nm-ai-ass-3

October 18, 2023

```
[ ]: import numpy as np
     import pandas as pd
     import matplotlib.pyplot as plt
     import matplotlib.animation as animation
     import seaborn as sns
```

```
[ ]: df = pd.read_csv('/content/House Price India.csv')
```

```
[ ]: df.head()
```

```
[ ]:            id   Date  number of bedrooms  number of bathrooms  living area  \
     0  6762810145  42491                   5                 2.50         3650
     1  6762810635  42491                   4                 2.50         2920
     2  6762810998  42491                   5                 2.75         2910
     3  6762812605  42491                   4                 2.50         3310
     4  6762812919  42491                   3                 2.00         2710

        lot area  number of floors  waterfront present  number of views  \
     0      9050               2.0                   0                4
     1      4000               1.5                   0                0
     2      9480               1.5                   0                0
     3     42998               2.0                   0                0
     4      4500               1.5                   0                0

        condition of the house  …  Built Year  Renovation Year  Postal Code  \
     0                       5  …        1921                0       122003
     1                       5  …        1909                0       122004
     2                       3  …        1939                0       122004
     3                       3  …        2001                0       122005
     4                       4  …        1929                0       122006

        Lattitude  Longitude  living_area_renov  lot_area_renov  \
     0    52.8645   -114.557               2880            5400
     1    52.8878   -114.470               2470            4000
     2    52.8852   -114.468               2940            6600
     3    52.9532   -114.321               3350           42847
     4    52.9047   -114.485               2060            4500
```

```
   Number of schools nearby  Distance from the airport    Price
0                         2                         58  2380000
1                         2                         51  1400000
2                         1                         53  1200000
3                         3                         76   838000
4                         1                         51   805000

[5 rows x 23 columns]
```

```
[ ]: df.describe()
```

```
[ ]:                  id  number of bedrooms  number of bathrooms   living area  \
count  1.462000e+04        14620.000000         14620.000000  14620.000000
mean   6.762821e+09            3.379343             2.129583   2098.262996
std    6.237575e+03            0.938719             0.769934    928.275721
min    6.762810e+09            1.000000             0.500000    370.000000
25%    6.762815e+09            3.000000             1.750000   1440.000000
50%    6.762821e+09            3.000000             2.250000   1930.000000
75%    6.762826e+09            4.000000             2.500000   2570.000000
max    6.762832e+09           33.000000             8.000000  13540.000000

           lot area  number of floors  waterfront present  number of views  \
count  1.462000e+04      14620.000000        14620.000000     14620.000000
mean   1.509328e+04          1.502360            0.007661         0.233105
std    3.791962e+04          0.540239            0.087193         0.766259
min    5.200000e+02          1.000000            0.000000         0.000000
25%    5.010750e+03          1.000000            0.000000         0.000000
50%    7.620000e+03          1.500000            0.000000         0.000000
75%    1.080000e+04          2.000000            0.000000         0.000000
max    1.074218e+06          3.500000            1.000000         4.000000

       condition of the house  grade of the house  …    Built Year  \
count            14620.000000        14620.000000  …  14620.000000
mean                 3.430506            7.682421  …   1970.926402
std                  0.664151            1.175033  …     29.493625
min                  1.000000            4.000000  …   1900.000000
25%                  3.000000            7.000000  …   1951.000000
50%                  3.000000            7.000000  …   1975.000000
75%                  4.000000            8.000000  …   1997.000000
max                  5.000000           13.000000  …   2015.000000

       Renovation Year    Postal Code    Lattitude     Longitude  \
count     14620.000000   14620.000000  14620.000000  14620.000000
mean         90.924008  122033.062244     52.792848   -114.404007
std         416.216661      19.082418      0.137522      0.141326
min           0.000000  122003.000000     52.385900   -114.709000
```

```
25%          0.000000  122017.000000     52.707600   -114.519000
50%          0.000000  122032.000000     52.806400   -114.421000
75%          0.000000  122048.000000     52.908900   -114.315000
max       2015.000000  122072.000000     53.007600   -113.505000

       living_area_renov  lot_area_renov  Number of schools nearby  \
count       14620.000000    14620.000000              14620.000000
mean         1996.702257    12753.500068                  2.012244
std           691.093366    26058.414467                  0.817284
min           460.000000      651.000000                  1.000000
25%          1490.000000     5097.750000                  1.000000
50%          1850.000000     7620.000000                  2.000000
75%          2380.000000    10125.000000                  3.000000
max          6110.000000   560617.000000                  3.000000

       Distance from the airport         Price
count               14620.000000  1.462000e+04
mean                   64.950958  5.389322e+05
std                     8.936008  3.675324e+05
min                    50.000000  7.800000e+04
25%                    57.000000  3.200000e+05
50%                    65.000000  4.500000e+05
75%                    73.000000  6.450000e+05
max                    80.000000  7.700000e+06

[8 rows x 22 columns]
```

[ ]:
```
df.shape
```

[ ]:
```
(14620, 23)
```

DATA CLEANING

[ ]:
```
df.dropna(inplace = True)
```

[ ]:
```
print(df.duplicated())
```

```
0        False
1        False
2        False
3        False
4        False
         …
14615    False
14616    False
14617    False
14618    False
14619    False
```

```
Length: 14620, dtype: bool
```

```
[ ]: df.drop_duplicates(inplace = True)
```

```
[ ]: df['Date'] = pd.to_datetime(df['Date'])
```

```
[ ]: df.head()
```

```
[ ]:            id                          Date  number of bedrooms  \
     0  6762810145 1970-01-01 00:00:00.000042491                   5
     1  6762810635 1970-01-01 00:00:00.000042491                   4
     2  6762810998 1970-01-01 00:00:00.000042491                   5
     3  6762812605 1970-01-01 00:00:00.000042491                   4
     4  6762812919 1970-01-01 00:00:00.000042491                   3

        number of bathrooms  living area  lot area  number of floors  \
     0                 2.50         3650      9050               2.0
     1                 2.50         2920      4000               1.5
     2                 2.75         2910      9480               1.5
     3                 2.50         3310     42998               2.0
     4                 2.00         2710      4500               1.5

        waterfront present  number of views  condition of the house  …  \
     0                   0                4                       5  …
     1                   0                0                       5  …
     2                   0                0                       3  …
     3                   0                0                       3  …
     4                   0                0                       4  …

        Built Year  Renovation Year  Postal Code  Lattitude  Longitude  \
     0        1921                0       122003    52.8645   -114.557
     1        1909                0       122004    52.8878   -114.470
     2        1939                0       122004    52.8852   -114.468
     3        2001                0       122005    52.9532   -114.321
     4        1929                0       122006    52.9047   -114.485

        living_area_renov  lot_area_renov  Number of schools nearby  \
     0               2880            5400                         2
     1               2470            4000                         2
     2               2940            6600                         1
     3               3350           42847                         3
     4               2060            4500                         1

        Distance from the airport    Price
     0                         58  2380000
     1                         51  1400000
     2                         53  1200000
```

```
3                         76   838000
4                         51   805000

[5 rows x 23 columns]
```

```
[ ]: df['Date'] = df['Date'].dt.date
```

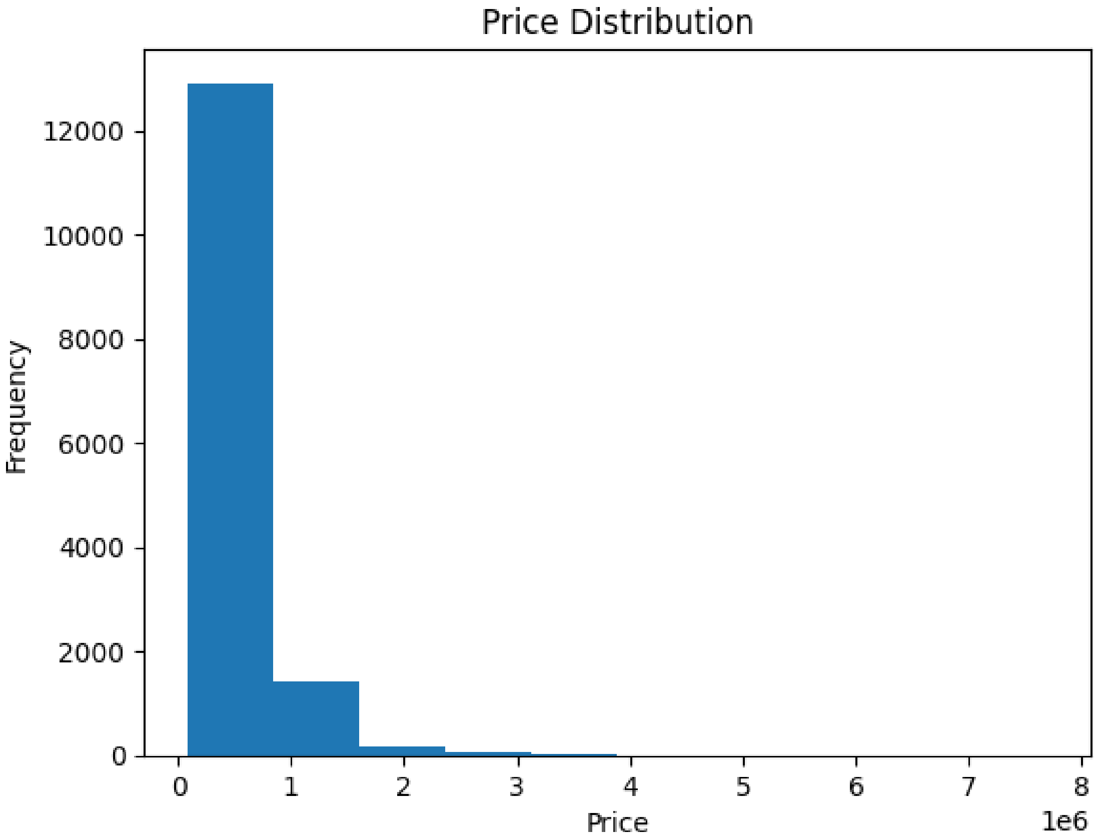
```
[ ]: df.head()
```

```
[ ]:
           id        Date  number of bedrooms  number of bathrooms  \
0  6762810145  1970-01-01                   5                 2.50
1  6762810635  1970-01-01                   4                 2.50
2  6762810998  1970-01-01                   5                 2.75
3  6762812605  1970-01-01                   4                 2.50
4  6762812919  1970-01-01                   3                 2.00

   living area  lot area  number of floors  waterfront present  \
0         3650      9050               2.0                   0
1         2920      4000               1.5                   0
2         2910      9480               1.5                   0
3         3310     42998               2.0                   0
4         2710      4500               1.5                   0

   number of views  condition of the house  …  Built Year  Renovation Year  \
0                4                       5  …        1921                0
1                0                       5  …        1909                0
2                0                       3  …        1939                0
3                0                       3  …        2001                0
4                0                       4  …        1929                0

   Postal Code  Lattitude  Longitude  living_area_renov  lot_area_renov  \
0       122003    52.8645   -114.557               2880            5400
1       122004    52.8878   -114.470               2470            4000
2       122004    52.8852   -114.468               2940            6600
3       122005    52.9532   -114.321               3350           42847
4       122006    52.9047   -114.485               2060            4500

   Number of schools nearby  Distance from the airport    Price
0                         2                         58  2380000
1                         2                         51  1400000
2                         1                         53  1200000
3                         3                         76   838000
4                         1                         51   805000

[5 rows x 23 columns]
```

UNIVARIATE

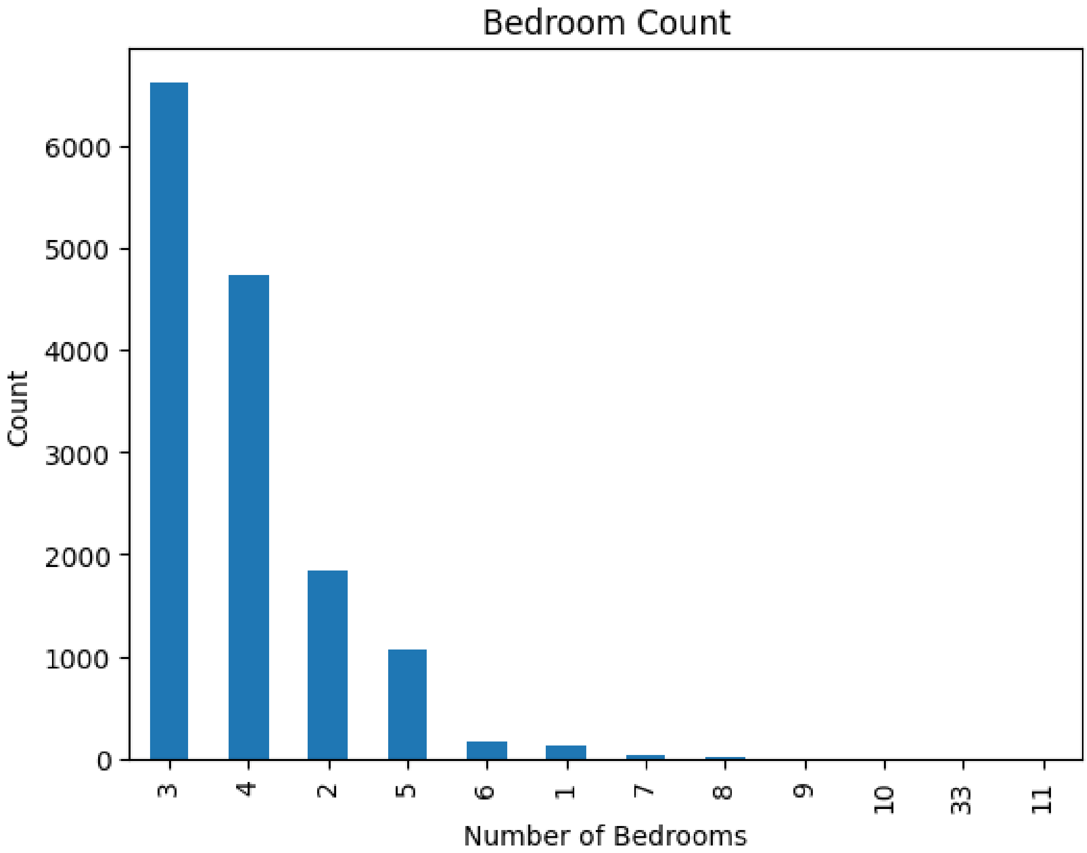
[ ]:

```
df['Price'].plot.hist()
plt.xlabel('Price')
plt.title('Price Distribution')
plt.show()
```



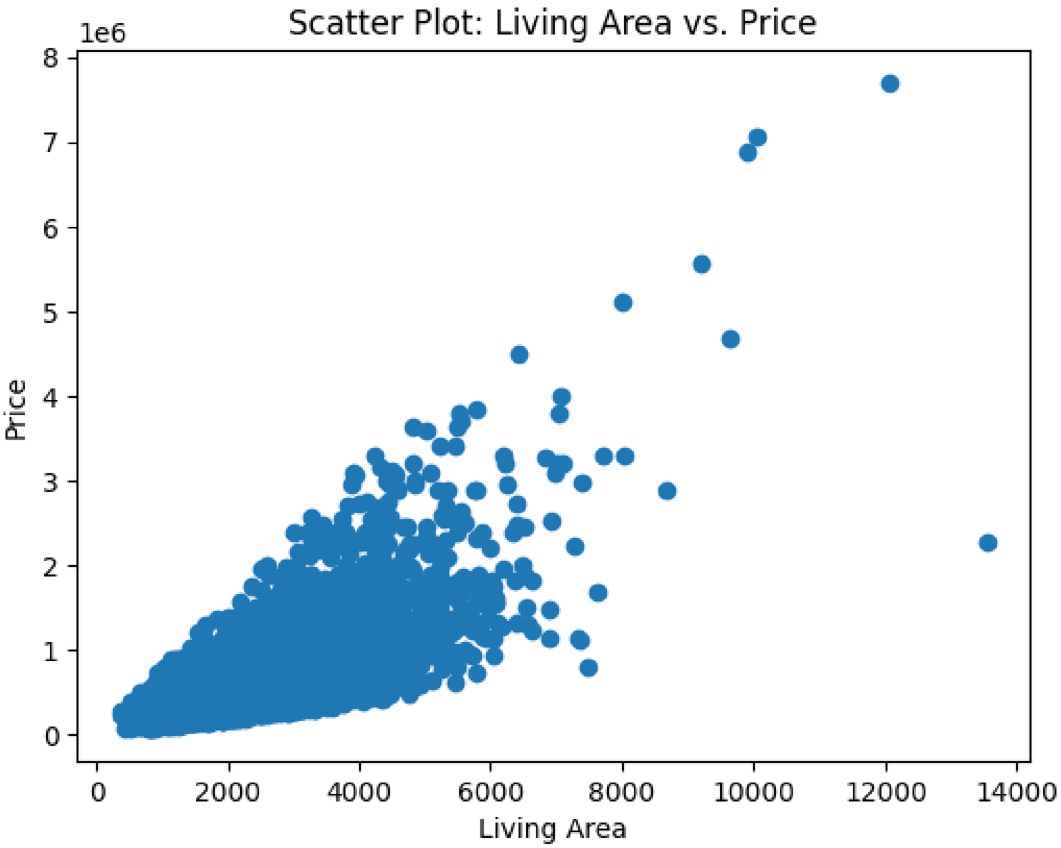
[ ]:

```
df['number of bedrooms'].value_counts().plot(kind='bar')
plt.xlabel('Number of Bedrooms')
plt.ylabel('Count')
plt.title('Bedroom Count')
plt.show()
```

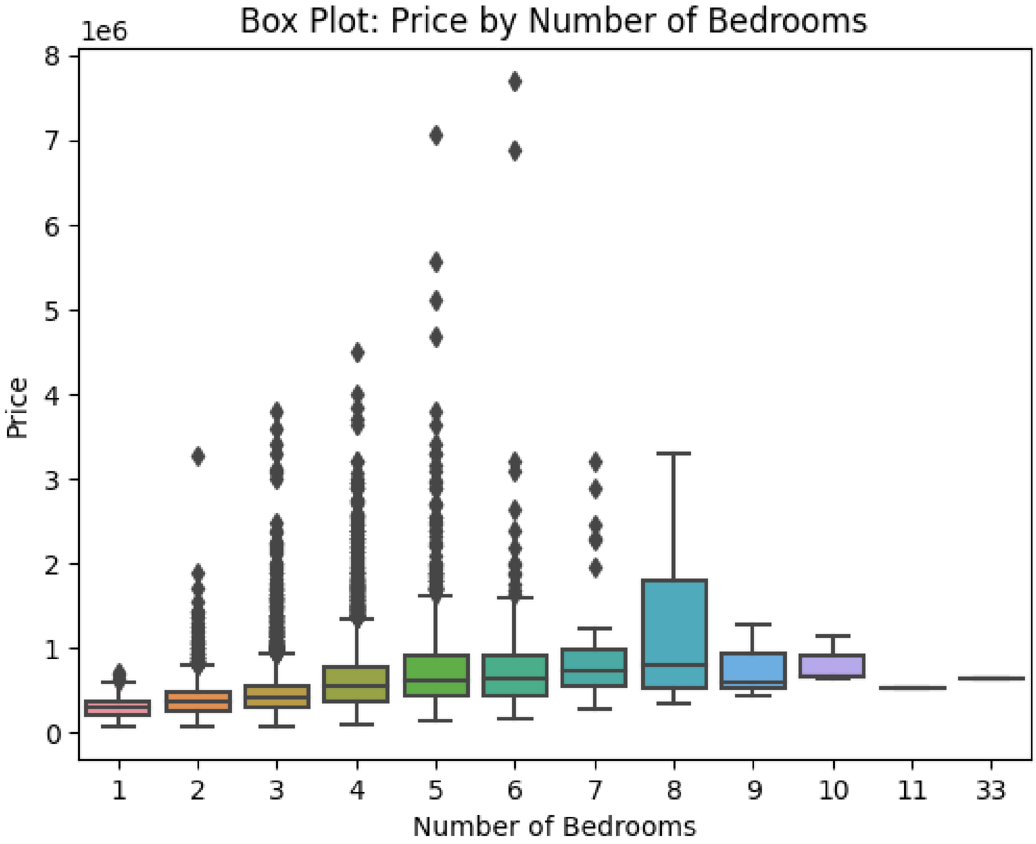


BI-VARIATE

```
[ ]: plt.scatter(df['living area'], df['Price'])
     plt.xlabel('Living Area')
     plt.ylabel('Price')
     plt.title('Scatter Plot: Living Area vs. Price')
     plt.show()
```



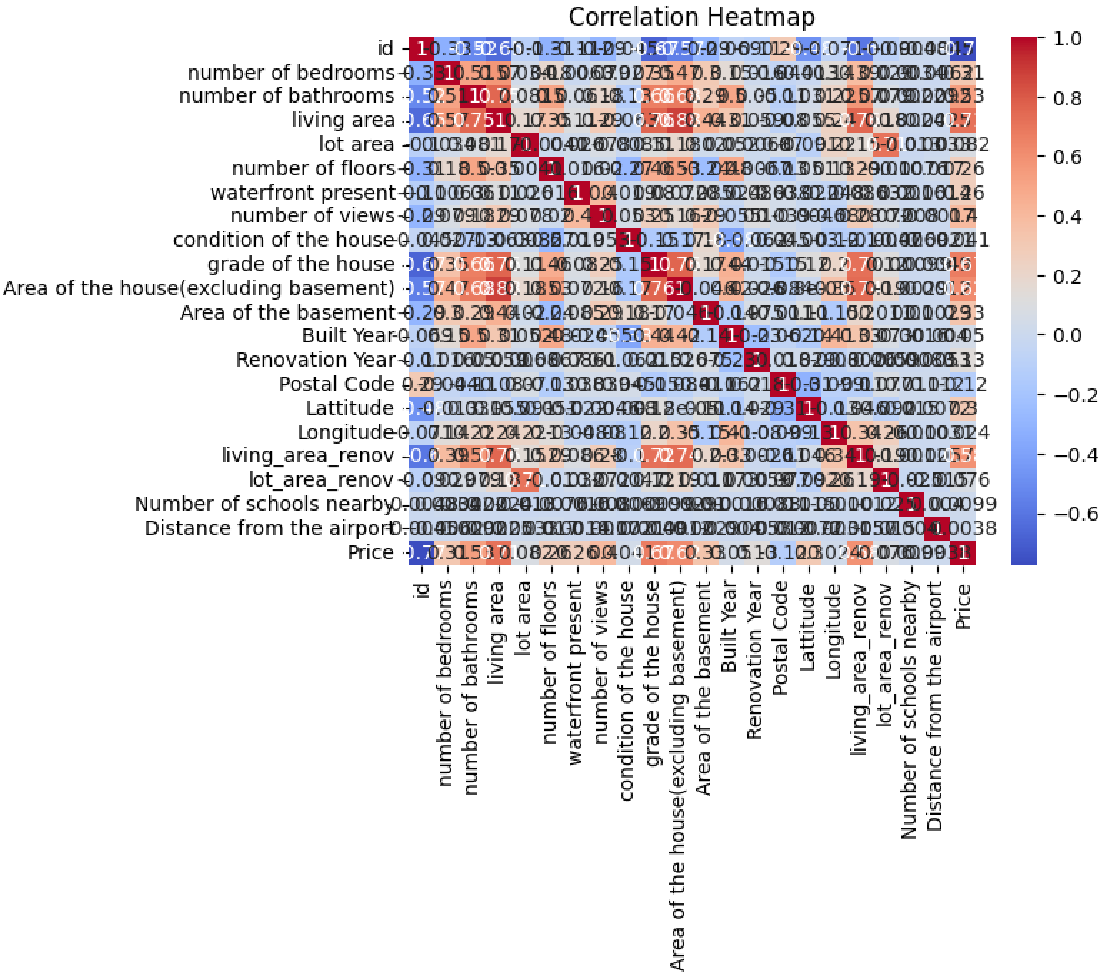
[ ]:
```
sns.boxplot(x='number of bedrooms', y='Price', data=df)
plt.xlabel('Number of Bedrooms')
plt.ylabel('Price')
plt.title('Box Plot: Price by Number of Bedrooms')
plt.show()
```



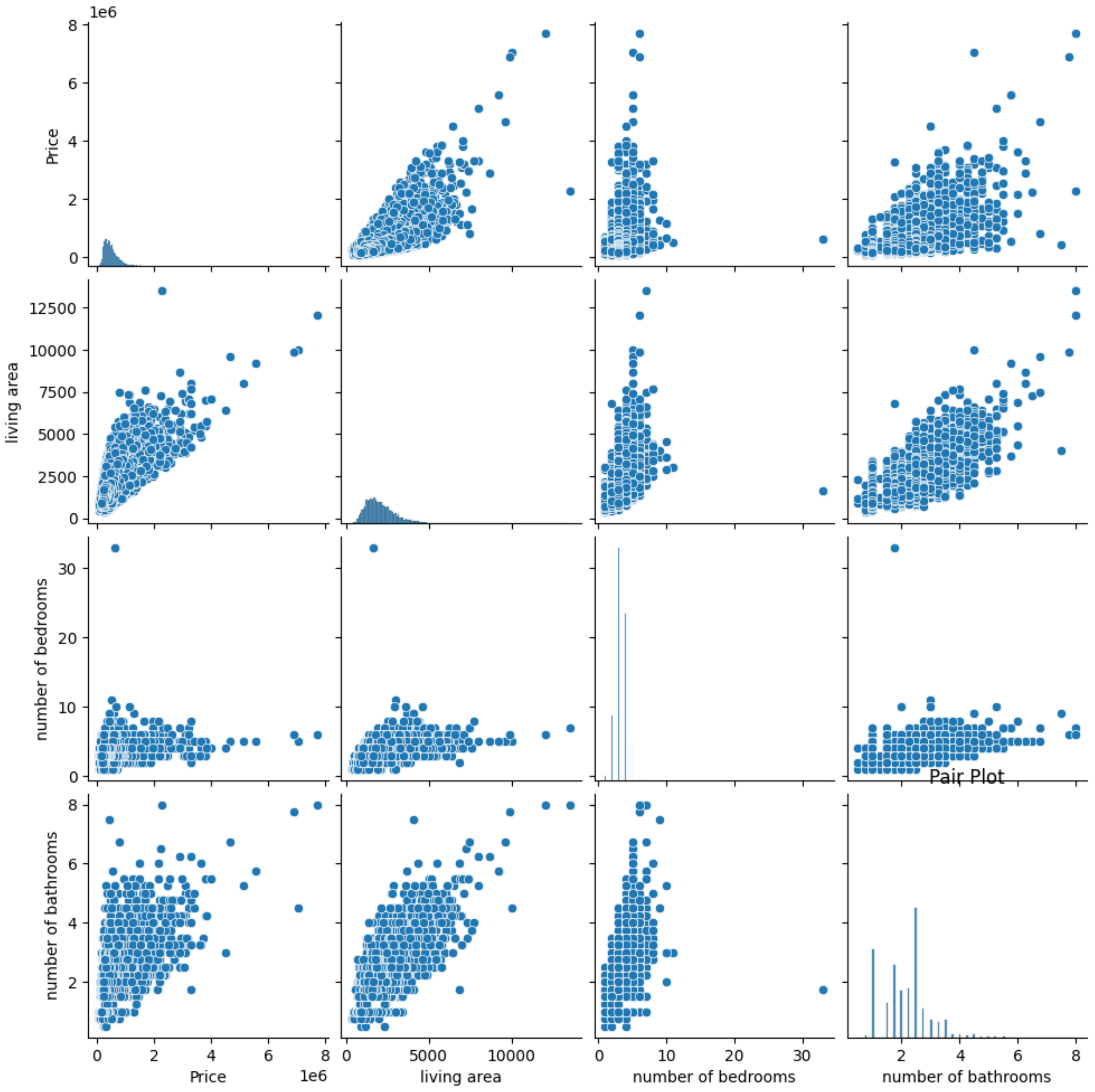
Multivariate

```
[ ]: correlation_matrix = df.corr()
     sns.heatmap(correlation_matrix, annot=True, cmap='coolwarm')
     plt.title('Correlation Heatmap')
     plt.show()
```

```
<ipython-input-40-182fd031f822>:1: FutureWarning: The default value of
numeric_only in DataFrame.corr is deprecated. In a future version, it will
default to False. Select only valid columns or specify the value of numeric_only
to silence this warning.
  correlation_matrix = df.corr()
```



```
[ ]: sns.pairplot(df[['Price', 'living area', 'number of bedrooms', 'number of␣
     ↪bathrooms']])
     plt.title('Pair Plot')
     plt.show()
```



DESCRIPTIVE STATISTICS

```
[ ]: #Basic Summary Statistics for Numerical Columns:
     descriptive_stats = df.describe()
```

```
[ ]: #Count of Non-null Values:
     non_null_counts = df.count()
     non_null_counts
```

```
[ ]: id                                       14620
     Date                                     14620
     number of bedrooms                       14620
     number of bathrooms                      14620
```

```
living area                                 14620
lot area                                    14620
number of floors                            14620
waterfront present                          14620
number of views                             14620
condition of the house                      14620
grade of the house                          14620
Area of the house(excluding basement)       14620
Area of the basement                        14620
Built Year                                  14620
Renovation Year                             14620
Postal Code                                 14620
Lattitude                                   14620
Longitude                                   14620
living_area_renov                           14620
lot_area_renov                              14620
Number of schools nearby                    14620
Distance from the airport                   14620
Price                                       14620
dtype: int64
```

```
[ ]: #Frequency Count for Categorical Columns:
     bedroom_counts = df['number of bedrooms'].value_counts()
     bedroom_counts
```

```
[ ]: 3     6612
     4     4724
     2     1844
     5     1079
     6      176
     1      136
     7       30
     8       11
     9        3
     10       3
     33       1
     11       1
     Name: number of bedrooms, dtype: int64
```

```
[ ]: #Grouping and Aggregating:
     avg_price_by_bedrooms = df.groupby('number of bedrooms')['Price'].mean()
     avg_price_by_bedrooms
```

```
[ ]: number of bedrooms
     1     3.089638e+05
     2     3.985476e+05
     3     4.632776e+05
```

```
4     6.361988e+05
5     7.752550e+05
6     8.375815e+05
7     1.016544e+06
8     1.208455e+06
9     7.766663e+05
10    8.200000e+05
11    5.200000e+05
33    6.400000e+05
Name: Price, dtype: float64
```

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[ ]:
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