Predict house prices using the California Housing Dataset.

1. Load the dataset and describe its features (e.g., MedInc, HouseAge,AveRooms, etc.).

```
# 1. Load the dataset and describe features

from sklearn.datasets import fetch_california_housing
import pandas as pd

housing = fetch_california_housing()
df = pd.DataFrame(housing.data,columns=housing.feature_names)
df['MedHouseVal'] = housing.target

print(df.info())
print(df.describe())
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 20640 entries, 0 to 20639
Data columns (total 9 columns):
 #   Column       Non-Null Count  Dtype  
---  ------       --------------  -----  
 0   MedInc       20640 non-null  float64
 1   HouseAge     20640 non-null  float64
 2   AveRooms     20640 non-null  float64
 3   AveBedrms    20640 non-null  float64
 4   Population   20640 non-null  float64
 5   AveOccup     20640 non-null  float64
 6   Latitude     20640 non-null  float64
 7   Longitude    20640 non-null  float64
 8   MedHouseVal  20640 non-null  float64
dtypes: float64(9)
memory usage: 1.4 MB
None
             MedInc      HouseAge      AveRooms     AveBedrms
Population  \
count  20640.000000  20640.000000  20640.000000  20640.000000
20640.000000
mean       3.870671     28.639486      5.429000      1.096675
1425.476744
std        1.899822     12.585558      2.474173      0.473911
1132.462122
min        0.499900      1.000000      0.846154      0.333333
3.000000
25%        2.563400     18.000000      4.440716      1.006079
787.000000
50%        3.534800     29.000000      5.229129      1.048780
1166.000000
75%        4.743250     37.000000      6.052381      1.099526
```

```
1725.000000
max       15.000100     52.000000    141.909091     34.066667
35682.000000

           AveOccup      Latitude     Longitude   MedHouseVal
count  20640.000000  20640.000000  20640.000000  20640.000000
mean       3.070655     35.631861   -119.569704      2.068558
std       10.386050      2.135952      2.003532      1.153956
min        0.692308     32.540000   -124.350000      0.149990
25%        2.429741     33.930000   -121.800000      1.196000
50%        2.818116     34.260000   -118.490000      1.797000
75%        3.282261     37.710000   -118.010000      2.647250
max     1243.333333     41.950000   -114.310000      5.000010
```

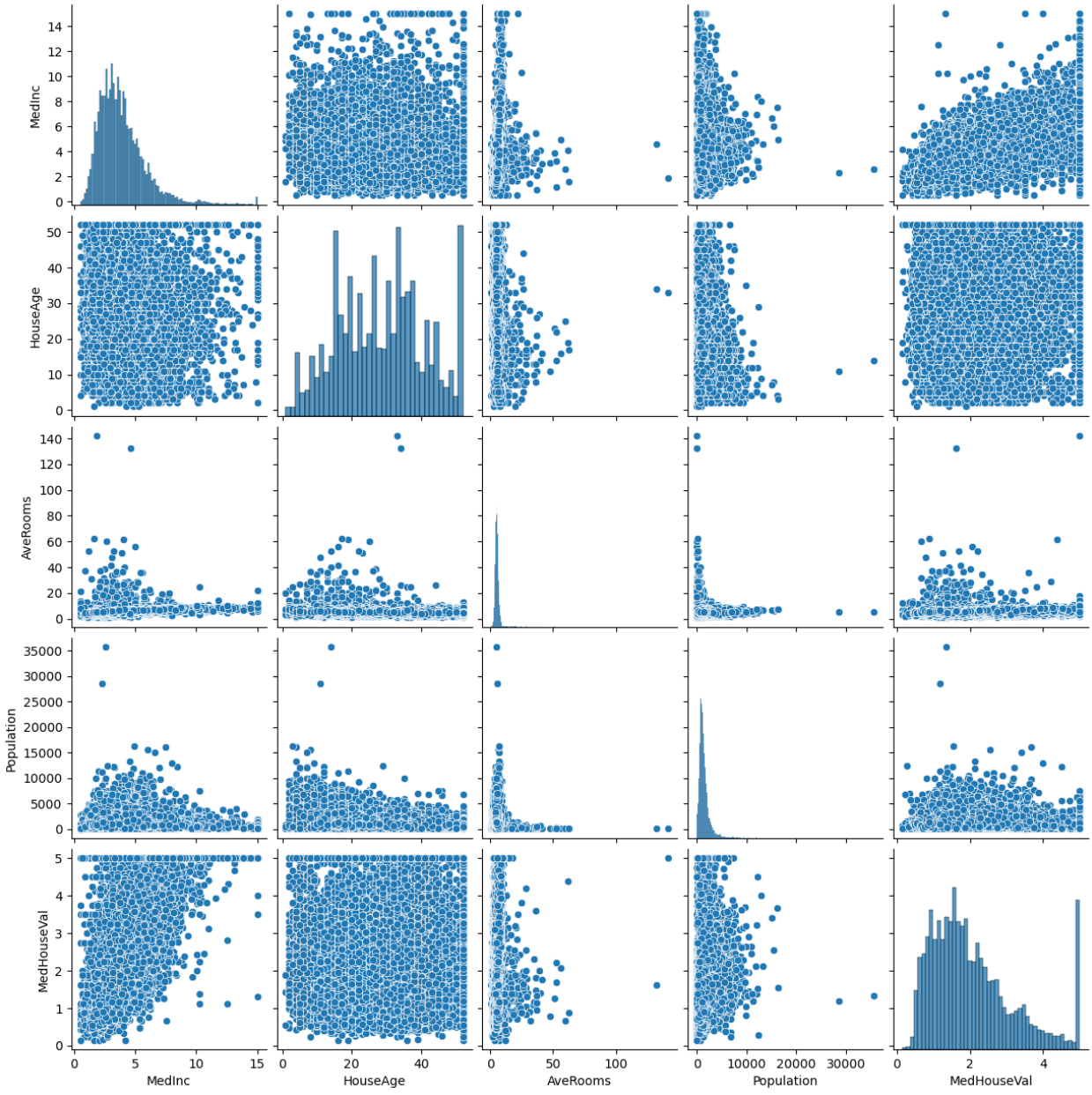
2. Visualize relationships between features and the target variable (MedHouseVal).

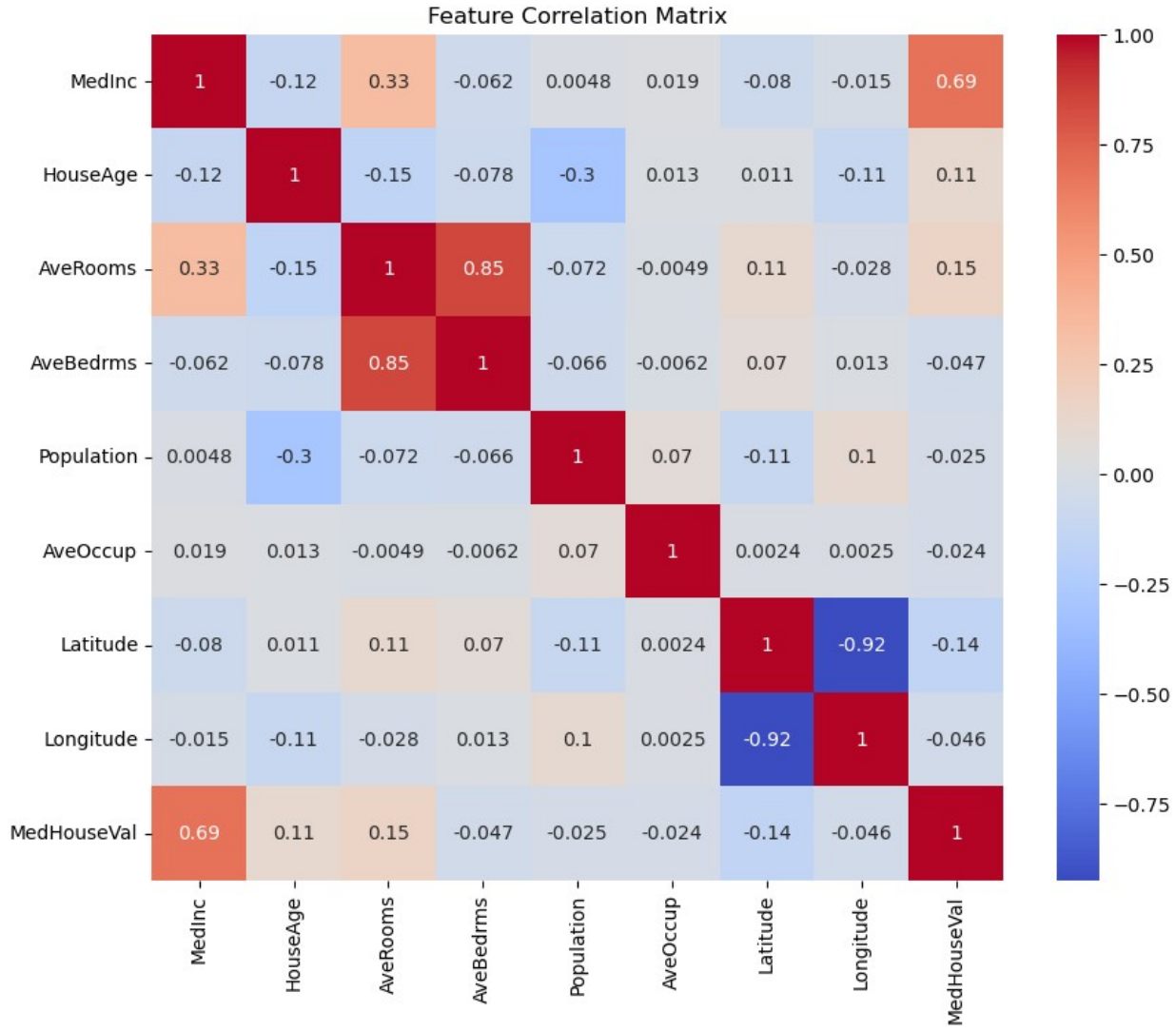
```
# 2. Visualize relationships
import seaborn as sns
import matplotlib.pyplot as plt

# Pairplot (you can comment this if it takes too long)

sns.pairplot(df[['MedInc','HouseAge','AveRooms','Population','MedHouse
Val']])
plt.show()

# Heatmap
plt.figure(figsize=(10,8))
sns.heatmap(df.corr(),annot=True,cmap='coolwarm')
plt.title('Feature Correlation Matrix')
plt.show()
```


MedInc
HouseAge
AveRooms
Population
MedHouseVal
0 5 10 15
0 20 40
0 50 100
0 10000 20000 30000
0 2 4



3. Check and handle missing values

```
# 3. Check and handle missing values
print("\nMissing values in dataset:\n", df.isnull().sum())
```

```
Missing values in dataset:
 MedInc         0
HouseAge        0
AveRooms        0
AveBedrms       0
Population      0
AveOccup        0
Latitude        0
Longitude       0
MedHouseVal     0
dtype: int64
```

4. Split data into training and testing sets

```
from sklearn.model_selection import train_test_split

X = df.drop('MedHouseVal',axis=1)
y = df['MedHouseVal']

X_train,X_test,y_train,y_test = train_test_split(
    X,y,test_size=0.2,random_state=42
)
```

5. Normalize/standardize features if needed.

```
# 5. Normalize/standardize features
from sklearn.preprocessing import StandardScaler

scaler = StandardScaler()
X_train_scaled = scaler.fit_transform(X_train)
X_test_scaled = scaler.transform(X_test)
```

6. Train the model and print the model's coefficients and intercept.

```
from sklearn.linear_model import LinearRegression

model = LinearRegression()
model.fit(X_train_scaled,y_train)

print("Intercept:",model.intercept_)
coeff_df = pd.DataFrame(model.coef_,
X.columns,columns=['Coefficient'])
print(coeff_df)
```

```
Intercept: 2.0719469373788777
            Coefficient
MedInc         0.854383
HouseAge       0.122546
AveRooms      -0.294410
AveBedrms      0.339259
Population    -0.002308
AveOccup      -0.040829
Latitude      -0.896929
Longitude     -0.869842
```

7. Calculate Mean Squared Error (MSE) and R2 Score on the test set.

```
from sklearn.metrics import mean_squared_error,r2_score

y_pred = model.predict(X_test_scaled)
```

```
mse = mean_squared_error(y_test,y_pred)
r2 = r2_score(y_test,y_pred)

print("Mean Sqaured Error (MSE): ",mse)
print("R2 Score:",r2)
```

```
Mean Sqaured Error (MSE):  0.5558915986952442
R2 Score: 0.575787706032451
```