In [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)
```

In [7]:
```
df1 = pd.read_csv("bengaluru_house_prices.csv")
df1.head()
```

Out[7]:

| | area_type | availability | location | size | society | total_sqft | bath | balcony | price |
|---|---|---|---|---|---|---|---|---|---|
| **0** | Super built-up Area | 19-Dec | Electronic City Phase II | 2 BHK | Coomee | 1056 | 2.0 | 1.0 | 39.07 |
| **1** | Plot Area | Ready To Move | Chikka Tirupathi | 4 Bedroom | Theanmp | 2600 | 5.0 | 3.0 | 120.00 |
| **2** | Built-up Area | Ready To Move | Uttarahalli | 3 BHK | NaN | 1440 | 2.0 | 3.0 | 62.00 |
| **3** | Super built-up Area | Ready To Move | Lingadheeranahalli | 3 BHK | Soiewre | 1521 | 3.0 | 1.0 | 95.00 |
| **4** | Super built-up Area | Ready To Move | Kothanur | 2 BHK | NaN | 1200 | 2.0 | 1.0 | 51.00 |

In [8]:
```
df1.shape
```

Out[8]:
```
(13320, 9)
```

In [9]:
```
df2 = df1.drop(['area_type','society','balcony','availability'],axis='columns')
df2.head()
```

Out[9]:

| | 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 |

In [10]:
```
df2.isnull().sum()
```

Out[10]:
```
location       1
size          16
total_sqft     0
bath          73
price          0
dtype: int64
```

In [11]:
```
df1.groupby('area_type')['area_type'].agg('count')
```

Out[11]:
```
area_type
Built-up  Area          2418
Carpet  Area              87
Plot  Area              2025
Super built-up  Area    8790
Name: area_type, dtype: int64
```

In [12]:
```
df3 = df2.dropna()
df3.isnull().sum()
```

Out[12]:
```
location      0
size          0
total_sqft    0
bath          0
price         0
dtype: int64
```

In [13]:
```
df3.shape
```

Out[13]:
```
(13246, 5)
```

In [14]:
```
df3['size'].unique()
```

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

In [15]:
```
df3['bhk'] = df3['size'].apply(lambda x: int(x.split(' ')[0]))
```

```
C:\Users\bhise\AppData\Local\Temp\ipykernel_28832\2222900254.py:1: SettingWithCopyWar
ning:
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

See the caveats in the documentation: https://pandas.pydata.org/pandas-docs/stable/us
er_guide/indexing.html#returning-a-view-versus-a-copy
  df3['bhk'] = df3['size'].apply(lambda x: int(x.split(' ')[0]))
```

In [16]:
```
df3.head()
```

Out[16]:

| | 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 |

In [17]:
```
df3['bhk'].unique()
```

Out[17]:
```
array([ 2,  4,  3,  6,  1,  8,  7,  5, 11,  9, 27, 10, 19, 16, 43, 14, 12,
       13, 18], dtype=int64)
```

In [18]:
```
df3[df3.bhk>20]
```

Out[18]:

| | location | size | total_sqft | bath | price | bhk |
|---|---|---|---|---|---|---|
| **1718** | 2Electronic City Phase II | 27 BHK | 8000 | 27.0 | 230.0 | 27 |
| **4684** | Munnekollal | 43 Bedroom | 2400 | 40.0 | 660.0 | 43 |

In [19]:
```
df3.total_sqft.unique()
```

Out[19]:
```
array(['1056', '2600', '1440', ..., '1133 - 1384', '774', '4689'],
      dtype=object)
```

In [20]:
```
def is_float(x):
    try:
        float(x)
    except:
        return False
    return True
```

In [21]:
```
df3[~df3['total_sqft'].apply(is_float)].head(10)
```

Out[21]:

| | 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 |

In [22]:
```
def convert_sqft_to_num(x):
```

```
  Input In [22]
    def convert_sqft_to_num(x):
                               ^
IndentationError: expected an indented block
```

In [23]:
```
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
```

In [24]:
```
convert_sqft_to_num('2166')
```

Out[24]:
```
2166.0
```

In [25]:
```
convert_sqft_to_num('2166 - 2850')
```

Out[25]:
```
2508.0
```

In [26]:
```
convert_sqft_to_num('34.46sq. Meter')
```

In [27]:
```
df4 = df3.copy()
df4.total_sqft = df4.total_sqft.apply(convert_sqft_to_num)
df4 = df4[df4.total_sqft.notnull()]
df4.head(2)
```

Out[27]:

| | 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 |

In [28]:
```
df4.loc[30]
```

Out[28]:
```
location      Yelahanka
size              4 BHK
total_sqft       2475.0
bath               4.0
price             186.0
bhk                   4
Name: 30, dtype: object
```

In [29]:
```
(2100+2850)/2
```

Out[29]:
```
2475.0
```

In [30]:
```
df3.total_sqft.unique()
```

Out[30]:
```
array(['1056', '2600', '1440', ..., '1133 - 1384', '774', '4689'],
      dtype=object)
```

In [31]:
```
import os
```

In [4]:
```
os.getcwd()
```

Out[4]:
```
'C:\\Users\\bhise'
```

In [5]:
```
os.chdir('C:\\Users\\bhise\\Downloads')
```

In [6]:
```
df1 = pd.read_csv("bengaluru_house_prices.csv")
df1.head()
```

Out[6]:

| | area_type | availability | location | size | society | total_sqft | bath | balcony | price |
|---|---|---|---|---|---|---|---|---|---|
| **0** | Super built-up Area | 19-Dec | Electronic City Phase II | 2 BHK | Coomee | 1056 | 2.0 | 1.0 | 39.07 |
| **1** | Plot Area | Ready To Move | Chikka Tirupathi | 4 Bedroom | Theanmp | 2600 | 5.0 | 3.0 | 120.00 |
| **2** | Built-up Area | Ready To Move | Uttarahalli | 3 BHK | NaN | 1440 | 2.0 | 3.0 | 62.00 |
| **3** | Super built-up Area | Ready To Move | Lingadheeranahalli | 3 BHK | Soiewre | 1521 | 3.0 | 1.0 | 95.00 |
| **4** | Super built-up Area | Ready To Move | Kothanur | 2 BHK | NaN | 1200 | 2.0 | 1.0 | 51.00 |

In [32]:
```
df5 = df4.copy()
df5['price_per_sqft'] = df5['price']*100000/df5['total_sqft']
df5.head()
```

Out[32]:

| | location | size | total_sqft | bath | price | bhk | price_per_sqft |
|---|---|---|---|---|---|---|---|
| **0** | Electronic City Phase II | 2 BHK | 1056.0 | 2.0 | 39.07 | 2 | 3699.810606 |
| **1** | Chikka Tirupathi | 4 Bedroom | 2600.0 | 5.0 | 120.00 | 4 | 4615.384615 |
| **2** | Uttarahalli | 3 BHK | 1440.0 | 2.0 | 62.00 | 3 | 4305.555556 |
| **3** | Lingadheeranahalli | 3 BHK | 1521.0 | 3.0 | 95.00 | 3 | 6245.890861 |
| **4** | Kothanur | 2 BHK | 1200.0 | 2.0 | 51.00 | 2 | 4250.000000 |

In [33]:
```
df5_stats = df5['price_per_sqft'].describe()
df5_stats
```

Out[33]:
```
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
```

In [34]:
```
df5.to_csv("bhp.csv",index=False)
```

In [35]:
```
df5.location = df5.location.apply(lambda x: x.strip())
location_stats = df5['location'].value_counts(ascending=False)
location_stats
```

Out[35]:
```
Whitefield                  533
Sarjapur  Road              392
Electronic City             304
Kanakpura Road              264
Thanisandra                 235
                           ...
Rajanna Layout                1
Subramanyanagar               1
Lakshmipura Vidyaanyapura     1
Malur Hosur Road              1
Abshot Layout                 1
Name: location, Length: 1287, dtype: int64
```

In [36]:
```
location_stats.values.sum()
```

Out[36]:
```
13200
```

In [37]:
```
len(location_stats[location_stats>10])
```

Out[37]:
```
240
```

In [38]:
```
len(location_stats)
```

Out[38]:
```
1287
```

In [39]:
```
len(location_stats[location_stats<=10])
```

Out[39]:
```
1047
```

In [40]:
```
location_stats_less_than_10 = location_stats[location_stats<=10]
location_stats_less_than_10
```

Out[40]:
```
BTM 1st Stage                10
Gunjur Palya                 10
Nagappa Reddy Layout         10
Sector 1 HSR Layout          10
Thyagaraja Nagar             10
                             ..
Rajanna Layout                1
Subramanyanagar               1
Lakshmipura Vidyaanyapura     1
Malur Hosur Road              1
Abshot Layout                 1
Name: location, Length: 1047, dtype: int64
```

In [41]:
```
len(df5.location.unique())
```

Out[41]:
```
1287
```

In [42]:
```
df5.location = df5.location.apply(lambda x: 'other' if x in location_stats_less_than_1
len(df5.location.unique())
```

Out[42]:
```
241
```

In [43]:
```
df5.head(10)
```

Out[43]:

| | location | size | total_sqft | bath | price | bhk | price_per_sqft |
|---|---|---|---|---|---|---|---|
| **0** | Electronic City Phase II | 2 BHK | 1056.0 | 2.0 | 39.07 | 2 | 3699.810606 |
| **1** | Chikka Tirupathi | 4 Bedroom | 2600.0 | 5.0 | 120.00 | 4 | 4615.384615 |
| **2** | Uttarahalli | 3 BHK | 1440.0 | 2.0 | 62.00 | 3 | 4305.555556 |
| **3** | Lingadheeranahalli | 3 BHK | 1521.0 | 3.0 | 95.00 | 3 | 6245.890861 |
| **4** | Kothanur | 2 BHK | 1200.0 | 2.0 | 51.00 | 2 | 4250.000000 |
| **5** | Whitefield | 2 BHK | 1170.0 | 2.0 | 38.00 | 2 | 3247.863248 |
| **6** | Old Airport Road | 4 BHK | 2732.0 | 4.0 | 204.00 | 4 | 7467.057101 |
| **7** | Rajaji Nagar | 4 BHK | 3300.0 | 4.0 | 600.00 | 4 | 18181.818182 |
| **8** | Marathahalli | 3 BHK | 1310.0 | 3.0 | 63.25 | 3 | 4828.244275 |
| **9** | other | 6 Bedroom | 1020.0 | 6.0 | 370.00 | 6 | 36274.509804 |

In [44]:
```
df5[df5.total_sqft/df5.bhk<300].head()
```

Out[44]:

| | location | size | total_sqft | bath | price | bhk | price_per_sqft |
|---|---|---|---|---|---|---|---|
| **9** | other | 6 Bedroom | 1020.0 | 6.0 | 370.0 | 6 | 36274.509804 |
| **45** | HSR Layout | 8 Bedroom | 600.0 | 9.0 | 200.0 | 8 | 33333.333333 |
| **58** | Murugeshpalya | 6 Bedroom | 1407.0 | 4.0 | 150.0 | 6 | 10660.980810 |
| **68** | Devarachikkanahalli | 8 Bedroom | 1350.0 | 7.0 | 85.0 | 8 | 6296.296296 |
| **70** | other | 3 Bedroom | 500.0 | 3.0 | 100.0 | 3 | 20000.000000 |

In [45]:
```
df5.shape
```

Out[45]:
```
(13200, 7)
```

In [46]:
```
df6 = df5[~(df5.total_sqft/df5.bhk<300)]
df6.shape
```

Out[46]:
```
(12456, 7)
```

In [47]:
```
df6.price_per_sqft.describe()
```

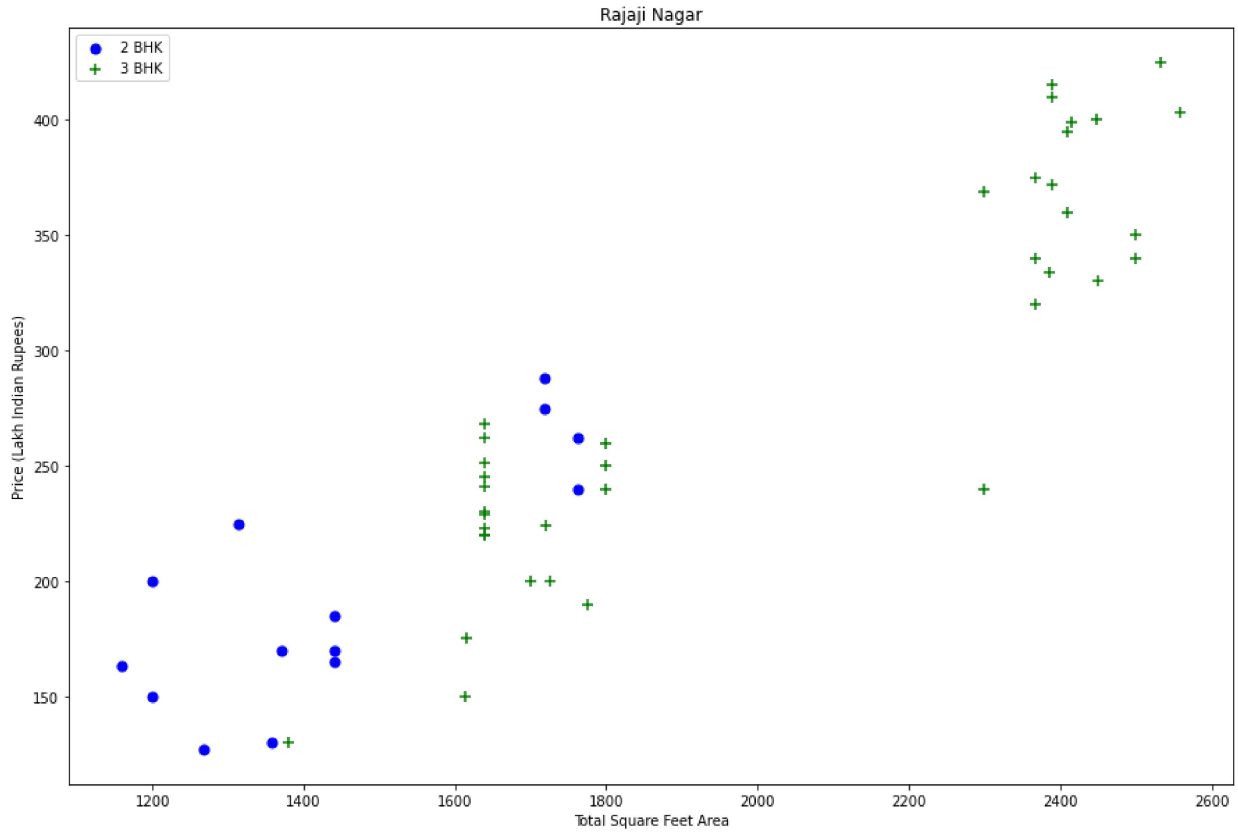
Out[47]:
```
count     12456.000000
mean       6308.502826
std        4168.127339
min         267.829813
25%        4210.526316
50%        5294.117647
75%        6916.666667
max      176470.588235
Name: price_per_sqft, dtype: float64
```

In [48]:
```
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+s
        df_out = pd.concat([df_out,reduced_df],ignore_index=True)
    return df_out
df7 = remove_pps_outliers(df6)
df7.shape
```

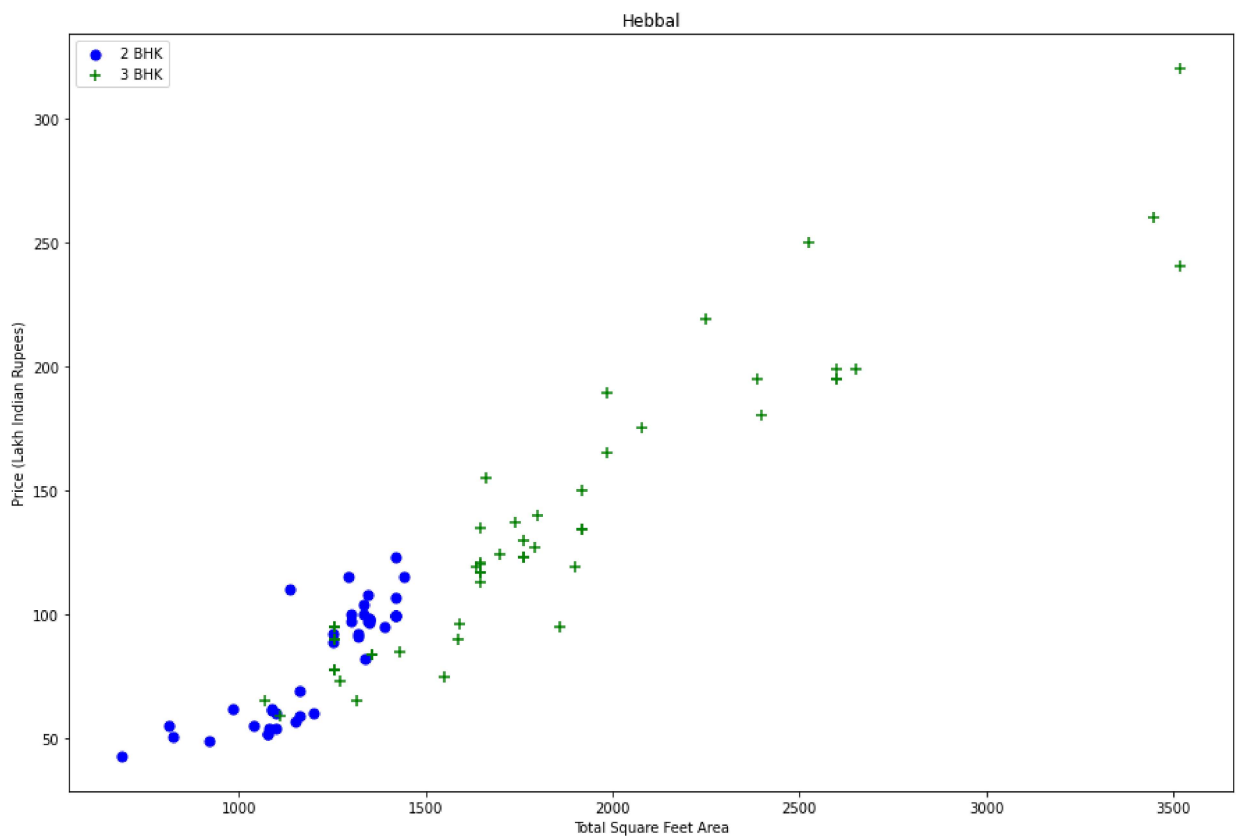
Out[48]:
```
(10242, 7)
```

In [49]:
```
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=
    plt.xlabel("Total Square Feet Area")
    plt.ylabel("Price (Lakh Indian Rupees)")
    plt.title(location)
    plt.legend()

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




In [50]:
```
plot_scatter_chart(df7,"Hebbal")
```

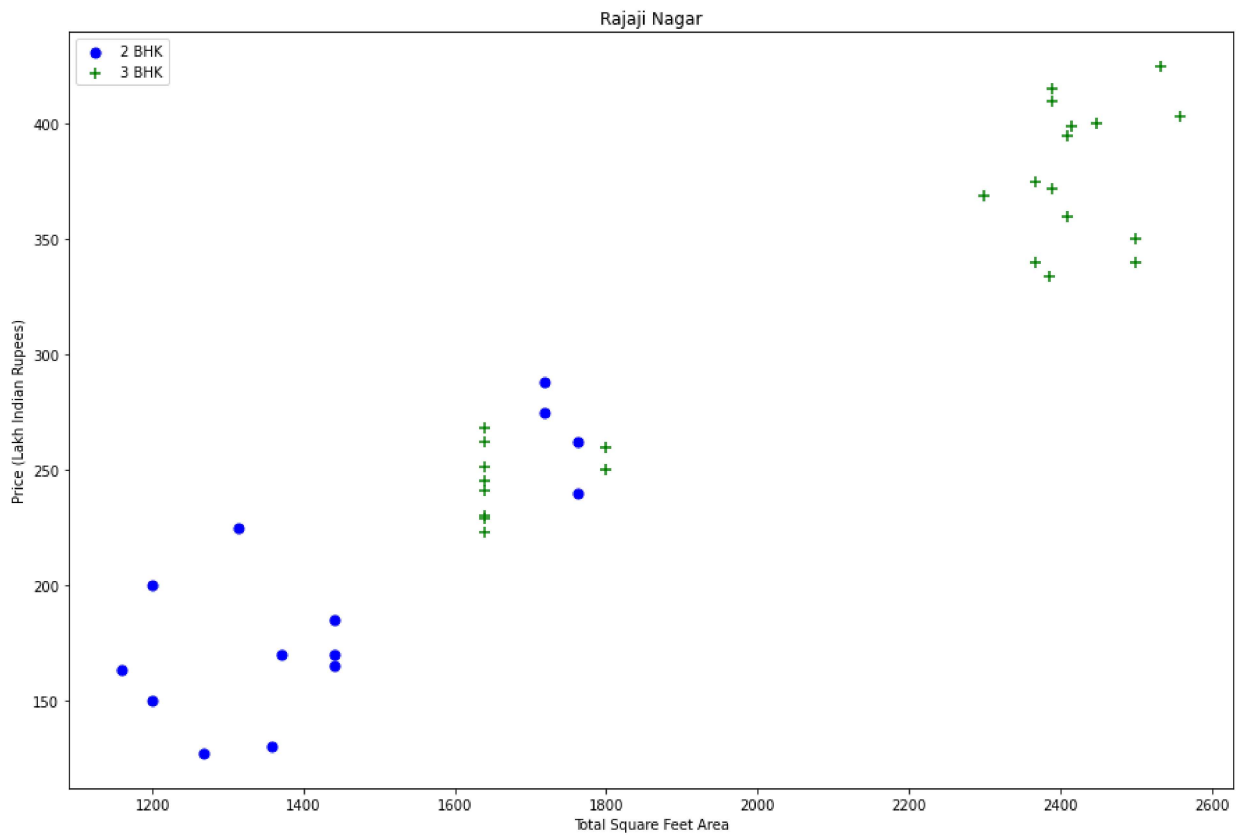



In [51]:
```
def remove_bhk_outliers(df):
    exclude_indices = np.array([])
    for location, location_df in df.groupby('location'):
        bhk_stats = {}
```

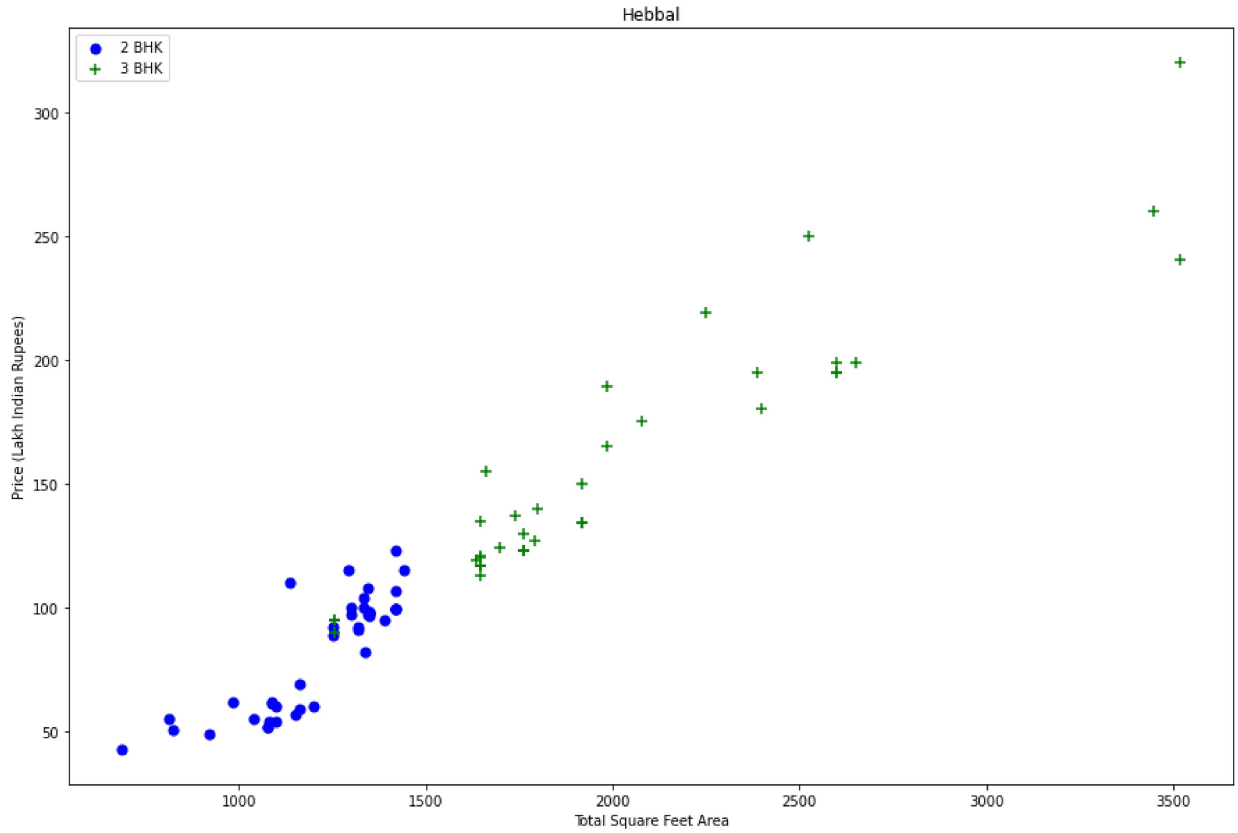
```
        for bhk, bhk_df in location_df.groupby('bhk'):
            bhk_stats[bhk] = {
                'mean': np.mean(bhk_df.price_per_sqft),
                'std': np.std(bhk_df.price_per_sqft),
                'count': bhk_df.shape[0]
            }
        for bhk, bhk_df in location_df.groupby('bhk'):
            stats = bhk_stats.get(bhk-1)
            if stats and stats['count']>5:
                exclude_indices = np.append(exclude_indices, bhk_df[bhk_df.price_per_s
    return df.drop(exclude_indices,axis='index')
df8 = remove_bhk_outliers(df7)
# df8 = df7.copy()
df8.shape
```

Out[51]: (7317, 7)

In [52]:
```
plot_scatter_chart(df8,"Rajaji Nagar")
```

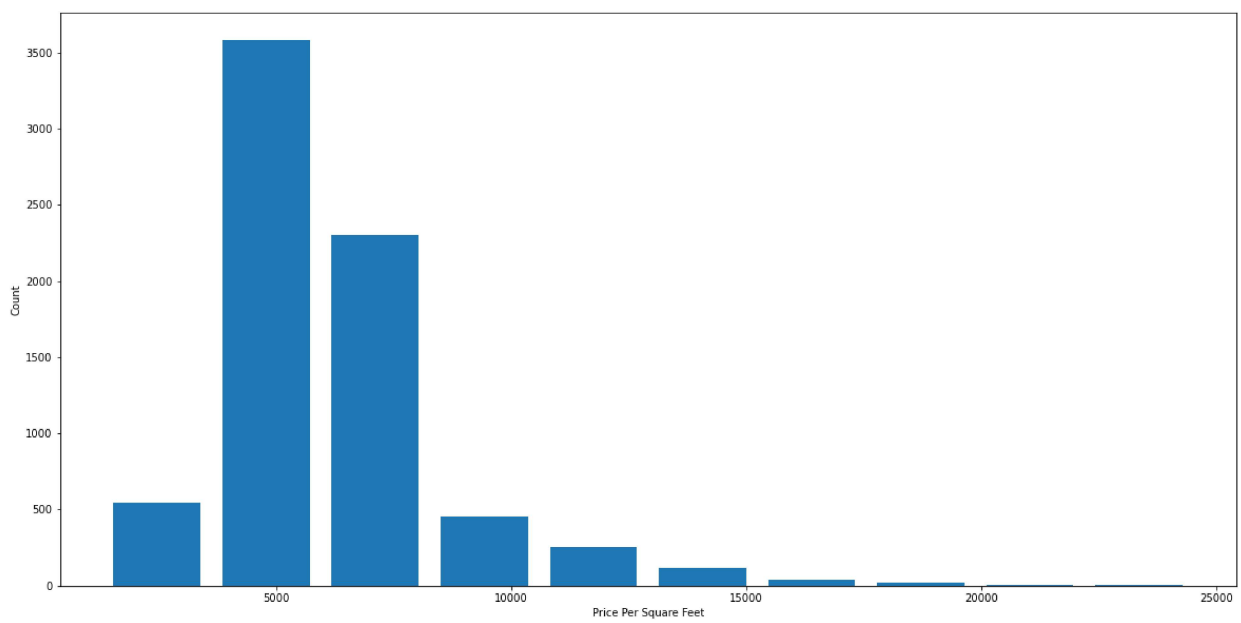



In [54]:
```
plot_scatter_chart(df8,"Hebbal")
```




In [55]:
```
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")
```

Out[55]:
```
Text(0, 0.5, 'Count')
```

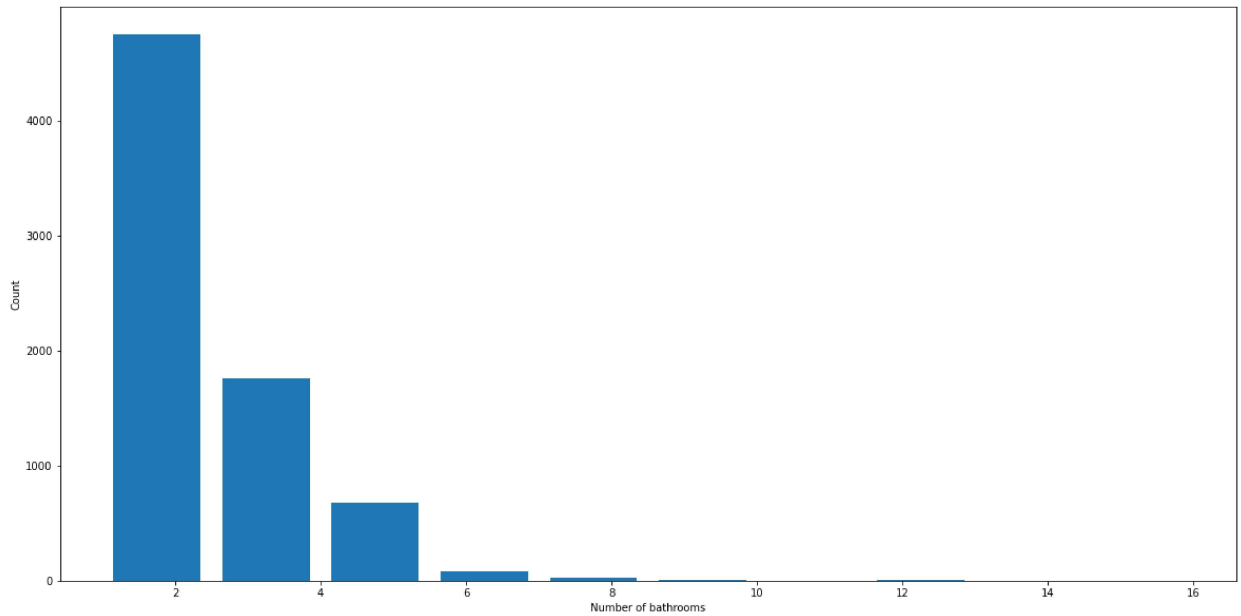



In [63]:
```
df8.bath.unique()
```

Out[63]:
```
array([ 4.,  3.,  2.,  5.,  8.,  1.,  6.,  7.,  9., 12., 16., 13.])
```

In [64]:
```
plt.hist(df8.bath,rwidth=0.8)
plt.xlabel("Number of bathrooms")
plt.ylabel("Count")
```

Out[64]:
```
Text(0, 0.5, 'Count')
```




In [65]:
```
df8[df8.bath>10]
```

Out[65]:

| | 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 |

In [66]:
```
df8[df8.bath>df8.bhk+2]
```

Out[66]:

| | 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 |

In [67]:
```
df9 = df8[df8.bath<df8.bhk+2]
df9.shape
```

Out[67]:
```
(7239, 7)
```

In [68]:
```
df9.head(2)
```

Out[68]:

| | 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 |

In [69]:

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

Out[69]:

| | 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 |

In [70]:

```
dummies = pd.get_dummies(df10.location)
dummies.head(3)
```

Out[70]:

| | 1st Block Jayanagar | 1st Phase JP Nagar | 2nd Phase Judicial Layout | 2nd Stage Nagarbhavi | 5th Block Hbr Layout | 5th Phase JP Nagar | 6th Phase JP Nagar | 7th Phase JP Nagar | 8th Phase JP Nagar | 9th Phase JP Nagar | ... | Vishves |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **0** | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | ... | |
| **1** | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | ... | |
| **2** | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | ... | |

3 rows × 241 columns

In [71]:

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

Out[71]:

| | location | total_sqft | bath | price | bhk | 1st Block Jayanagar | 1st Phase JP Nagar | 2nd Phase Judicial Layout | 2nd Stage Nagarbhavi | 5th Block Hbr Layout | ... | Vijaya |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **0** | 1st Block Jayanagar | 2850.0 | 4.0 | 428.0 | 4 | 1 | 0 | 0 | 0 | 0 | ... | |
| **1** | 1st Block Jayanagar | 1630.0 | 3.0 | 194.0 | 3 | 1 | 0 | 0 | 0 | 0 | ... | |
| **2** | 1st Block Jayanagar | 1875.0 | 2.0 | 235.0 | 3 | 1 | 0 | 0 | 0 | 0 | ... | |
| **3** | 1st Block Jayanagar | 1200.0 | 2.0 | 130.0 | 3 | 1 | 0 | 0 | 0 | 0 | ... | |
| **4** | 1st Block Jayanagar | 1235.0 | 2.0 | 148.0 | 2 | 1 | 0 | 0 | 0 | 0 | ... | |

5 rows × 245 columns

In [72]:
```
df12 = df11.drop('location',axis='columns')
df12.head(2)
```

Out[72]:

| | total_sqft | bath | price | bhk | 1st Block Jayanagar | 1st Phase JP Nagar | 2nd Phase Judicial Layout | 2nd Stage Nagarbhavi | 5th Block Hbr Layout | 5th Phase JP Nagar | ... | Vijayana |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **0** | 2850.0 | 4.0 | 428.0 | 4 | 1 | 0 | 0 | 0 | 0 | 0 | ... | |
| **1** | 1630.0 | 3.0 | 194.0 | 3 | 1 | 0 | 0 | 0 | 0 | 0 | ... | |

2 rows × 244 columns

In [73]:
```
df12.shape
```

Out[73]:
```
(7239, 244)
```

In [74]:
```
X = df12.drop(['price'],axis='columns')
X.head(3)
```

Out[74]:

| | total_sqft | bath | bhk | 1st Block Jayanagar | 1st Phase JP Nagar | 2nd Phase Judicial Layout | 2nd Stage Nagarbhavi | 5th Block Hbr Layout | 5th Phase JP Nagar | 6th Phase JP Nagar | ... | Vijayan |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **0** | 2850.0 | 4.0 | 4 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | ... | |
| **1** | 1630.0 | 3.0 | 3 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | ... | |
| **2** | 1875.0 | 2.0 | 3 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | ... | |

3 rows × 243 columns

In [75]:
```
X.shape
```

Out[75]:
```
(7239, 243)
```

In [76]:
```
y = df12.price
y.head(3)
```

Out[76]:
```
0    428.0
1    194.0
2    235.0
Name: price, dtype: float64
```

In [77]:
```
len(y)
```

Out[77]:
```
7239
```

In [78]:
```
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)
```

In [79]:
```
from sklearn.linear_model import LinearRegression
lr_clf = LinearRegression()
lr_clf.fit(X_train,y_train)
lr_clf.score(X_test,y_test)
```

Out[79]:
```
0.862913224522946
```

In [80]:
```
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)
```

Out[80]:
```
array([0.82702546, 0.86027005, 0.85322178, 0.8436466 , 0.85481502])
```

In [82]:
```
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_scor
        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)
```

```
C:\Users\bhise\anaconda3\lib\site-packages\sklearn\linear_model\_base.py:141: FutureW
arning: 'normalize' was deprecated in version 1.0 and will be removed in 1.2.
If you wish to scale the data, use Pipeline with a StandardScaler in a preprocessing
stage. To reproduce the previous behavior:

from sklearn.pipeline import make_pipeline

model = make_pipeline(StandardScaler(with_mean=False), LinearRegression())

If you wish to pass a sample_weight parameter, you need to pass it as a fit parameter
to each step of the pipeline as follows:

kwargs = {s[0] + '__sample_weight': sample_weight for s in model.steps}
model.fit(X, y, **kwargs)


  warnings.warn(
C:\Users\bhise\anaconda3\lib\site-packages\sklearn\linear_model\_base.py:141: FutureW
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```

```
  warnings.warn(
C:\Users\bhise\anaconda3\lib\site-packages\sklearn\tree\_classes.py:359: FutureWarnin
g: Criterion 'mse' was deprecated in v1.0 and will be removed in version 1.2. Use `cr
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C:\Users\bhise\anaconda3\lib\site-packages\sklearn\tree\_classes.py:359: FutureWarnin
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iterion='squared_error'` which is equivalent.
  warnings.warn(
```

Out[82]:

| | model | best_score | best_params |
|---|---|---|---|
| **0** | linear_regression | 0.847796 | {'normalize': False} |
| **1** | lasso | 0.726806 | {'alpha': 2, 'selection': 'random'} |
| **2** | decision_tree | 0.719323 | {'criterion': 'mse', 'splitter': 'best'} |

In [83]:

```
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]
```

In [84]:
```
predict_price('1st Phase JP Nagar',1000, 2, 2)
```

```
C:\Users\bhise\anaconda3\lib\site-packages\sklearn\base.py:450: UserWarning: X does n
ot have valid feature names, but LinearRegression was fitted with feature names
  warnings.warn(
```

Out[84]:
```
83.8657025830942
```

In [85]:
```
predict_price('1st Phase JP Nagar',1000, 3, 3)
```

```
C:\Users\bhise\anaconda3\lib\site-packages\sklearn\base.py:450: UserWarning: X does n
ot have valid feature names, but LinearRegression was fitted with feature names
  warnings.warn(
```

Out[85]:
```
86.08062284984219
```

In [86]:
```
predict_price('Indira Nagar',1000, 2, 2)
```

```
C:\Users\bhise\anaconda3\lib\site-packages\sklearn\base.py:450: UserWarning: X does n
ot have valid feature names, but LinearRegression was fitted with feature names
  warnings.warn(
```

Out[86]:
```
193.31197733178985
```

In [87]:
```
predict_price('Indira Nagar',1000, 3, 3)
```

```
C:\Users\bhise\anaconda3\lib\site-packages\sklearn\base.py:450: UserWarning: X does n
ot have valid feature names, but LinearRegression was fitted with feature names
  warnings.warn(
```

Out[87]:
```
195.52689759853783
```

In [88]:
```
import pickle
with open('banglore_home_prices_model.pickle','wb') as f:
    pickle.dump(lr_clf,f)
```

In [89]:
```
import json
columns = {
    'data_columns' : [col.lower() for col in X.columns]
}
with open("columns.json","w") as f:
    f.write(json.dumps(columns))
```

In [ ]: