'n_estimators': 500, 'max_depth': 30}
```

```
random_y_predict = ranom_model.best_estimator_.predict(x_test)
print("r2_score Random Search:", r2_score(y_test,random_y_predict))
print("MSE Random Search:", mean_squared_error(y_test, random_y_predict))
print("MAE Random Search:", mean_absolute_error(y_test, random_y_predict))
```

```
r2_score Random Search: 0.9999153921484492
MSE Random Search: 1428457.101811923
MAE Random Search: 404.34186000000017
```

```
pip install gradio
```

```
Collecting gradio
  Downloading gradio-5.11.0-py3-none-any.whl.metadata (16 kB)
Collecting aiofiles<24.0,>=22.0 (from gradio)
  Downloading aiofiles-23.2.1-py3-none-any.whl.metadata (9.7 kB)
Requirement already satisfied: anyio<5.0,>=3.0 in /usr/local/lib/python3.10/dist-packages (from gradio) (3.7.1)
Collecting fastapi<1.0,>=0.115.2 (from gradio)
  Downloading fastapi-0.115.6-py3-none-any.whl.metadata (27 kB)
Collecting ffmpy (from gradio)
  Downloading ffmpy-0.5.0-py3-none-any.whl.metadata (3.0 kB)
Collecting gradio-client==1.5.3 (from gradio)
  Downloading gradio_client-1.5.3-py3-none-any.whl.metadata (7.1 kB)
Requirement already satisfied: httpx>=0.24.1 in /usr/local/lib/python3.10/dist-packages (from gradio) (0.28.1)
Requirement already satisfied: huggingface-hub>=0.25.1 in /usr/local/lib/python3.10/dist-packages (from gradio) (0.27.1)
Requirement already satisfied: jinja2<4.0 in /usr/local/lib/python3.10/dist-packages (from gradio) (3.1.5)
Collecting markupsafe~=2.0 (from gradio)
  Downloading MarkupSafe-2.1.5-cp310-cp310-manylinux_2_17_x86_64.manylinux2014_x86_64.whl.metadata (3.0 kB)
Requirement already satisfied: numpy<3.0,>=1.0 in /usr/local/lib/python3.10/dist-packages (from gradio) (1.26.4)
Requirement already satisfied: orjson~=3.0 in /usr/local/lib/python3.10/dist-packages (from gradio) (3.10.13)
Requirement already satisfied: packaging in /usr/local/lib/python3.10/dist-packages (from gradio) (24.2)
Requirement already satisfied: pandas<3.0,>=1.0 in /usr/local/lib/python3.10/dist-packages (from gradio) (2.2.2)
Requirement already satisfied: pillow<12.0,>=8.0 in /usr/local/lib/python3.10/dist-packages (from gradio) (11.1.0)
Requirement already satisfied: pydantic>=2.0 in /usr/local/lib/python3.10/dist-packages (from gradio) (2.10.4)
Collecting pydub (from gradio)
  Downloading pydub-0.25.1-py2.py3-none-any.whl.metadata (1.4 kB)
Collecting python-multipart>=0.0.18 (from gradio)
  Downloading python_multipart-0.0.20-py3-none-any.whl.metadata (1.8 kB)
Requirement already satisfied: pyyaml<7.0,>=5.0 in /usr/local/lib/python3.10/dist-packages (from gradio) (6.0.2)
Collecting ruff>=0.2.2 (from gradio)
  Downloading ruff-0.9.0-py3-none-manylinux_2_17_x86_64.manylinux2014_x86_64.whl.metadata (25 kB)
Collecting safehttpx<0.2.0,>=0.1.6 (from gradio)
  Downloading safehttpx-0.1.6-py3-none-any.whl.metadata (4.2 kB)
Collecting semantic-version~=2.0 (from gradio)
  Downloading semantic_version-2.10.0-py2.py3-none-any.whl.metadata (9.7 kB)
Collecting starlette<1.0,>=0.40.0 (from gradio)
  Downloading starlette-0.45.2-py3-none-any.whl.metadata (6.3 kB)
Collecting tomlkit<0.14.0,>=0.12.0 (from gradio)
  Downloading tomlkit-0.13.2-py3-none-any.whl.metadata (2.7 kB)
Requirement already satisfied: typer<1.0,>=0.12 in /usr/local/lib/python3.10/dist-packages (from gradio) (0.15.1)
Requirement already satisfied: typing-extensions~=4.0 in /usr/local/lib/python3.10/dist-packages (from gradio) (4.12.2)
Collecting uvicorn>=0.14.0 (from gradio)
  Downloading uvicorn-0.34.0-py3-none-any.whl.metadata (6.5 kB)
Requirement already satisfied: fsspec in /usr/local/lib/python3.10/dist-packages (from gradio-client==1.5.3->gradio) (2024.10.0)
Requirement already satisfied: websockets<15.0,>=10.0 in /usr/local/lib/python3.10/dist-packages (from gradio-client==1.5.3->gradio) (
Requirement already satisfied: idna>=2.8 in /usr/local/lib/python3.10/dist-packages (from anyio<5.0,>=3.0->gradio) (3.10)
Requirement already satisfied: sniffio>=1.1 in /usr/local/lib/python3.10/dist-packages (from anyio<5.0,>=3.0->gradio) (1.3.1)
Requirement already satisfied: exceptiongroup in /usr/local/lib/python3.10/dist-packages (from anyio<5.0,>=3.0->gradio) (1.2.2)
Collecting starlette<1.0,>=0.40.0 (from gradio)
  Downloading starlette-0.41.3-py3-none-any.whl.metadata (6.0 kB)
Requirement already satisfied: certifi in /usr/local/lib/python3.10/dist-packages (from httpx>=0.24.1->gradio) (2024.12.14)
Requirement already satisfied: httpcore==1.* in /usr/local/lib/python3.10/dist-packages (from httpx>=0.24.1->gradio) (1.0.7)
Requirement already satisfied: h11<0.15,>=0.13 in /usr/local/lib/python3.10/dist-packages (from httpcore==1.*->httpx>=0.24.1->gradio)
Requirement already satisfied: filelock in /usr/local/lib/python3.10/dist-packages (from huggingface-hub>=0.25.1->gradio) (3.16.1)
Requirement already satisfied: requests in /usr/local/lib/python3.10/dist-packages (from huggingface-hub>=0.25.1->gradio) (2.32.3)
Requirement already satisfied: tqdm>=4.42.1 in /usr/local/lib/python3.10/dist-packages (from huggingface-hub>=0.25.1->gradio) (4.67.1)
Requirement already satisfied: python-dateutil>=2.8.2 in /usr/local/lib/python3.10/dist-packages (from pandas<3.0,>=1.0->gradio) (2.8
Requirement already satisfied: pytz>=2020.1 in /usr/local/lib/python3.10/dist-packages (from pandas<3.0,>=1.0->gradio) (2024.2)
Requirement already satisfied: tzdata>=2022.7 in /usr/local/lib/python3.10/dist-packages (from pandas<3.0,>=1.0->gradio) (2024.2)
```

```
import gradio as gr
def predict_house_price(Location, Size, Bedrooms, Bathrooms, YearBuilt, Condition):
  # Create a DataFrame with the input data
    input_data = pd.DataFrame({
        'Location': [Location],
        'Size (sqft)': [Size],
        'Bedrooms': [Bedrooms],
        'Bathrooms': [Bathrooms],
        'Year Built': [YearBuilt],
        'Condition': [Condition]
    })

    # Encode the categorical column
    input_data['Location'] = le.transform(input_data['Location'])
```