March 13, 2024

[1]:
```
import pandas as pd
file_path = '/content/archive (3).zip'
df = pd.read_csv(file_path)
print("First few rows of the data:")
print(df.head())
print("\nSummary statistics:")
print(df.describe())
print("\nDataFrame info:")
print(df.info())
```

```
First few rows of the data:
   longitude  latitude  housing_median_age  total_rooms  total_bedrooms  \
0    -122.23     37.88                41.0        880.0           129.0
1    -122.22     37.86                21.0       7099.0          1106.0
2    -122.24     37.85                52.0       1467.0           190.0
3    -122.25     37.85                52.0       1274.0           235.0
4    -122.25     37.85                52.0       1627.0           280.0

   population  households  median_income  median_house_value ocean_proximity
0       322.0       126.0         8.3252            452600.0        NEAR BAY
1      2401.0      1138.0         8.3014            358500.0        NEAR BAY
2       496.0       177.0         7.2574            352100.0        NEAR BAY
3       558.0       219.0         5.6431            341300.0        NEAR BAY
4       565.0       259.0         3.8462            342200.0        NEAR BAY

Summary statistics:
          longitude      latitude  housing_median_age   total_rooms  \
count  20640.000000  20640.000000        20640.000000  20640.000000
mean    -119.569704     35.631861           28.639486   2635.763081
std        2.003532      2.135952           12.585558   2181.615252
min     -124.350000     32.540000            1.000000      2.000000
25%     -121.800000     33.930000           18.000000   1447.750000
50%     -118.490000     34.260000           29.000000   2127.000000
75%     -118.010000     37.710000           37.000000   3148.000000
max     -114.310000     41.950000           52.000000  39320.000000

       total_bedrooms    population    households  median_income  \
count    20433.000000  20640.000000  20640.000000   20640.000000
```

```
mean       537.870553   1425.476744    499.539680       3.870671
std        421.385070   1132.462122    382.329753       1.899822
min          1.000000      3.000000      1.000000       0.499900
25%        296.000000    787.000000    280.000000       2.563400
50%        435.000000   1166.000000    409.000000       3.534800
75%        647.000000   1725.000000    605.000000       4.743250
max       6445.000000  35682.000000   6082.000000      15.000100

       median_house_value
count        20640.000000
mean        206855.816909
std         115395.615874
min          14999.000000
25%         119600.000000
50%         179700.000000
75%         264725.000000
max         500001.000000

DataFrame info:
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 20640 entries, 0 to 20639
Data columns (total 10 columns):
 #   Column              Non-Null Count  Dtype
---  ------              --------------  -----
 0   longitude           20640 non-null  float64
 1   latitude            20640 non-null  float64
 2   housing_median_age  20640 non-null  float64
 3   total_rooms         20640 non-null  float64
 4   total_bedrooms      20433 non-null  float64
 5   population          20640 non-null  float64
 6   households          20640 non-null  float64
 7   median_income       20640 non-null  float64
 8   median_house_value  20640 non-null  float64
 9   ocean_proximity     20640 non-null  object
dtypes: float64(9), object(1)
memory usage: 1.6+ MB
None
```

[5]:
```python
import pandas as pd
file_path = '//content/archive (3).zip'
df = pd.read_csv(file_path)
print("Data types of each column:")
print(df.dtypes)
print("\nShape of the DataFrame:")
print(df.shape)
```

```
Data types of each column:
longitude             float64
```

```
latitude              float64
housing_median_age    float64
total_rooms           float64
total_bedrooms        float64
population            float64
households            float64
median_income         float64
median_house_value    float64
ocean_proximity        object
dtype: object

Shape of the DataFrame:
(20640, 10)
```

[6]:
```
import pandas as pd
file_path = '//content/archive (3).zip'
df = pd.read_csv(file_path)
print("Null values in the DataFrame:")
print(df.isnull().sum())
df_filled_zero = df.fillna(0)
df_filled_mean = df.fillna(df.mean())
print("\nDataFrame with null values filled with '0':")
print(df_filled_zero.head())
print("\nDataFrame with null values filled with the mean of each column:")
print(df_filled_mean.head())
```

```
Null values in the DataFrame:
longitude               0
latitude                0
housing_median_age      0
total_rooms             0
total_bedrooms        207
population              0
households              0
median_income           0
median_house_value      0
ocean_proximity         0
dtype: int64

DataFrame with null values filled with '0':
   longitude  latitude  housing_median_age  total_rooms  total_bedrooms  \
0    -122.23     37.88                41.0        880.0           129.0
1    -122.22     37.86                21.0       7099.0          1106.0
2    -122.24     37.85                52.0       1467.0           190.0
3    -122.25     37.85                52.0       1274.0           235.0
4    -122.25     37.85                52.0       1627.0           280.0

   population  households  median_income  median_house_value ocean_proximity
```

```
0       322.0       126.0         8.3252            452600.0        NEAR BAY
1      2401.0      1138.0         8.3014            358500.0        NEAR BAY
2       496.0       177.0         7.2574            352100.0        NEAR BAY
3       558.0       219.0         5.6431            341300.0        NEAR BAY
4       565.0       259.0         3.8462            342200.0        NEAR BAY

DataFrame with null values filled with the mean of each column:
   longitude  latitude  housing_median_age  total_rooms  total_bedrooms  \
0    -122.23     37.88                41.0        880.0           129.0
1    -122.22     37.86                21.0       7099.0          1106.0
2    -122.24     37.85                52.0       1467.0           190.0
3    -122.25     37.85                52.0       1274.0           235.0
4    -122.25     37.85                52.0       1627.0           280.0

   population  households  median_income  median_house_value ocean_proximity
0       322.0       126.0         8.3252            452600.0        NEAR BAY
1      2401.0      1138.0         8.3014            358500.0        NEAR BAY
2       496.0       177.0         7.2574            352100.0        NEAR BAY
3       558.0       219.0         5.6431            341300.0        NEAR BAY
4       565.0       259.0         3.8462            342200.0        NEAR BAY
<ipython-input-6-211ad813ad18>:7: FutureWarning: The default value of
numeric_only in DataFrame.mean is deprecated. In a future version, it will
default to False. In addition, specifying 'numeric_only=None' is deprecated.
Select only valid columns or specify the value of numeric_only to silence this
warning.
  df_filled_mean = df.fillna(df.mean())
```

[7]:
```
df=df.fillna(0)
y=df['median_house_value']
x=df.drop('median_house_value',axis=1)
x1=x.drop('ocean_proximity',axis=1)
print(x1)
```

```
       longitude  latitude  housing_median_age  total_rooms  total_bedrooms  \
0        -122.23     37.88                41.0        880.0           129.0
1        -122.22     37.86                21.0       7099.0          1106.0
2        -122.24     37.85                52.0       1467.0           190.0
3        -122.25     37.85                52.0       1274.0           235.0
4        -122.25     37.85                52.0       1627.0           280.0
...          ...       ...                 ...          ...             ...
20635    -121.09     39.48                25.0       1665.0           374.0
20636    -121.21     39.49                18.0        697.0           150.0
20637    -121.22     39.43                17.0       2254.0           485.0
20638    -121.32     39.43                18.0       1860.0           409.0
20639    -121.24     39.37                16.0       2785.0           616.0

       population  households  median_income
```

```
0           322.0       126.0         8.3252
1          2401.0      1138.0         8.3014
2           496.0       177.0         7.2574
3           558.0       219.0         5.6431
4           565.0       259.0         3.8462
…             …           …             …
20635       845.0       330.0         1.5603
20636       356.0       114.0         2.5568
20637      1007.0       433.0         1.7000
20638       741.0       349.0         1.8672
20639      1387.0       530.0         2.3886

[20640 rows x 8 columns]
```

[8]:
```
print(y)
```

```
0        452600.0
1        358500.0
2        352100.0
3        341300.0
4        342200.0
           …
20635     78100.0
20636     77100.0
20637     92300.0
20638     84700.0
20639     89400.0
Name: median_house_value, Length: 20640, dtype: float64
```

[10]:
```
from sklearn.model_selection import train_test_split
```

[11]:
```
x_train,x_test,y_train,y_test=train_test_split(x1,y,test_size=0.
↪20,random_state=30)
```

[12]:
```
print(x_train)
```

```
       longitude  latitude  housing_median_age  total_rooms  total_bedrooms  \
7186     -118.18     34.03                39.0        609.0           145.0
7686     -118.10     33.93                35.0       1622.0           302.0
6332     -117.95     33.99                24.0       1219.0           177.0
14192    -117.07     32.69                20.0       2192.0           406.0
6611     -118.11     34.18                52.0       3571.0           510.0
…          …         …                    …          …               …
500      -122.27     37.85                52.0       1974.0           426.0
12077    -117.64     33.87                 2.0      17470.0          2727.0
15277    -117.34     33.06                17.0       2718.0           518.0
4517     -118.20     34.04                44.0       1399.0           386.0
5925     -117.80     34.15                14.0       7876.0          1253.0
```

```
       population  households  median_income
7186        690.0       134.0         2.9167
7686        845.0       284.0         4.5769
6332        610.0       185.0         6.7978
14192      1766.0       393.0         4.0921
6611       1434.0       490.0         5.9009
…             …           …              …
500         875.0       363.0         1.5817
12077      5964.0      1985.0         6.2308
15277       815.0       403.0         4.3182
4517       1419.0       373.0         1.8224
5925       3699.0      1162.0         5.5423

[16512 rows x 8 columns]
```

[13]:
```
print(x_test)
```

```
       longitude  latitude  housing_median_age  total_rooms  total_bedrooms  \
19449    -121.03     37.68                20.0       3204.0           625.0
10452    -117.66     33.46                26.0       2073.0           370.0
18982    -122.01     38.26                12.0       4132.0           710.0
8187     -118.11     33.78                16.0       3985.0           567.0
15759    -122.44     37.77                52.0       2994.0           736.0
…            …         …                   …            …               …
12704    -121.41     38.58                18.0       6955.0          1882.0
18742    -122.34     40.57                26.0       2187.0           472.0
19142    -122.69     38.32                15.0       2536.0           414.0
1027     -120.55     38.46                16.0       1443.0           249.0
17830    -121.85     37.41                25.0       1837.0           278.0

       population  households  median_income
19449      2016.0       605.0         2.6567
10452       952.0       340.0         5.0877
18982      2087.0       633.0         4.5987
8187       1327.0       564.0         7.9767
15759      1428.0       700.0         3.0766
…             …           …              …
12704      2803.0      1740.0         3.0890
18742      1339.0       463.0         2.0395
19142      1400.0       426.0         5.6613
1027        435.0       181.0         3.2031
17830      1006.0       271.0         6.6842

[4128 rows x 8 columns]
```

[14]:
```
from sklearn.preprocessing import MinMaxScaler

scaling=MinMaxScaler()
housing_scaled_df=scaling.fit_transform(df[['median_house_value','population']])
housing_normalized_df=pd.
  ↪DataFrame(housing_scaled_df,columns=['median_house_value','population'])
housing_normalized_df.head()
```

[14]:

	median_house_value	population
0	0.902266	0.008941
1	0.708247	0.067210
2	0.695051	0.013818
3	0.672783	0.015555
4	0.674638	0.015752

[15]:
```
import numpy as np
from sklearn.model_selection import train_test_split
from sklearn.linear_model import LinearRegression
from sklearn.metrics import mean_squared_error, mean_absolute_error
import math
lin_reg = LinearRegression()
lin_reg.fit(x_train, y_train)
y_pred = lin_reg.predict(x_test)
mse = mean_squared_error(y_test, y_pred)
mae = mean_absolute_error(y_test, y_pred)
rmse = math.sqrt(mse)
print("Mean Squared Error (MSE):", mse)
print("Mean Absolute Error (MAE):", mae)
print("Root Mean Squared Error (RMSE):", rmse)
```

```
Mean Squared Error (MSE): 5371308873.230868
Mean Absolute Error (MAE): 52486.39360780328
Root Mean Squared Error (RMSE): 73289.2138942073
```

[16]:
```
coefficients = lin_reg.coef_
intercept = lin_reg.intercept_

print("Intercept:", intercept)
print("Coefficient (Weight):", coefficients[0])
```

```
Intercept: -3466246.7043957342
Coefficient (Weight): -41577.30377414892
```

[19]:
```
print(lin_reg.coef_)
```

```
[-4.15773038e+04 -4.18177918e+04  1.14464383e+03 -5.01967848e+00
  4.92067893e+01 -4.44012137e+01  1.16069437e+02  3.89419169e+04]
```

[20]:
```
import numpy as np
from sklearn.model_selection import train_test_split
from sklearn.linear_model import LinearRegression
from sklearn.metrics import mean_squared_error, mean_absolute_error
import math
lin_reg = LinearRegression()
lin_reg.fit(x_train, y_train)
y_pred = lin_reg.predict(x_train)
mse = mean_squared_error(y_train, y_pred)
mae = mean_absolute_error(y_train, y_pred)
rmse = math.sqrt(mse)
print("Mean Squared Error (MSE):", mse)
print("Mean Absolute Error (MAE):", mae)
print("Root Mean Squared Error (RMSE):", rmse)
```

```
Mean Squared Error (MSE): 4743701682.935274
Mean Absolute Error (MAE): 50505.64822763461
Root Mean Squared Error (RMSE): 68874.53580921816
```