banglore-home-prices-final

```
[1]: import pandas as pd
     import numpy as np
     from matplotlib import pyplot as plt
     %matplotlib inline
     import matplotlib
     matplotlib.rcParams["figure.figsize"] = (20,10)
```

```
[2]: df1 = pd.read_csv("bengaluru_house_prices.csv")
     df1.head()
```

```
[2]:              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
```

```
[3]: df1.shape
```

```
[3]: (13320, 9)
```

```
[4]: df1.columns
```

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

```
[5]: df1['area_type'].unique()
```

```
[5]: array(['Super built-up  Area', 'Plot  Area', 'Built-up  Area',
            'Carpet  Area'], dtype=object)
```

```
[6]: df1['area_type'].value_counts()
```

```
[6]: Super built-up  Area    8790
     Built-up  Area          2418
     Plot  Area              2025
     Carpet  Area              87
     Name: area_type, dtype: int64
```

```
[7]: df2 = df1.drop(['area_type','society','balcony','availability'],axis='columns')
     df2.shape
```

```
[7]: (13320, 5)
```

Data Cleaning: Handle NA values

```
[8]: df2.isnull().sum()
```

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

```
[9]: df2.shape
```

```
[9]: (13320, 5)
```

```
[10]: df3 = df2.dropna()
      df3.isnull().sum()
```

```
[10]: location      0
      size          0
      total_sqft    0
      bath          0
      price         0
      dtype: int64
```

```
[11]: df3.shape
```

```
[11]: (13246, 5)
```

```
[12]: df3['bhk'] = df3['size'].apply(lambda x: int(x.split(' ')[0]))
      df3.bhk.unique()
```

```
C:\ProgramData\Anaconda3\lib\site-packages\ipykernel_launcher.py:1:
SettingWithCopyWarning:
A value is trying to be set on a copy of a slice from a DataFrame.
Try using .loc[row_indexer,col_indexer] = value instead
```

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

```
[13]: def is_float(x):
          try:
              float(x)
          except:
              return False
          return True
```

```
[14]: 2+3
```

```
[14]: 5
```

```
[15]: df3[~df3['total_sqft'].apply(is_float)].head(10)
```

```
[15]:                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
      410             Kengeri      1 BHK  34.46Sq. Meter   1.0   18.500    1
      549         Hennur Road      2 BHK     1195 - 1440   2.0   63.770    2
      648             Arekere  9 Bedroom       4125Perch   9.0  265.000    9
      661           Yelahanka      2 BHK     1120 - 1145   2.0   48.130    2
      672        Bettahalsoor  4 Bedroom     3090 - 5002   4.0  445.000    4
```

[16]:

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

[17]:

```
df4 = df3.copy()
df4.total_sqft = df4.total_sqft.apply(convert_sqft_to_num)
df4 = df4[df4.total_sqft.notnull()]
df4.head(2)
```

[17]:

```
                   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
```

[18]:

```
df4.loc[30]
```

[18]:

```
location      Yelahanka
size              4 BHK
total_sqft         2475
bath                  4
price               186
bhk                   4
Name: 30, dtype: object
```

[19]:

```
(2100+2850)/2
```

[19]:

```
2475.0
```

[20]:

```
df5 = df4.copy()
df5['price_per_sqft'] = df5['price']*100000/df5['total_sqft']
df5.head()
```

[20]:

```
                   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     3699.810606
1     4615.384615
2     4305.555556
3     6245.890861
4     4250.000000
```

```
[21]: df5_stats = df5['price_per_sqft'].describe()
      df5_stats
```

```
[21]: count    1.320000e+04
      mean     7.920759e+03
      std      1.067272e+05
      min      2.678298e+02
      25%      4.267701e+03
      50%      5.438331e+03
      75%      7.317073e+03
      max      1.200000e+07
      Name: price_per_sqft, dtype: float64
```

```
[69]: df5.to_csv("bhp.csv",index=False)
```

```
[22]: df5.location = df5.location.apply(lambda x: x.strip())
      location_stats = df5['location'].value_counts(ascending=False)
      location_stats
```

```
[22]: Whitefield                                    533
      Sarjapur  Road                                392
      Electronic City                               304
      Kanakpura Road                                264
      Thanisandra                                   235
      Yelahanka                                     210
      Uttarahalli                                   186
      Hebbal                                        176
      Marathahalli                                  175
      Raja Rajeshwari Nagar                         171
      Bannerghatta Road                             151
      Hennur Road                                   150
      7th Phase JP Nagar                            148
      Haralur Road                                  141
```

```
Electronic City Phase II                            131
Rajaji Nagar                                        106
Chandapura                                           98
Bellandur                                            96
KR Puram                                             88
Hoodi                                                88
Electronics City Phase 1                             87
Yeshwanthpur                                         85
Begur Road                                           84
Sarjapur                                             80
Kasavanhalli                                         79
Harlur                                               79
Hormavu                                              74
Banashankari                                         74
Ramamurthy Nagar                                     72
Koramangala                                          72
                                                 …
Ckikkakammana Halli                                   1
Neelasandra                                           1
Gangondanahalli                                       1
Agara Village                                         1
Sundara Nagar                                         1
Binny Mills Employees Colony                          1
Adugodi                                               1
Uvce Layout                                           1
Kenchanehalli R R Nagar                               1
Whietfield,                                           1
manyata                                               1
Air View Colony                                       1
Thavarekere                                           1
Muthyala Nagar                                        1
Haralur Road,                                         1
Manonarayanapalya                                     1
GKW Layout                                            1
Marathalli bridge                                     1
Banashankari 6th Stage ,Subramanyapura                1
anjananager magdi road                                1
akshaya nagar t c palya                               1
Indiranagar HAL 2nd Stage                             1
Maruthi HBCS Layout                                   1
Gopal Reddy Layout                                    1
High grounds                                          1
CMH Road                                              1
Chambenahalli                                         1
Sarvobhogam Nagar                                     1
Ex-Servicemen Colony Dinnur Main Road R.T.Nagar       1
Bilal Nagar                                           1
```

```
Name: location, Length: 1287, dtype: int64
```

[23]:
```
location_stats.values.sum()
```

[23]:
```
13200
```

[24]:
```
len(location_stats[location_stats>10])
```

[24]:
```
240
```

[25]:
```
len(location_stats)
```

[25]:
```
1287
```

[26]:
```
len(location_stats[location_stats<=10])
```

[26]:
```
1047
```

[27]:
```
location_stats_less_than_10 = location_stats[location_stats<=10]
location_stats_less_than_10
```

[27]:
```
BTM 1st Stage                                   10
Sector 1 HSR Layout                             10
Ganga Nagar                                     10
Naganathapura                                   10
1st Block Koramangala                           10
Thyagaraja Nagar                                10
Dairy Circle                                    10
Nagadevanahalli                                 10
Sadashiva Nagar                                 10
Gunjur Palya                                    10
Dodsworth Layout                                10
Basapura                                        10
Kalkere                                         10
Nagappa Reddy Layout                            10
2nd Phase JP Nagar                               9
Yemlur                                           9
Medahalli                                        9
Kaverappa Layout                                 9
Ejipura                                          9
Mathikere                                        9
Lingarajapuram                                   9
```

```
Peenya                                              9
Vignana Nagar                                       9
B Narayanapura                                      9
Chandra Layout                                      9
Jakkur Plantation                                   9
Banagiri Nagar                                      9
Chennammana Kere                                    9
Richmond Town                                       9
Vishwanatha Nagenahalli                             9
                                                   ..
Ckikkakammana Halli                                 1
Neelasandra                                         1
Gangondanahalli                                     1
Agara Village                                       1
Sundara Nagar                                       1
Binny Mills Employees Colony                        1
Adugodi                                             1
Uvce Layout                                         1
Kenchanehalli R R Nagar                             1
Whietfield,                                         1
manyata                                             1
Air View Colony                                     1
Thavarekere                                         1
Muthyala Nagar                                      1
Haralur Road,                                       1
Manonarayanapalya                                   1
GKW Layout                                          1
Marathalli bridge                                   1
Banashankari 6th Stage ,Subramanyapura              1
anjananager magdi road                              1
akshaya nagar t c palya                             1
Indiranagar HAL 2nd Stage                           1
Maruthi HBCS Layout                                 1
Gopal Reddy Layout                                  1
High grounds                                        1
CMH Road                                            1
Chambenahalli                                       1
Sarvobhogam Nagar                                   1
Ex-Servicemen Colony Dinnur Main Road R.T.Nagar     1
Bilal Nagar                                         1
Name: location, Length: 1047, dtype: int64
```

[28]:
```
len(df5.location.unique())
```

[28]:
```
1287
```

[29]:
```
df5.location = df5.location.apply(lambda x: 'other' if x in␣
 ↪location_stats_less_than_10 else x)
len(df5.location.unique())
```

[29]:
```
241
```

[30]:
```
df5.head(10)
```

[30]:
```
                   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
5                Whitefield      2 BHK      1170.0   2.0   38.00    2
6          Old Airport Road      4 BHK      2732.0   4.0  204.00    4
7              Rajaji Nagar      4 BHK      3300.0   4.0  600.00    4
8            Marathahalli      3 BHK      1310.0   3.0   63.25    3
9                     other  6 Bedroom      1020.0   6.0  370.00    6

   price_per_sqft
0     3699.810606
1     4615.384615
2     4305.555556
3     6245.890861
4     4250.000000
5     3247.863248
6     7467.057101
7    18181.818182
8     4828.244275
9    36274.509804
```

[31]:
```
df5[df5.total_sqft/df5.bhk<300].head()
```

[31]:
```
                 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     36274.509804
45    33333.333333
58    10660.980810
68     6296.296296
70    20000.000000
```

[32]:

```
df5.shape
```

[32]:

```
(13200, 7)
```

[33]:

```
df6 = df5[~(df5.total_sqft/df5.bhk<300)]
df6.shape
```

[33]:

```
(12456, 7)
```

[34]:

```
df6.price_per_sqft.describe()
```

[34]:

```
count     12456.000000
mean       6308.502826
std        4168.127339
min         267.829813
25%        4210.526316
50%        5294.117647
75%        6916.666667
max      176470.588235
Name: price_per_sqft, dtype: float64
```

[35]:

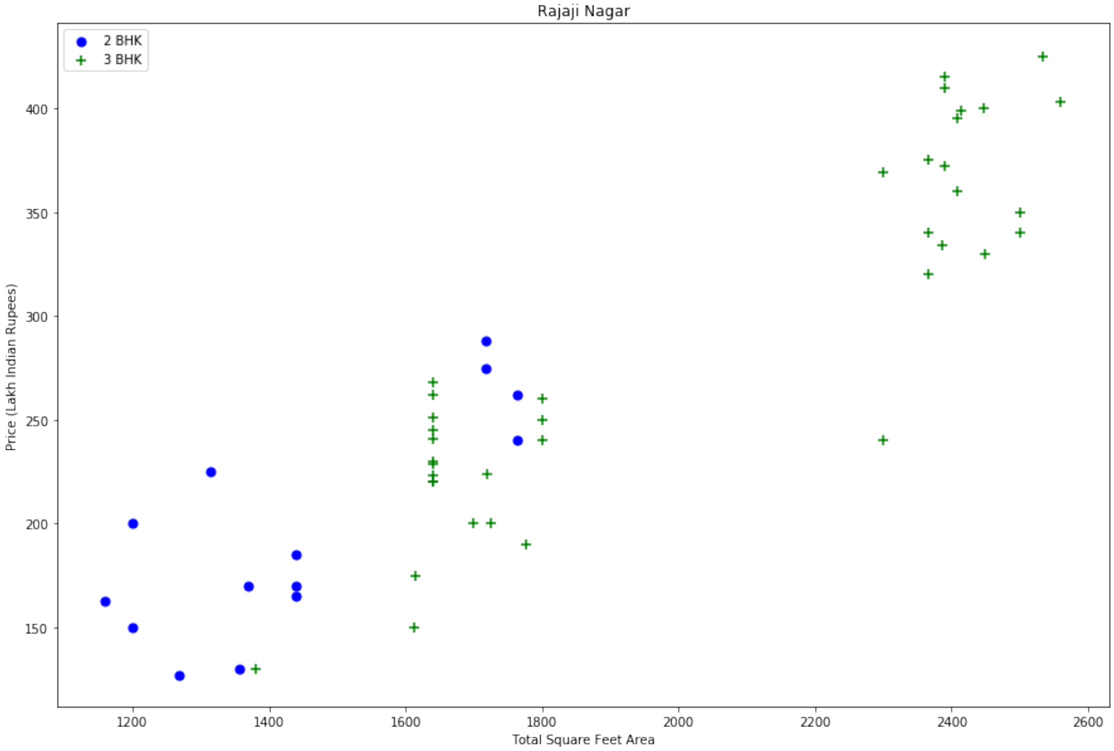
```
def remove_pps_outliers(df):
    df_out = pd.DataFrame()
    for key, subdf in df.groupby('location'):
        m = np.mean(subdf.price_per_sqft)
        st = np.std(subdf.price_per_sqft)
        reduced_df = subdf[(subdf.price_per_sqft>(m-st)) & (subdf.
 ↪price_per_sqft<=(m+st))]
        df_out = pd.concat([df_out,reduced_df],ignore_index=True)
    return df_out
df7 = remove_pps_outliers(df6)
```

```
df7.shape
```

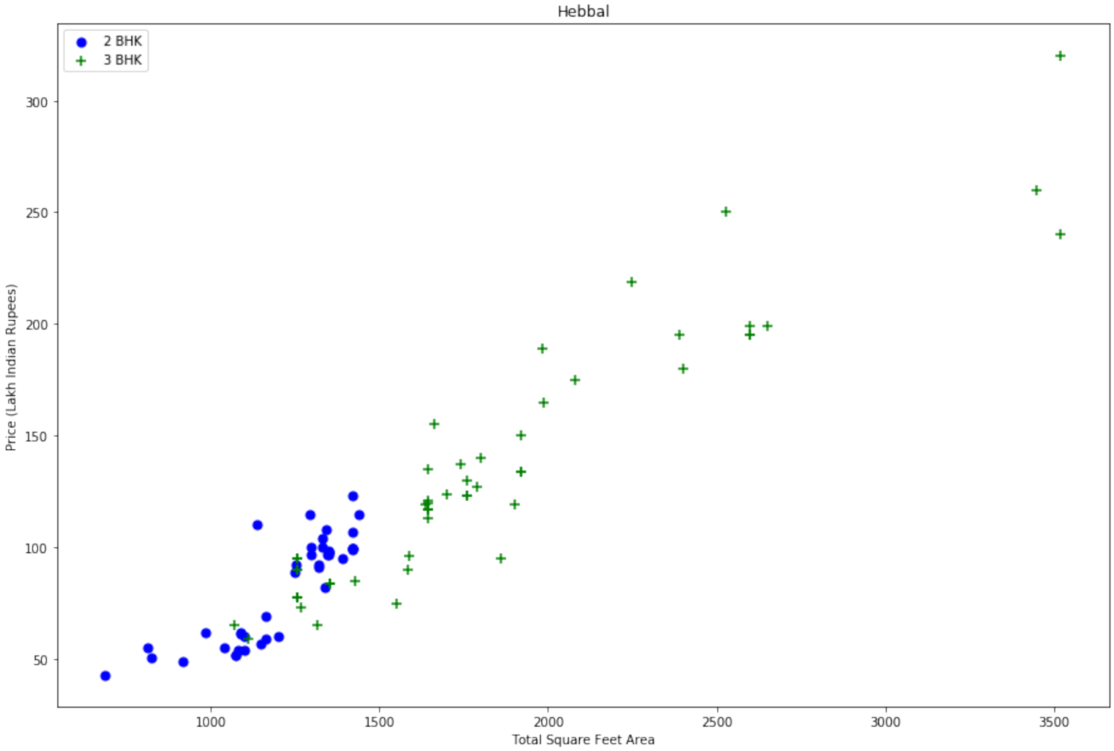
[35]:
```
(10242, 7)
```

[36]:
```
def plot_scatter_chart(df,location):
    bhk2 = df[(df.location==location) & (df.bhk==2)]
    bhk3 = df[(df.location==location) & (df.bhk==3)]
    matplotlib.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,marker='+', color='green',label='3␣
 ↪BHK', s=50)
    plt.xlabel("Total Square Feet Area")
    plt.ylabel("Price (Lakh Indian Rupees)")
    plt.title(location)
    plt.legend()

plot_scatter_chart(df7,"Rajaji Nagar")
```



[37]:
```
plot_scatter_chart(df7,"Hebbal")
```



```
{
    '1' : {
        'mean': 4000,
        'std: 2000,
        'count': 34
    },
    '2' : {
        'mean': 4300,
        'std: 2300,
        'count': 22
    },
}
```

[38]:

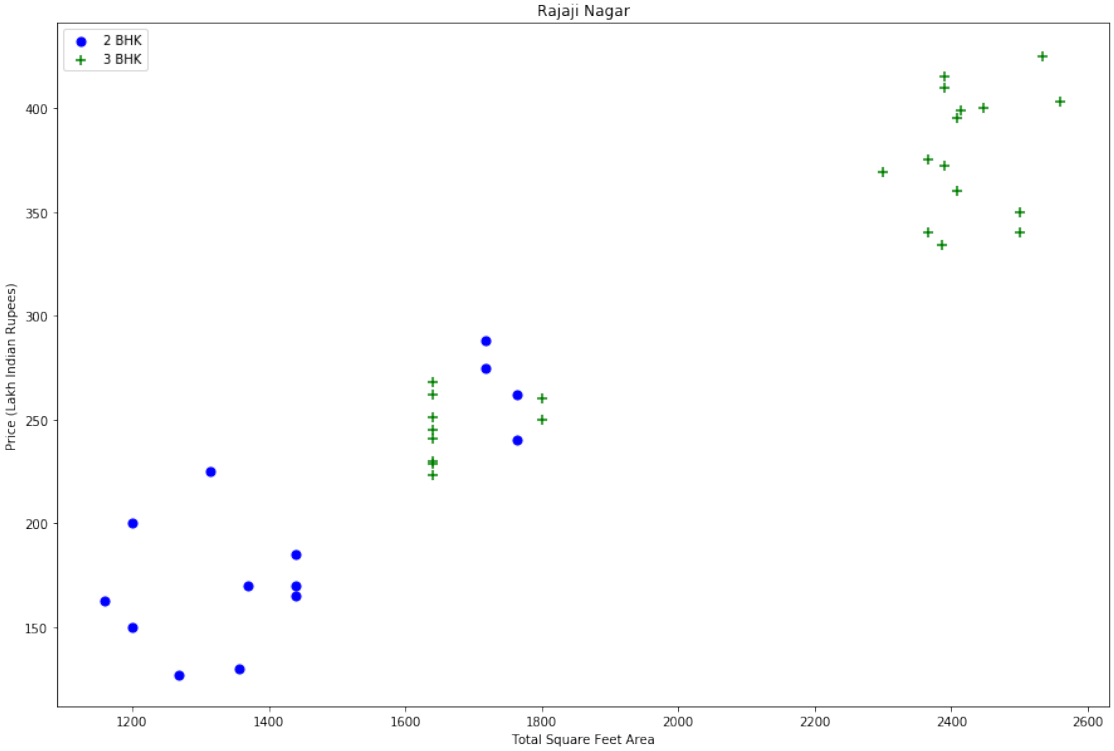
```python
def remove_bhk_outliers(df):
    exclude_indices = np.array([])
    for location, location_df in df.groupby('location'):
        bhk_stats = {}
        for bhk, bhk_df in location_df.groupby('bhk'):
            bhk_stats[bhk] = {
                'mean': np.mean(bhk_df.price_per_sqft),
                'std': np.std(bhk_df.price_per_sqft),
                'count': bhk_df.shape[0]
            }
        for bhk, bhk_df in location_df.groupby('bhk'):
            stats = bhk_stats.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')
df8 = remove_bhk_outliers(df7)
# df8 = df7.copy()
df8.shape
```

[38]:

```
(7317, 7)
```

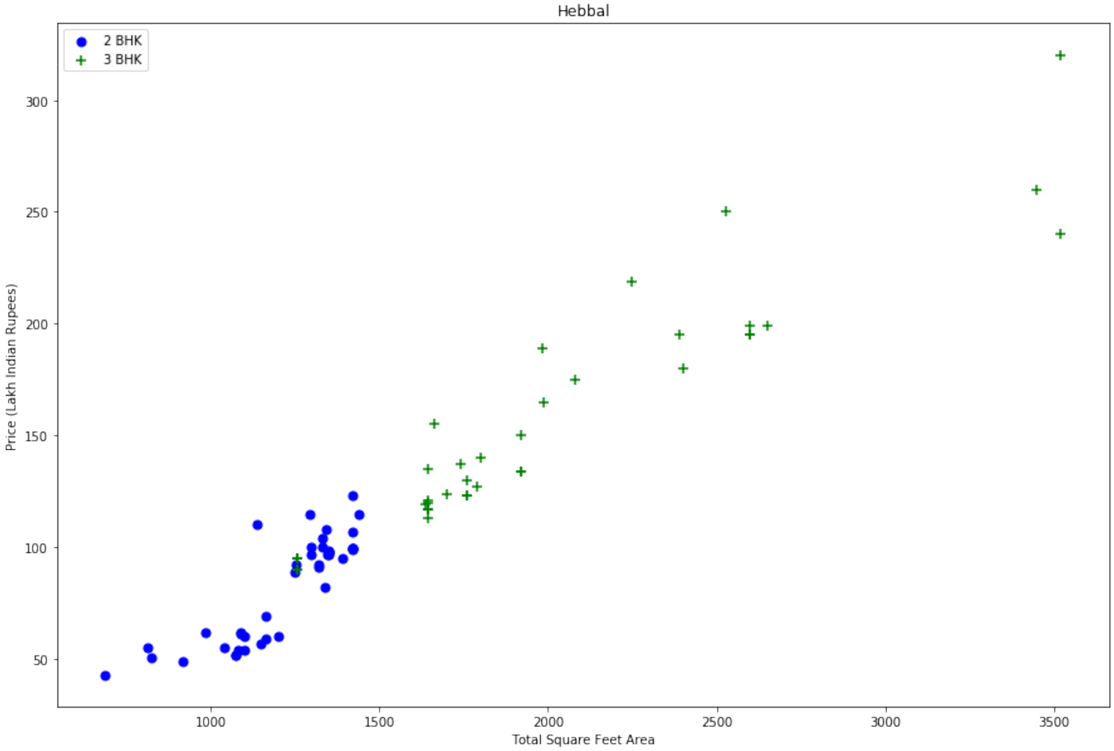
[39]:

```
plot_scatter_chart(df8,"Rajaji Nagar")
```



[40]:

```
plot_scatter_chart(df8,"Hebbal")
```

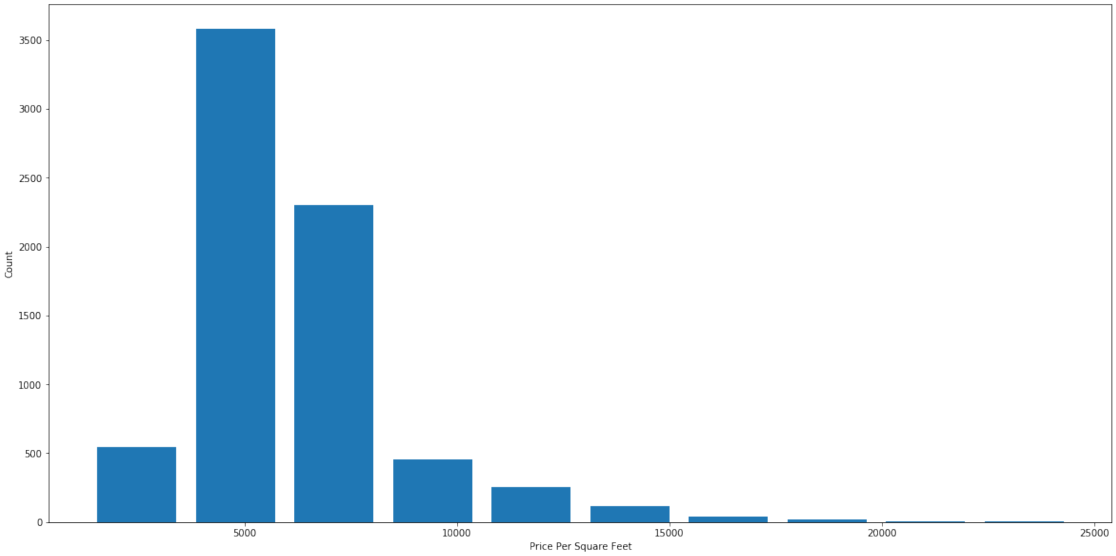


[41]:

```
import matplotlib
matplotlib.rcParams["figure.figsize"] = (20,10)
plt.hist(df8.price_per_sqft,rwidth=0.8)
plt.xlabel("Price Per Square Feet")
plt.ylabel("Count")
```

[41]:

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



[42]:

```
df8.bath.unique()
```

[42]:

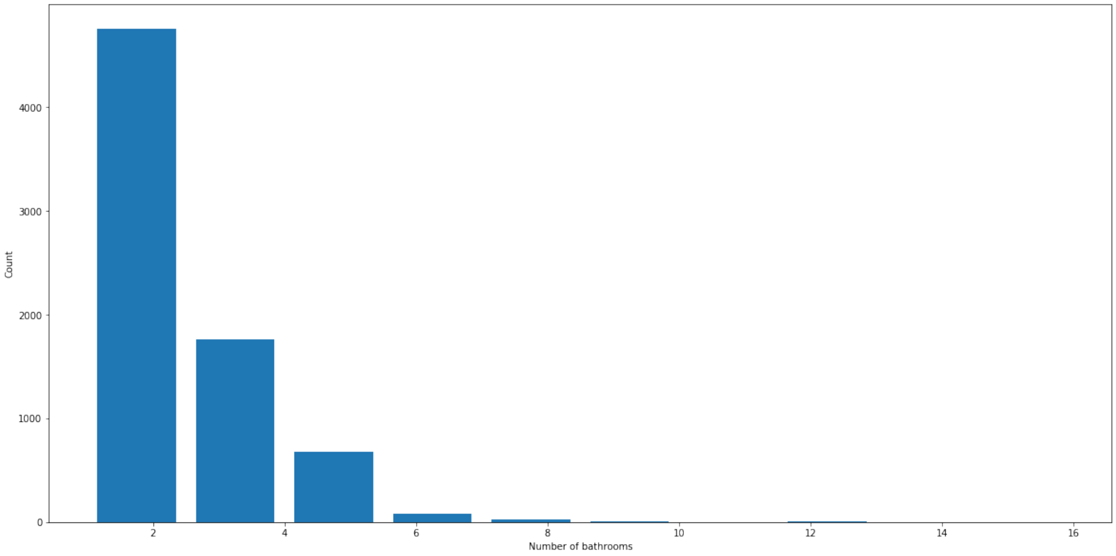
```
array([ 4.,  3.,  2.,  5.,  8.,  1.,  6.,  7.,  9., 12., 16., 13.])
```

[43]:

```
plt.hist(df8.bath,rwidth=0.8)
plt.xlabel("Number of bathrooms")
plt.ylabel("Count")
```

[43]:

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



```
[44]: df8[df8.bath>10]
```

```
[44]:            location    size  total_sqft  bath  price  bhk  price_per_sqft
      5277  Neeladri Nagar  10 BHK      4000.0  12.0  160.0   10     4000.000000
      8483           other  10 BHK     12000.0  12.0  525.0   10     4375.000000
      8572           other  16 BHK     10000.0  16.0  550.0   16     5500.000000
      9306           other  11 BHK      6000.0  12.0  150.0   11     2500.000000
      9637           other  13 BHK      5425.0  13.0  275.0   13     5069.124424
```

```
[45]: df8[df8.bath>df8.bhk+2]
```

```
[45]:           location       size  total_sqft  bath   price  bhk  price_per_sqft
      1626  Chikkabanavar  4 Bedroom      2460.0   7.0    80.0    4     3252.032520
      5238     Nagasandra  4 Bedroom      7000.0   8.0   450.0    4     6428.571429
      6711    Thanisandra      3 BHK      1806.0   6.0   116.0    3     6423.034330
      8408          other      6 BHK     11338.0   9.0  1000.0    6     8819.897689
```

```
[46]: df9 = df8[df8.bath<df8.bhk+2]
      df9.shape
```

```
[46]: (7239, 7)
```

```
[47]: df9.head(2)
```

```
[47]:               location   size  total_sqft  bath  price  bhk  price_per_sqft
      0  1st Block Jayanagar  4 BHK      2850.0   4.0  428.0    4    15017.543860
      1  1st Block Jayanagar  3 BHK      1630.0   3.0  194.0    3    11901.840491
```

```
[48]: df10 = df9.drop(['size','price_per_sqft'],axis='columns')
      df10.head(3)
```

```
[48]:               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
```

```
[49]: dummies = pd.get_dummies(df10.location)
      dummies.head(3)
```

[49]:
```
   1st Block Jayanagar  1st Phase JP Nagar  2nd Phase Judicial Layout  \
0                    1                   0                          0
1                    1                   0                          0
2                    1                   0                          0

   2nd Stage Nagarbhavi  5th Block Hbr Layout  5th Phase JP Nagar  \
0                     0                     0                   0
1                     0                     0                   0
2                     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

   9th Phase JP Nagar  …  Vishveshwarya Layout  Vishwapriya Layout  \
0                   0  …                     0                   0
1                   0  …                     0                   0
2                   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

   Yelenahalli  Yeshwanthpur  other
0            0             0      0
1            0             0      0
2            0             0      0

[3 rows x 241 columns]
```

[50]:
```python
df11 = pd.concat([df10,dummies.drop('other',axis='columns')],axis='columns')
df11.head()
```

[50]:
```
              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 245 columns]
```

[51]:
```
df12 = df11.drop('location',axis='columns')
df12.head(2)
```

[51]:
```
   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

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

   5th Phase JP Nagar  …  Vijayanagar  Vishveshwarya Layout  \
0                   0  …            0                     0
1                   0  …            0                     0

   Vishwapriya Layout  Vittasandra  Whitefield  Yelachenahalli  Yelahanka  \
0                   0            0           0               0          0
1                   0            0           0               0          0

   Yelahanka New Town  Yelenahalli  Yeshwanthpur
0                   0            0             0
1                   0            0             0
```

```
[2 rows x 244 columns]
```

Build a Model Now...

[52]:
```
df12.shape
```

[52]:
```
(7239, 244)
```

[53]:
```
X = df12.drop(['price'],axis='columns')
X.head(3)
```

[53]:
```
   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

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

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

   Vishveshwarya Layout  Vishwapriya Layout  Vittasandra  Whitefield  \
0                     0                   0            0           0
1                     0                   0            0           0
2                     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 rows x 243 columns]
```

[54]:
```
X.shape
```

[54]:
```
(7239, 243)
```

[55]:
```
y = df12.price
y.head(3)
```

[55]:

```
0    428.0
1    194.0
2    235.0
Name: price, dtype: float64
```

[56]:

```
len(y)
```

[56]:

```
7239
```

[57]:

```
from sklearn.model_selection import train_test_split
X_train, X_test, y_train, y_test = train_test_split(X,y,test_size=0.
 ↪2,random_state=10)
```

[58]:

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

[58]:

```
0.8629132245229449
```

Use K Fold cross validation to measure accuracy of our LinearRegression model

[59]:

```
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)
```

[59]:

```
array([0.82702546, 0.86027005, 0.85322178, 0.8436466 , 0.85481502])
```

[60]:

```
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)
```

[60]:

```
               model  best_score  \
0  linear_regression    0.847796
1              lasso    0.726738
2      decision_tree    0.716064

                                          best_params
0                                {'normalize': False}
1                 {'alpha': 2, 'selection': 'cyclic'}
2  {'criterion': 'friedman_mse', 'splitter': 'best'}
```

[61]:

```
def predict_price(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 lr_clf.predict([x])[0]
```

[62]:

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

[62]:

```
83.86570258311222
```

[63]:

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

[63]:

```
86.08062284985995
```

[64]:

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

[64]:

```
193.31197733179556
```

[65]:

```
predict_price('Indira Nagar',1000, 3, 3)
```

[65]:

```
195.52689759854331
```