```
import pandas as pd
import numpy as np
import matplotlib.pyplot as plt
import seaborn as sns
import warnings
warnings.filterwarnings("ignore")
```

```
house_data = pd.read_csv("bengaluru_house_data.csv")
```

```
house_data.shape
```

```
(13320, 9)
```

```
house_data.columns
```

```
Index(['area_type', 'availability', 'location', 'size', 'society',
       'total_sqft', 'bath', 'balcony', 'price'],
      dtype='object')
```

```
house_data.head()
```

```
              area_type   availability                  location
size  \
0  Super built-up  Area         19-Dec  Electronic City Phase II
2 BHK
1            Plot  Area  Ready To Move          Chikka Tirupathi  4
Bedroom
2        Built-up  Area  Ready To Move               Uttarahalli
3 BHK
3  Super built-up  Area  Ready To Move        Lingadheeranahalli
3 BHK
4  Super built-up  Area  Ready To Move                  Kothanur
2 BHK

   society total_sqft  bath  balcony   price
0  Coomee        1056   2.0      1.0   39.07
1  Theanmp       2600   5.0      3.0  120.00
2      NaN       1440   2.0      3.0   62.00
3  Soiewre       1521   3.0      1.0   95.00
4      NaN       1200   2.0      1.0   51.00
```

```
house_data.tail(20)
```

```
                  area_type   availability                  location
size  \
13300            Plot  Area  Ready To Move         Hosakerehalli  5
Bedroom
13301  Super built-up  Area  Ready To Move              Kothanur
3 BHK
13302  Super built-up  Area  Ready To Move   Annaiah Reddy Layout
2 BHK
13303            Plot  Area  Ready To Move        Vidyaranyapura  5
```

```
Bedroom
13304  Super built-up  Area  Ready To Move  Raja Rajeshwari Nagar
2 BHK
13305          Carpet  Area  Ready To Move               Hulimavu
1 BHK
13306            Plot  Area  Ready To Move  Rajarajeshwari Nagara  4
Bedroom
13307        Built-up  Area  Ready To Move           Billekahalli
3 BHK
13308        Built-up  Area  Ready To Move      Bannerghatta Road
3 BHK
13309  Super built-up  Area  Ready To Move           Yeshwanthpur
3 BHK
13310  Super built-up  Area  Ready To Move           Rachenahalli
2 BHK
13311            Plot  Area  Ready To Move       Ramamurthy Nagar  7
Bedroom
13312  Super built-up  Area  Ready To Move              Bellandur
2 BHK
13313  Super built-up  Area  Ready To Move            Uttarahalli
3 BHK
13314  Super built-up  Area  Ready To Move      Green Glen Layout
3 BHK
13315        Built-up  Area  Ready To Move             Whitefield  5
Bedroom
13316  Super built-up  Area  Ready To Move          Richards Town
4 BHK
13317        Built-up  Area  Ready To Move  Raja Rajeshwari Nagar
2 BHK
13318  Super built-up  Area         18-Jun        Padmanabhanagar
4 BHK
13319  Super built-up  Area  Ready To Move           Doddathoguru
1 BHK

       society total_sqft  bath  balcony   price
13300      NaN       1500   6.0      2.0  145.00
13301      NaN       1454   3.0      3.0   71.50
13302      NaN       1075   2.0      2.0   48.00
13303      NaN        774   5.0      3.0   70.00
13304  GrrvaGr       1187   2.0      2.0   40.14
13305      NaN        500   1.0      3.0  220.00
13306      NaN       1200   5.0      NaN  325.00
13307      NaN       1805   3.0      3.0  134.00
13308  Baanise       1527   3.0      1.0  142.00
13309  IBityin       1675   3.0      NaN   92.13
13310      NaN       1050   2.0      2.0   52.71
13311      NaN       1500   9.0      2.0  250.00
13312      NaN       1262   2.0      2.0   47.00
13313  Aklia R       1345   2.0      1.0   57.00
13314  SoosePr       1715   3.0      3.0  112.00
```

```
13315  ArsiaEx       3453   4.0      0.0  231.00
13316      NaN       3600   5.0      NaN  400.00
13317  Mahla T       1141   2.0      1.0   60.00
13318  SollyCl       4689   4.0      1.0  488.00
13319      NaN        550   1.0      1.0   17.00
```

```
house_data.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 13320 entries, 0 to 13319
Data columns (total 9 columns):
 #   Column        Non-Null Count  Dtype  
---  ------        --------------  -----  
 0   area_type     13320 non-null  object 
 1   availability  13320 non-null  object 
 2   location      13319 non-null  object 
 3   size          13304 non-null  object 
 4   society       7818 non-null   object 
 5   total_sqft    13320 non-null  object 
 6   bath          13247 non-null  float64
 7   balcony       12711 non-null  float64
 8   price         13320 non-null  float64
dtypes: float64(3), object(6)
memory usage: 936.7+ KB
```

```
house_data.describe()
```

```
               bath       balcony         price
count  13247.000000  12711.000000  13320.000000
mean       2.692610      1.584376    112.565627
std        1.341458      0.817263    148.971674
min        1.000000      0.000000      8.000000
25%        2.000000      1.000000     50.000000
50%        2.000000      2.000000     72.000000
75%        3.000000      2.000000    120.000000
max       40.000000      3.000000   3600.000000
```

```
house_data.isnull().sum()
```

```
area_type          0
availability       0
location           1
size              16
society         5502
total_sqft         0
bath              73
balcony          609
price              0
dtype: int64
```

```
house_data=house_data.drop(['area_type','availability','balcony',
                            'society'],axis=1)
```

```
house_data.head()
```

```
                   location       size total_sqft  bath   price
0  Electronic City Phase II      2 BHK       1056   2.0   39.07
1          Chikka Tirupathi  4 Bedroom       2600   5.0  120.00
2               Uttarahalli      3 BHK       1440   2.0   62.00
3        Lingadheeranahalli      3 BHK       1521   3.0   95.00
4                  Kothanur      2 BHK       1200   2.0   51.00
```

```
house_data.isnull().sum()
```

```
location       1
size          16
total_sqft     0
bath          73
price          0
dtype: int64
```

```
house_data = house_data.dropna()
```

```
house_data.shape
```

```
(13246, 5)
```

```
house_data['BHK']=house_data['size'].apply(lambda x: int(x.split(' ')
[0]))
```

```
house_data.head()
```

```
                   location       size total_sqft  bath   price  BHK
0  Electronic City Phase II      2 BHK       1056   2.0   39.07    2
1          Chikka Tirupathi  4 Bedroom       2600   5.0  120.00    4
2               Uttarahalli      3 BHK       1440   2.0   62.00    3
3        Lingadheeranahalli      3 BHK       1521   3.0   95.00    3
4                  Kothanur      2 BHK       1200   2.0   51.00    2
```

```
house_data['BHK'].unique()
```

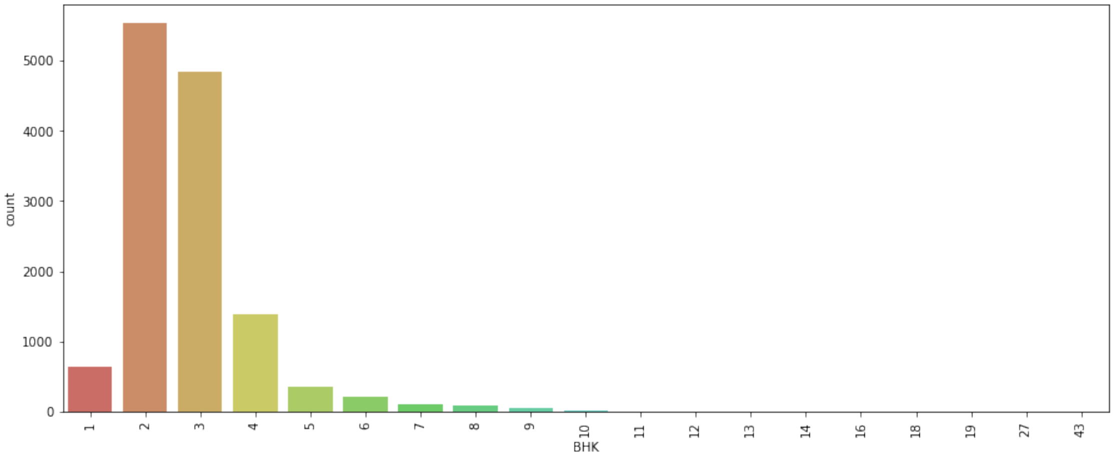
```
array([ 2,  4,  3,  6,  1,  8,  7,  5, 11,  9, 27, 10, 19, 16, 43, 14,
12,
       13, 18], dtype=int64)
```

```
house_data['BHK'].value_counts()
```

```
2     5527
3     4832
4     1395
1      649
5      353
6      221
7      100
8       89
9       54
```

```
10      14
11       4
27       1
19       1
16       1
43       1
14       1
12       1
13       1
18       1
Name: BHK, dtype: int64
```

```
plt.figure(figsize=(15,6))
sns.countplot('BHK', data = house_data, palette='hls')
plt.xticks(rotation = 90)
plt.show()
```



```
house_data['bath'].unique()
```

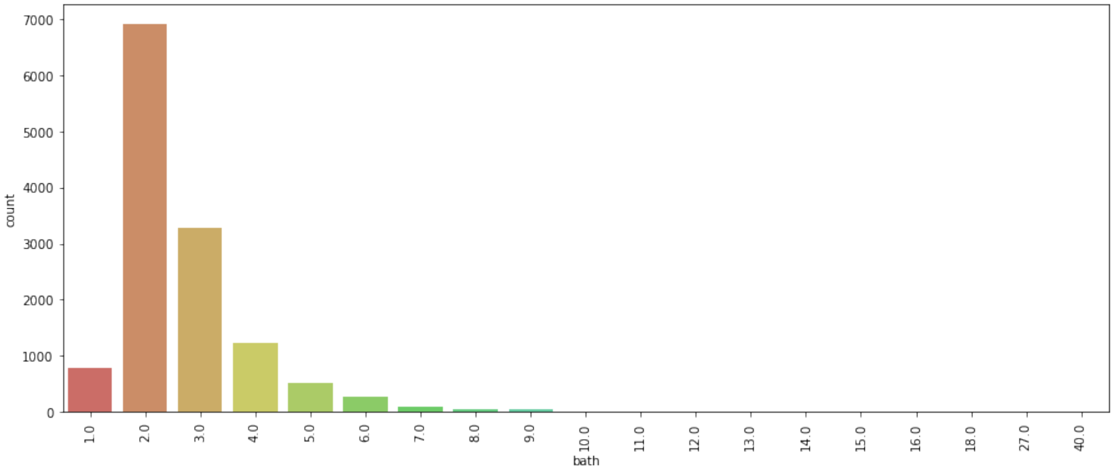
```
array([ 2.,  5.,  3.,  4.,  6.,  1.,  9.,  8.,  7., 11., 10., 14.,
27.,
       12., 16., 40., 15., 13., 18.])
```

```
house_data['bath'].value_counts()
```

```
2.0     6908
3.0     3285
4.0     1226
1.0      788
5.0      524
6.0      273
7.0      102
8.0       64
9.0       43
10.0      13
12.0       7
13.0       3
```

```
11.0       3
16.0       2
27.0       1
40.0       1
15.0       1
14.0       1
18.0       1
Name: bath, dtype: int64
```

```
plt.figure(figsize=(15,6))
sns.countplot('bath', data = house_data, palette='hls')
plt.xticks(rotation = 90)
plt.show()
```



```
house_data[house_data.BHK>15]
```

```
                            location        size total_sqft  bath
price  BHK
1718       2Electronic City Phase II      27 BHK       8000  27.0
230.0   27
3379                  1Hanuman Nagar      19 BHK       2000  16.0
490.0   19
3609   Koramangala Industrial Layout      16 BHK      10000  16.0
550.0   16
4684                     Munnekollal  43 Bedroom       2400  40.0
660.0   43
11559                  1Kasavanhalli  18 Bedroom       1200  18.0
200.0   18
```

```
def isfloat(x):
    try:
        float(x)
    except:
        return False
    return True
```

```
house_data[~ house_data['total_sqft'].apply(isfloat)]
```

```
                 location   size   total_sqft  bath    price  BHK
30              Yelahanka  4 BHK  2100 - 2850   4.0  186.000    4
122                Hebbal  4 BHK  3067 - 8156   4.0  477.000    4
137    8th Phase JP Nagar  2 BHK  1042 - 1105   2.0   54.005    2
165              Sarjapur  2 BHK  1145 - 1340   2.0   43.490    2
188             KR Puram  2 BHK  1015 - 1540   2.0   56.800    2
...                   ...    ...          ...   ...      ...  ...
12975          Whitefield  2 BHK   850 - 1060   2.0   38.190    2
12990      Talaghattapura  3 BHK  1804 - 2273   3.0  122.000    3
13059              Harlur  2 BHK  1200 - 1470   2.0   72.760    2
13265               Hoodi  2 BHK  1133 - 1384   2.0   59.135    2
13299          Whitefield  4 BHK  2830 - 2882   5.0  154.500    4

[190 rows x 6 columns]
```

```
house_data.head()
```

```
                   location       size total_sqft  bath   price  BHK
0  Electronic City Phase II      2 BHK       1056   2.0   39.07    2
1          Chikka Tirupathi  4 Bedroom       2600   5.0  120.00    4
2               Uttarahalli      3 BHK       1440   2.0   62.00    3
3        Lingadheeranahalli      3 BHK       1521   3.0   95.00    3
4                  Kothanur      2 BHK       1200   2.0   51.00    2
```

```
def convert_sqft_tonum(x):
    token=x.split('-')
    if len(token)==2:
        return (float(token[0])+float(token[1]))/2
    try:
        return float(x)
    except:
        return None
```

```
house_data=house_data.copy()
house_data['total_sqft']=house_data['total_sqft'].apply(convert_sqft_tonum)
```

```
house_data.head()
```

```
                   location       size  total_sqft  bath   price  BHK
0  Electronic City Phase II      2 BHK      1056.0   2.0   39.07    2
1          Chikka Tirupathi  4 Bedroom      2600.0   5.0  120.00    4
2               Uttarahalli      3 BHK      1440.0   2.0   62.00    3
3        Lingadheeranahalli      3 BHK      1521.0   3.0   95.00    3
4                  Kothanur      2 BHK      1200.0   2.0   51.00    2
```

```
house_data.loc[20]
```

```
location      Kengeri
size            1 BHK
total_sqft      600.0
bath              1.0
```

```
price            15.0
BHK                 1
Name: 20, dtype: object
```

```
data1=house_data.copy()
data1['price_per_sqft']=data1['price']*1000000/data1['total_sqft']
data1.head()
```

```
                   location       size  total_sqft  bath   price  BHK
\
0  Electronic City Phase II      2 BHK      1056.0   2.0   39.07    2

1          Chikka Tirupathi  4 Bedroom      2600.0   5.0  120.00    4

2               Uttarahalli      3 BHK      1440.0   2.0   62.00    3

3        Lingadheeranahalli      3 BHK      1521.0   3.0   95.00    3

4                  Kothanur      2 BHK      1200.0   2.0   51.00    2


   price_per_sqft
0    36998.106061
1    46153.846154
2    43055.555556
3    62458.908613
4    42500.000000
```

```
len(data1.location.unique())
```

```
1304
```

```
data1.location=data1.location.apply(lambda x: x.strip())
location_stats=data1.groupby('location')
['location'].agg('count').sort_values(ascending=False)
location_stats
```

```
location
Whitefield               535
Sarjapur  Road           392
Electronic City          304
Kanakpura Road           266
Thanisandra              236
                        ... 
1 Giri Nagar               1
Kanakapura Road,           1
Kanakapura main  Road      1
Karnataka Shabarimala      1
whitefiled                 1
Name: location, Length: 1293, dtype: int64
```

```
len(location_stats[location_stats<=10])
```

```
1052
```

```
locationlessthan10=location_stats[location_stats<=10]
locationlessthan10
```

```
location
Basapura                 10
1st Block Koramangala    10
Gunjur Palya             10
Kalkere                  10
Sector 1 HSR Layout      10
                         ..
1 Giri Nagar              1
Kanakapura Road,          1
Kanakapura main  Road     1
Karnataka Shabarimala     1
whitefiled                1
Name: location, Length: 1052, dtype: int64
```

```
len(data1.location.unique())
```

```
1293
```

```
data1.location=data1.location.apply(lambda x: 'other' if x in
locationlessthan10 else x)
len(data1.location.unique())
```

```
242
```

```
data1.head()
```

```
                  location       size  total_sqft  bath   price  BHK
\
0  Electronic City Phase II      2 BHK      1056.0   2.0   39.07    2

1         Chikka Tirupathi  4 Bedroom      2600.0   5.0  120.00    4

2              Uttarahalli      3 BHK      1440.0   2.0   62.00    3

3       Lingadheeranahalli      3 BHK      1521.0   3.0   95.00    3

4                 Kothanur      2 BHK      1200.0   2.0   51.00    2


   price_per_sqft
0    36998.106061
1    46153.846154
2    43055.555556
3    62458.908613
4    42500.000000
```

```
data1[data1.total_sqft/data1.BHK<300].head()
```

```
               location       size  total_sqft  bath  price  BHK  \
9                 other  6 Bedroom      1020.0   6.0  370.0    6   
45           HSR Layout  8 Bedroom       600.0   9.0  200.0    8   
58        Murugeshpalya  6 Bedroom      1407.0   4.0  150.0    6   
68  Devarachikkanahalli  8 Bedroom      1350.0   7.0   85.0    8   
70                other  3 Bedroom       500.0   3.0  100.0    3   

    price_per_sqft  
9    362745.098039  
45   333333.333333  
58   106609.808102  
68    62962.962963  
70   200000.000000  
```

```
data2=data1[~(data1.total_sqft/data1.BHK<300)]
data2.head()
```

```
                   location       size  total_sqft  bath   price  BHK  
\
0  Electronic City Phase II      2 BHK      1056.0   2.0   39.07    2   

1          Chikka Tirupathi  4 Bedroom      2600.0   5.0  120.00    4   

2               Uttarahalli      3 BHK      1440.0   2.0   62.00    3   

3        Lingadheeranahalli      3 BHK      1521.0   3.0   95.00    3   

4                  Kothanur      2 BHK      1200.0   2.0   51.00    2   



   price_per_sqft  
0    36998.106061  
1    46153.846154  
2    43055.555556  
3    62458.908613  
4    42500.000000  
```

```
data2.shape
```

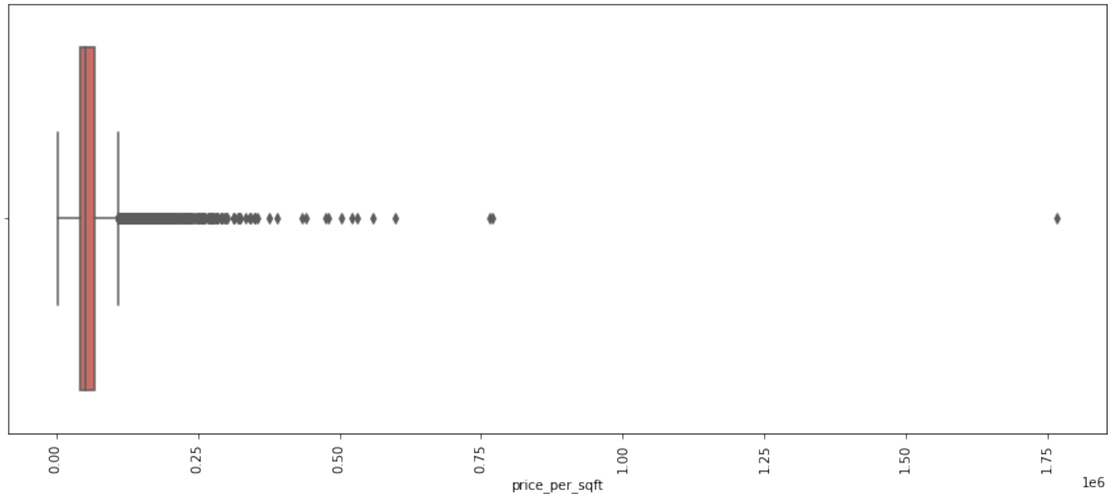
```
(12502, 7)
```

```
data2["price_per_sqft"].describe().apply(lambda x:format(x,'f'))
```

```
count      12456.000000
mean       63085.028260
std        41681.273385
min         2678.298133
25%        42105.263158
50%        52941.176471
```

```
75%        69166.666667
max      1764705.882353
Name: price_per_sqft, dtype: object
```

```
plt.figure(figsize=(15,6))
sns.boxplot('price_per_sqft', data = data2, palette='hls')
plt.xticks(rotation = 90)
plt.show()
```

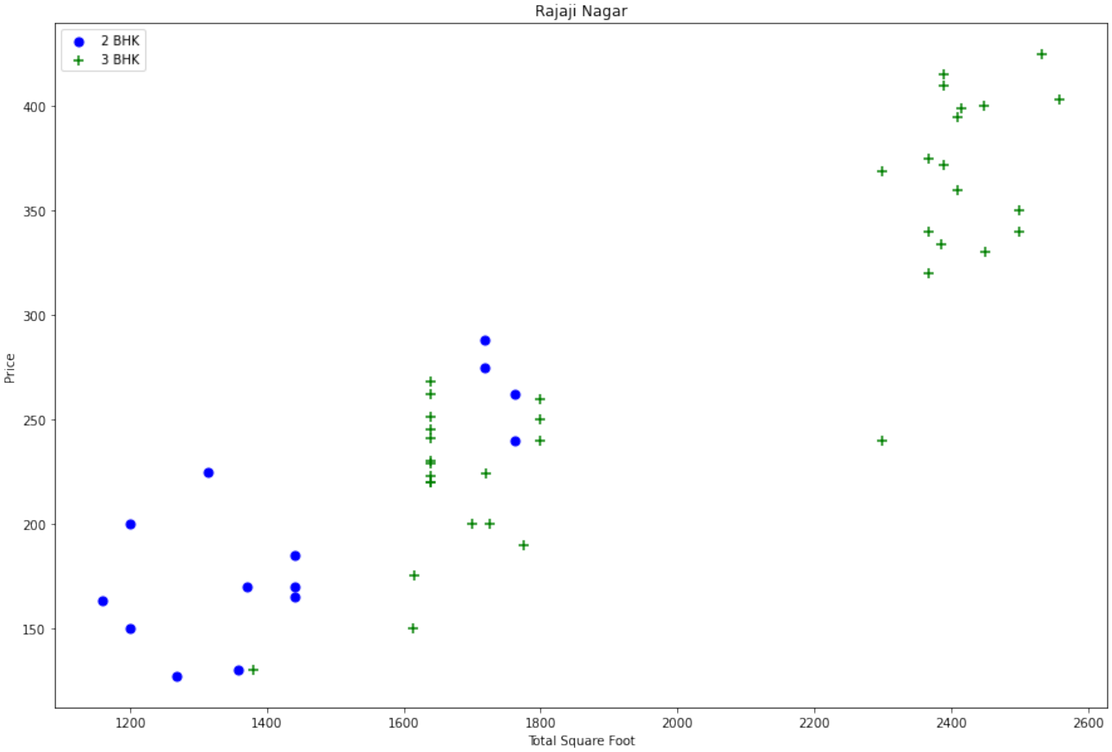


```
def remove_pps_outliers(df):
    df_out=pd.DataFrame()
    for key,subdf in df.groupby('location'):
        m=np.mean(subdf.price_per_sqft)
        st=np.std(subdf.price_per_sqft)
        reduced_df=subdf[(subdf.price_per_sqft>(m-st))&
(subdf.price_per_sqft<(m+st))]
        df_out=pd.concat([df_out,reduced_df],ignore_index=True)
    return df_out
data3=remove_pps_outliers(data2)
data3.shape
```

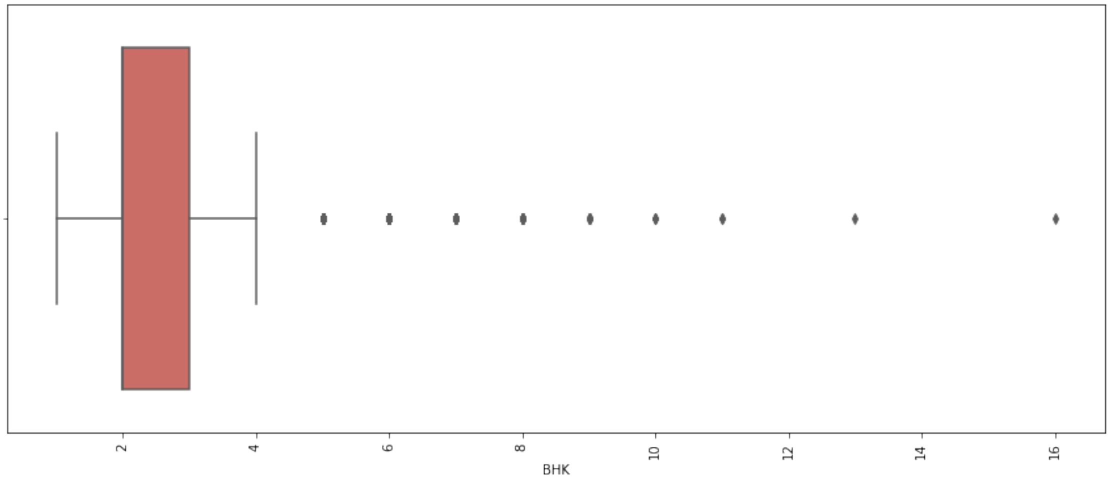
```
(10241, 7)
```

```
import matplotlib.pyplot as plt
def plot_scatter_chart(df,location):
    bhk2=df[(df.location==location)&(df.BHK==2)]
    bhk3=df[(df.location==location)&(df.BHK==3)]
    plt.rcParams['figure.figsize']=(15,10)
    plt.scatter(bhk2.total_sqft,bhk2.price,color='Blue',label='2
BHK',s=50)

plt.scatter(bhk3.total_sqft,bhk3.price,color='green',marker='+',label=
'3 BHK',s=50)
    plt.xlabel('Total Square Foot')
    plt.ylabel('Price')
    plt.title(location)
    plt.legend()
plot_scatter_chart(data3,"Rajaji Nagar")
```



```
plt.figure(figsize=(15,6))
sns.boxplot('BHK', data = data3, palette='hls')
plt.xticks(rotation = 90)
plt.show()
```



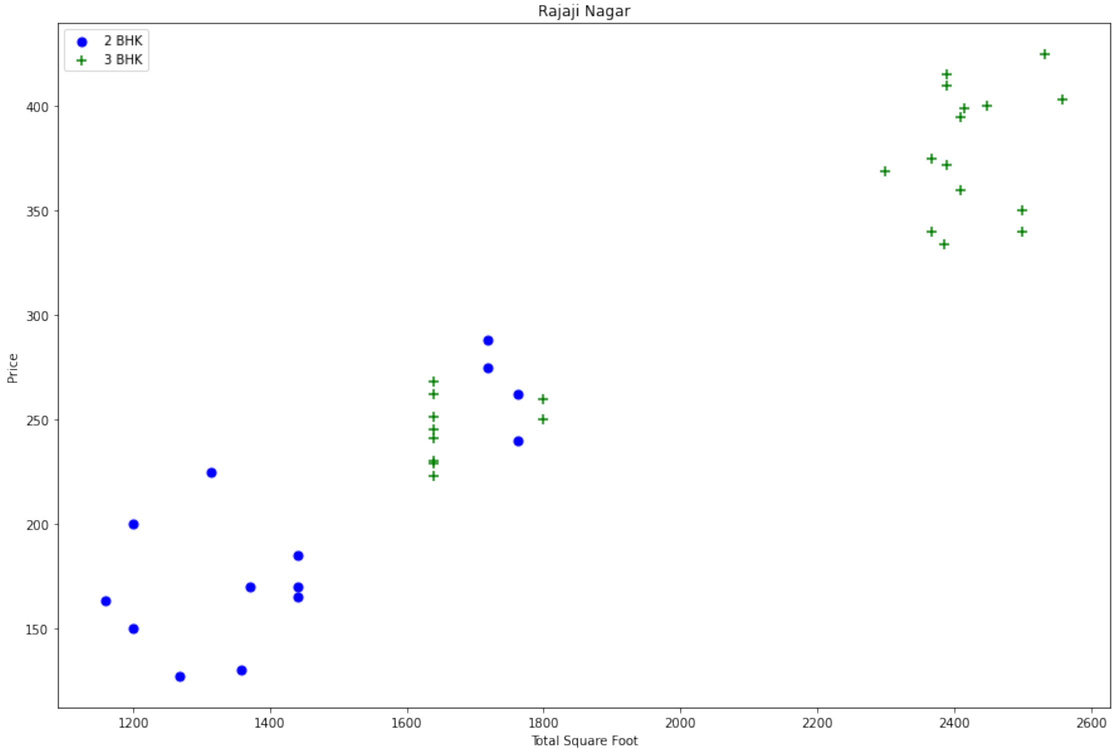
```
def remove_bhk_outliers(df):
    exclude_indices=np.array([])
    for location, location_df in df.groupby('location'):
        bhk_sats={}
        for BHK,BHK_df in location_df.groupby('BHK'):
            bhk_sats[BHK]={
                'mean':np.mean(BHK_df.price_per_sqft),
                'std':np.std(BHK_df.price_per_sqft),
                'count':BHK_df.shape[0]
            }
        for BHK,BHK_df in location_df.groupby('BHK'):
            stats=bhk_sats.get(BHK-1)
            if stats and stats['count']>5:

exclude_indices=np.append(exclude_indices,BHK_df[BHK_df.price_per_sqft
<(stats['mean'])].index.values)
    return df.drop(exclude_indices,axis='index')
```

```
data4=remove_bhk_outliers(data3)
data4.shape
```

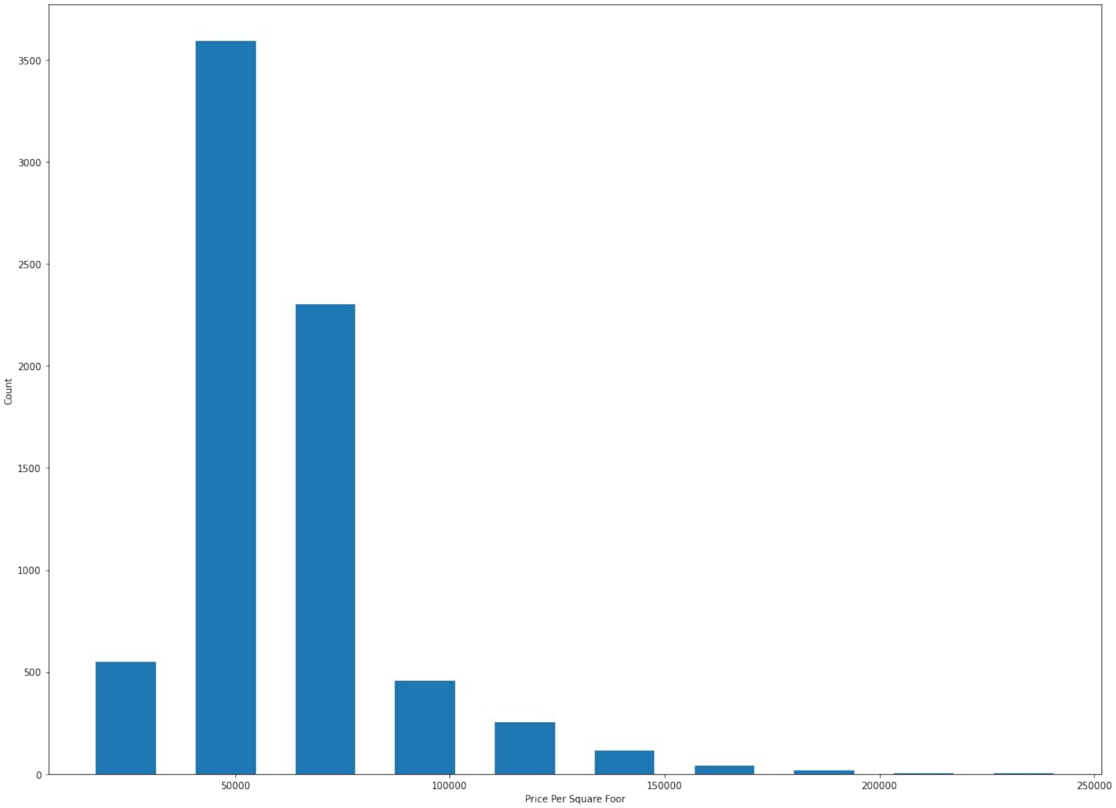
```
(7329, 7)
```

```
plot_scatter_chart(data4,"Rajaji Nagar")
```



```
plt.rcParams['figure.figsize']=(20,15)
plt.hist(data4.price_per_sqft,rwidth=0.6)
plt.xlabel("Price Per Square Foor")
plt.ylabel("Count")
```

```
Text(0, 0.5, 'Count')
```



```
data4.bath.unique()
```

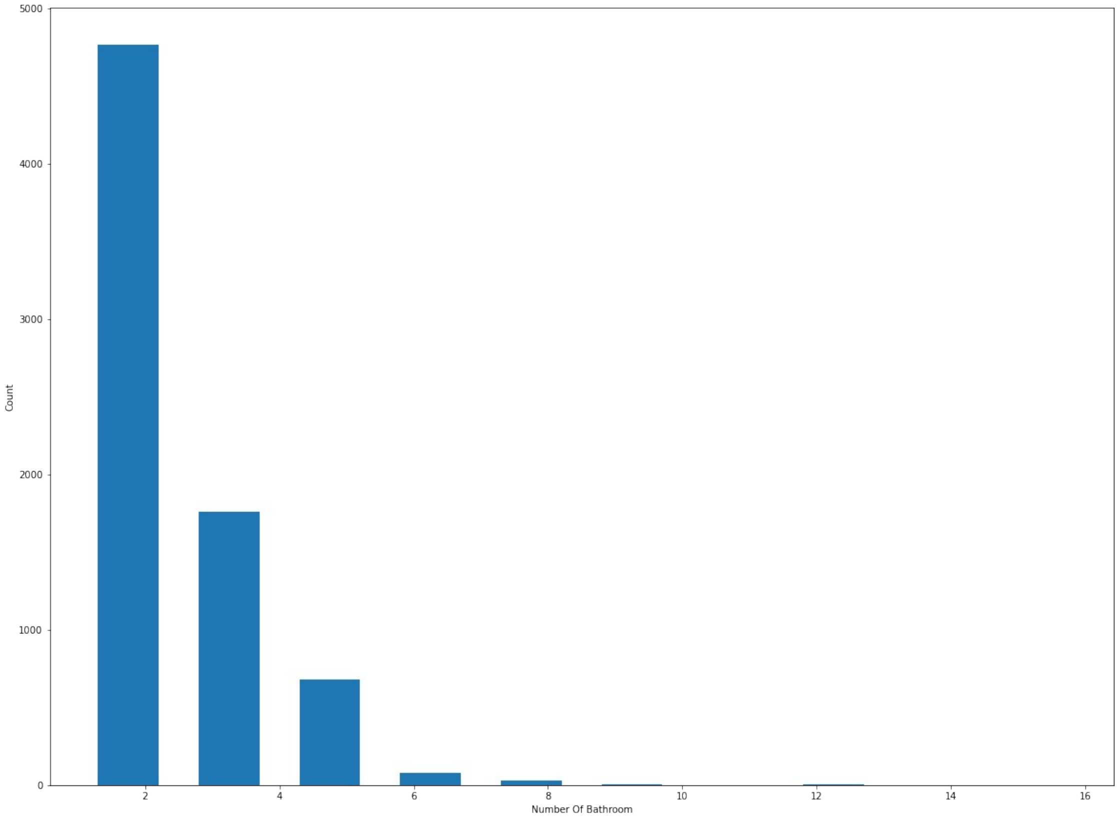
```
array([ 4.,  3.,  2.,  5.,  8.,  1.,  6.,  7.,  9., 12., 16., 13.])
```

```
data4[data4.bath>10]
```

```
            location    size  total_sqft  bath  price  BHK
price_per_sqft
5277  Neeladri Nagar  10 BHK      4000.0  12.0  160.0   10
40000.00000
8486           other  10 BHK     12000.0  12.0  525.0   10
43750.00000
8575           other  16 BHK     10000.0  16.0  550.0   16
55000.00000
9308           other  11 BHK      6000.0  12.0  150.0   11
25000.00000
9639           other  13 BHK      5425.0  13.0  275.0   13
50691.24424
```

```
plt.rcParams['figure.figsize']=(20,15)
plt.hist(data4.bath,rwidth=0.6)
plt.xlabel("Number Of Bathroom")
plt.ylabel("Count")
```

```
Text(0, 0.5, 'Count')
```



```
data4[data4.bath>data4.BHK+2]
```

```
           location       size  total_sqft  bath   price  BHK  
price_per_sqft
1626  Chikkabanavar  4 Bedroom      2460.0   7.0    80.0    4  
32520.325203
5238     Nagasandra  4 Bedroom      7000.0   8.0   450.0    4  
64285.714286
6711    Thanisandra      3 BHK      1806.0   6.0   116.0    3  
64230.343300
8411          other      6 BHK     11338.0   9.0  1000.0    6  
88198.976892
```

```
data5=data4[data4.bath<data4.BHK+2]
data5.shape
```

```
(7251, 7)
```

```
data6=data5.drop(['size','price_per_sqft'],axis='columns')
data6
```

```
                  location  total_sqft  bath  price  BHK
0      1st Block Jayanagar      2850.0   4.0  428.0    4
1      1st Block Jayanagar      1630.0   3.0  194.0    3
2      1st Block Jayanagar      1875.0   2.0  235.0    3
3      1st Block Jayanagar      1200.0   2.0  130.0    3
```

```
4      1st Block Jayanagar      1235.0   2.0  148.0    2
...                    ...         ...   ...    ...  ...
10232                other      1200.0   2.0   70.0    2
10233                other      1800.0   1.0  200.0    1
10236                other      1353.0   2.0  110.0    2
10237                other       812.0   1.0   26.0    1
10240                other      3600.0   5.0  400.0    4

[7251 rows x 5 columns]
```

```
dummies=pd.get_dummies(data6.location)
dummies.head(10)
```

```
    1st Block Jayanagar  1st Phase JP Nagar  2nd Phase Judicial Layout
\
0                     1                   0                          0

1                     1                   0                          0

2                     1                   0                          0

3                     1                   0                          0

4                     1                   0                          0

5                     1                   0                          0

6                     1                   0                          0

8                     0                   1                          0

9                     0                   1                          0

10                    0                   1                          0


    2nd Stage Nagarbhavi  5th Block Hbr Layout  5th Phase JP Nagar  \
0                      0                     0                   0
1                      0                     0                   0
2                      0                     0                   0
3                      0                     0                   0
4                      0                     0                   0
5                      0                     0                   0
6                      0                     0                   0
8                      0                     0                   0
9                      0                     0                   0
10                     0                     0                   0

    6th Phase JP Nagar  7th Phase JP Nagar  8th Phase JP Nagar  \
0                    0                   0                   0
1                    0                   0                   0
2                    0                   0                   0
3                    0                   0                   0
4                    0                   0                   0
5                    0                   0                   0
6                    0                   0                   0
8                    0                   0                   0
9                    0                   0                   0
10                   0                   0                   0

    9th Phase JP Nagar  ...  Vishveshwarya Layout  Vishwapriya Layout
\
0                    0  ...                     0                   0

1                    0  ...                     0                   0

2                    0  ...                     0                   0

3                    0  ...                     0                   0

4                    0  ...                     0                   0

5                    0  ...                     0                   0

6                    0  ...                     0                   0

8                    0  ...                     0                   0

9                    0  ...                     0                   0

10                   0  ...                     0                   0


    Vittasandra  Whitefield  Yelachenahalli  Yelahanka  Yelahanka New
Town  \
0             0           0               0          0
0
1             0           0               0          0
0
2             0           0               0          0
0
3             0           0               0          0
0
4             0           0               0          0
0
5             0           0               0          0
0
6             0           0               0          0
```

```
0
8             0           0               0          0
0
9             0           0               0          0
0
10            0           0               0          0
0

    Yelenahalli  Yeshwanthpur  other
0             0             0      0
1             0             0      0
2             0             0      0
3             0             0      0
4             0             0      0
5             0             0      0
6             0             0      0
8             0             0      0
9             0             0      0
10            0             0      0

[10 rows x 242 columns]
```

```
data7=pd.concat([data6,dummies.drop('other',axis='columns')],axis='col
umns')
data7.head()
```

```
              location  total_sqft  bath  price  BHK  1st Block
Jayanagar  \
0  1st Block Jayanagar      2850.0   4.0  428.0    4
1
1  1st Block Jayanagar      1630.0   3.0  194.0    3
1
2  1st Block Jayanagar      1875.0   2.0  235.0    3
1
3  1st Block Jayanagar      1200.0   2.0  130.0    3
1
4  1st Block Jayanagar      1235.0   2.0  148.0    2
1

   1st Phase JP Nagar  2nd Phase Judicial Layout  2nd Stage Nagarbhavi
\
0                   0                          0                     0

1                   0                          0                     0

2                   0                          0                     0

3                   0                          0                     0

4                   0                          0                     0
```

```
   5th Block Hbr Layout  ...  Vijayanagar  Vishveshwarya Layout  \
0                     0  ...            0                     0
1                     0  ...            0                     0
2                     0  ...            0                     0
3                     0  ...            0                     0
4                     0  ...            0                     0

   Vishwapriya Layout  Vittasandra  Whitefield  Yelachenahalli
Yelahanka  \
0                   0            0           0               0
0
1                   0            0           0               0
0
2                   0            0           0               0
0
3                   0            0           0               0
0
4                   0            0           0               0
0

   Yelahanka New Town  Yelenahalli  Yeshwanthpur
0                   0            0             0
1                   0            0             0
2                   0            0             0
3                   0            0             0
4                   0            0             0

[5 rows x 246 columns]
```

```
data8=data7.drop('location',axis='columns')
data8.head()
```

```
   total_sqft  bath  price  BHK  1st Block Jayanagar  1st Phase JP
Nagar  \
0      2850.0   4.0  428.0    4                    1
0
1      1630.0   3.0  194.0    3                    1
0
2      1875.0   2.0  235.0    3                    1
0
3      1200.0   2.0  130.0    3                    1
0
4      1235.0   2.0  148.0    2                    1
0

   2nd Phase Judicial Layout  2nd Stage Nagarbhavi  5th Block Hbr
Layout  \
0                          0                     0
```

```
0
1                          0                     0
0
2                          0                     0
0
3                          0                     0
0
4                          0                     0
0

   5th Phase JP Nagar  ...  Vijayanagar  Vishveshwarya Layout  \
0                   0  ...            0                     0
1                   0  ...            0                     0
2                   0  ...            0                     0
3                   0  ...            0                     0
4                   0  ...            0                     0

   Vishwapriya Layout  Vittasandra  Whitefield  Yelachenahalli
Yelahanka  \
0                   0            0           0               0
0
1                   0            0           0               0
0
2                   0            0           0               0
0
3                   0            0           0               0
0
4                   0            0           0               0
0

   Yelahanka New Town  Yelenahalli  Yeshwanthpur
0                   0            0             0
1                   0            0             0
2                   0            0             0
3                   0            0             0
4                   0            0             0

[5 rows x 245 columns]
```

```
data8.shape
```

```
(7251, 245)
```

```
X=data8.drop('price',axis='columns')
X.head()
```

```
   total_sqft  bath  BHK  1st Block Jayanagar  1st Phase JP Nagar  \
0      2850.0   4.0    4                    1                   0
1      1630.0   3.0    3                    1                   0
2      1875.0   2.0    3                    1                   0
3      1200.0   2.0    3                    1                   0
```

```
4      1235.0   2.0    2                    1                   0

   2nd Phase Judicial Layout  2nd Stage Nagarbhavi  5th Block Hbr
Layout  \
0                          0                     0
0
1                          0                     0
0
2                          0                     0
0
3                          0                     0
0
4                          0                     0
0

   5th Phase JP Nagar  6th Phase JP Nagar  ...  Vijayanagar  \
0                   0                   0  ...            0
1                   0                   0  ...            0
2                   0                   0  ...            0
3                   0                   0  ...            0
4                   0                   0  ...            0

   Vishveshwarya Layout  Vishwapriya Layout  Vittasandra
Whitefield  \
0                     0                   0            0           0

1                     0                   0            0           0

2                     0                   0            0           0

3                     0                   0            0           0

4                     0                   0            0           0


   Yelachenahalli  Yelahanka  Yelahanka New Town  Yelenahalli
Yeshwanthpur
0               0          0                   0            0
0
1               0          0                   0            0
0
2               0          0                   0            0
0
3               0          0                   0            0
0
4               0          0                   0            0
0

[5 rows x 244 columns]
```

```
y=data8.price
```

```
X_train = X.iloc[:5802]
```

```
y_train = y.iloc[:5802]
```

```
X_test = X.iloc[5802:7252]
```

```
y_test = y.iloc[5802:7252]
```

```
from sklearn.linear_model import LinearRegression
model=LinearRegression()
model.fit(X_train,y_train)
model.score(X_test,y_test)
```

```
0.7557473314013341
```

```
from sklearn.model_selection import ShuffleSplit
from sklearn.model_selection import cross_val_score

cv = ShuffleSplit(n_splits=5, test_size=0.2, random_state=0)

cross_val_score(LinearRegression(), X, y,
                           cv=cv)
```

```
array([0.82430186, 0.77166234, 0.85089567, 0.80837764, 0.83653286])
```

```
from sklearn.model_selection import GridSearchCV

from sklearn.linear_model import Lasso
from sklearn.tree import DecisionTreeRegressor

def find_best_model_using_gridsearchcv(X,y):
    algos = {
        'linear_regression' : {
            'model': LinearRegression(),
            'params': {
                'normalize': [True, False]
            }
        },
        'lasso': {
            'model': Lasso(),
            'params': {
                'alpha': [1,2],
                'selection': ['random', 'cyclic']
            }
        },
        'decision_tree': {
            'model': DecisionTreeRegressor(),
            'params': {
                'criterion' : ['mse','friedman_mse'],
                'splitter': ['best','random']
            }
        }
    }
    scores = []
    cv = ShuffleSplit(n_splits=5, test_size=0.2, random_state=0)
    for algo_name, config in algos.items():
        gs =  GridSearchCV(config['model'], config['params'], cv=cv, 
return_train_score=False)
        gs.fit(X,y)
        scores.append({
            'model': algo_name,
            'best_score': gs.best_score_,
            'best_params': gs.best_params_
        })

    return 
pd.DataFrame(scores,columns=['model','best_score','best_params'])

find_best_model_using_gridsearchcv(X,y)
```

```
               model  best_score 
best_params
0  linear_regression    0.818354                      {'normalize': 
False}
1              lasso    0.687457       {'alpha': 1, 'selection': 
'random'}
2      decision_tree    0.724382  {'criterion': 'mse', 'splitter': 
'best'}
```

```
def price_predict(location,sqft,bath,BHK):
    loc_index=np.where(X.columns==location)[0][0]
    x=np.zeros(len(X.columns))
    x[0]=sqft
    x[1]=bath
    x[2]=BHK
    if loc_index >=0:
        x[loc_index]=1
    return model.predict([x])[0]

price_predict('1st Phase JP Nagar',1000,2,2)
```

```
86.50537337732801
```

```
price_predict('1st Phase JP Nagar',1000,2,3)
```

```
81.96965686376684
```

```
price_predict('5th Phase JP Nagar',1000,2,2)
```

```
38.93415026546458
```

```
price_predict('Indira Nagar',1000,2,2)
```

```
180.82820686321492
```