03.price.analysis

August 20, 2024

0.1 Real Estate Price Analysis

0.2 1. Import Libraries

[ ]:
```
import folium
import numpy as np
import pandas as pd
import seaborn as sns
from collections import Counter
import matplotlib.pyplot as plt
import matplotlib.pylab as pylab
from geopy.geocoders import ArcGIS

import warnings
warnings.filterwarnings('ignore')
```

0.3 2. Load the Dataset

[ ]:
```
mum_prop = pd.read_csv('Mumbai_Property.csv')
```

0.3.1 2.1 Know more about dataset

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

[ ]:
```
                   Property_Name  \
0             Omkar Alta Monte
1  T Bhimjyani Neelkanth Woods
2       Legend 1 Pramila Nagar
3               Unnamed Property
4               Unnamed Property

                                            Location            Region  \
0                     W E Highway Malad East Mumbai     Highway Malad
1                              Manpada Thane Mumbai     Manpada Thane
2                               Dahisar West Mumbai    Dahisar Mumbai
3  Vidyavihar West Vidyavihar West Central Mumbai…    Central Mumbai
4  176 Cst Road Kalina Mumbai 400098 Santacruz Ea…  Santacruz Mumbai

   Property_Age   Availability            Area_Tpye  Area_SqFt  Rate_SqFt  \
```

```
0   0 to 1 Year  Ready To Move  Super Built Up Area     2900.0      17241
1   1 to 5 Year  Ready To Move  Super Built Up Area     1900.0      12631
2      10+ Year  Ready To Move  Super Built Up Area      595.0      15966
3  5 to 10 Year  Ready To Move        Built Up Area     1450.0      25862
4  5 to 10 Year  Ready To Move          Carpet Area      876.0      39954

   Floor_No  Bedroom  Bathroom  Price_Lakh
0        14        3         4       500.0
1         8        3         3       240.0
2         3        1         2        95.0
3         1        3         3       375.0
4         5        2         2       350.0
```

[ ]:
```
mum_prop.shape
```

[ ]:
```
(2580, 12)
```

[ ]:
```
mum_prop.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 2580 entries, 0 to 2579
Data columns (total 12 columns):
 #   Column         Non-Null Count  Dtype
---  ------         --------------  -----
 0   Property_Name  2580 non-null   object
 1   Location       2580 non-null   object
 2   Region         2580 non-null   object
 3   Property_Age   2580 non-null   object
 4   Availability   2580 non-null   object
 5   Area_Tpye      2580 non-null   object
 6   Area_SqFt      2580 non-null   float64
 7   Rate_SqFt      2580 non-null   int64
 8   Floor_No       2580 non-null   int64
 9   Bedroom        2580 non-null   int64
 10  Bathroom       2580 non-null   int64
 11  Price_Lakh     2580 non-null   float64
dtypes: float64(2), int64(4), object(6)
memory usage: 242.0+ KB
```

[ ]:
```
mum_prop.Availability.value_counts()
```

[ ]:
```
Availability
Ready To Move         2565
Under Construction      15
Name: count, dtype: int64
```

[ ]:
```
mum_prop.Region.value_counts().head(20)
```

[ ]:
```
Region
Central Mumbai                225
Mira Road                     201
Kharghar Navi-Mumbai          196
Ulwe Navi-Mumbai              174
Mumbai Thane                  166
Mumbai Harbour                104
Dombivli Thane                 82
Hiranandani-Estate Thane       79
Ghansoli Navi-Mumbai           76
Kamothe Navi-Mumbai            64
Panvel Navi-Mumbai             61
Road Thane                     47
Kandivali Mumbai               44
Manpada Thane                  42
Thane Thane                    41
Koparkhairane Navi-Mumbai      39
Parel Mumbai                   36
Malad Mumbai                   31
Taloja Navi-Mumbai             31
Naupada Thane                  30
Name: count, dtype: int64
```

[ ]:
```
mum_prop.Region.nunique()
```

[ ]:
```
210
```

[ ]:
```
mum_prop.describe().round(2)
```

[ ]:

	Area_SqFt	Rate_SqFt	Floor_No	Bedroom	Bathroom	Price_Lakh
count	2580.00	2580.00	2580.00	2580.00	2580.00	2580.00
mean	1026.11	19111.85	8.84	1.96	2.07	174.39
std	2287.13	40760.88	8.10	0.84	0.75	369.48
min	33.57	84.00	-1.00	1.00	1.00	13.00
25%	630.75	8791.75	3.00	1.00	2.00	67.00
50%	850.00	13785.00	6.00	2.00	2.00	111.50
75%	1156.00	22650.00	12.00	2.00	2.00	200.00
max	100000.00	1650000.00	59.00	6.00	7.00	16500.00

[ ]:
```
Q1 = np.quantile(mum_prop.Area_SqFt,0.02)
Q3 = np.quantile(mum_prop.Area_SqFt,0.98)
med = np.median(mum_prop.Area_SqFt)
IQR = Q3 - Q1
upper_bound = Q3+(1.5*IQR)
lower_bound = Q1-(1.5*IQR)
outliers1 = mum_prop.Area_SqFt[(mum_prop.Area_SqFt <= lower_bound) | (mum_prop.
 ↪Area_SqFt >= upper_bound)]
```

```
mum_prop = mum_prop.drop(outliers1.index).reset_index(drop=True)
```

[ ]:
```
Q1 = np.quantile(mum_prop.Rate_SqFt,0.02)
Q3 = np.quantile(mum_prop.Rate_SqFt,0.80)
med = np.median(mum_prop.Rate_SqFt)
IQR = Q3 - Q1
upper_bound = Q3+(1.5*IQR)
lower_bound = Q1-(1.5*IQR)
outliers1 = mum_prop.Rate_SqFt[(mum_prop.Rate_SqFt <= lower_bound) | (mum_prop.
 ↪Rate_SqFt >= upper_bound)]

mum_prop = mum_prop.drop(outliers1.index).reset_index(drop=True)
```

[ ]:
```
mum_prop.describe().round(2)
```

[ ]:

	Area_SqFt	Rate_SqFt	Floor_No	Bedroom	Bathroom	Price_Lakh
count	2538.00	2538.00	2538.00	2538.00	2538.00	2538.00
mean	948.95	16546.14	8.79	1.95	2.05	161.27
std	486.53	10192.02	7.98	0.83	0.73	162.12
min	185.00	1808.00	-1.00	1.00	1.00	13.00
25%	634.25	8762.25	3.00	1.00	2.00	66.25
50%	850.00	13629.50	6.00	2.00	2.00	110.00
75%	1150.00	22278.75	12.00	2.00	2.00	196.75
max	5000.00	55611.00	55.00	6.00	7.00	1900.00

[ ]:
```
mum_prop.duplicated().sum()
```

[ ]:
```
7
```

[ ]:
```
mum_prop = mum_prop.drop_duplicates(ignore_index=True)
```

[ ]:
```
mum_prop.isna().sum()
```

[ ]:
```
Property_Name    0
Location         0
Region           0
Property_Age     0
Availability     0
Area_Tpye        0
Area_SqFt        0
Rate_SqFt        0
Floor_No         0
Bedroom          0
Bathroom         0
Price_Lakh       0
dtype: int64
```

[ ]:
```
mum_prop.shape
```

[ ]:
```
(2531, 12)
```

[ ]:
```
mum_prop.to_csv('Final_Project.csv', index_label = False)
mum_prop = pd.read_csv('Final_Project.csv')
```

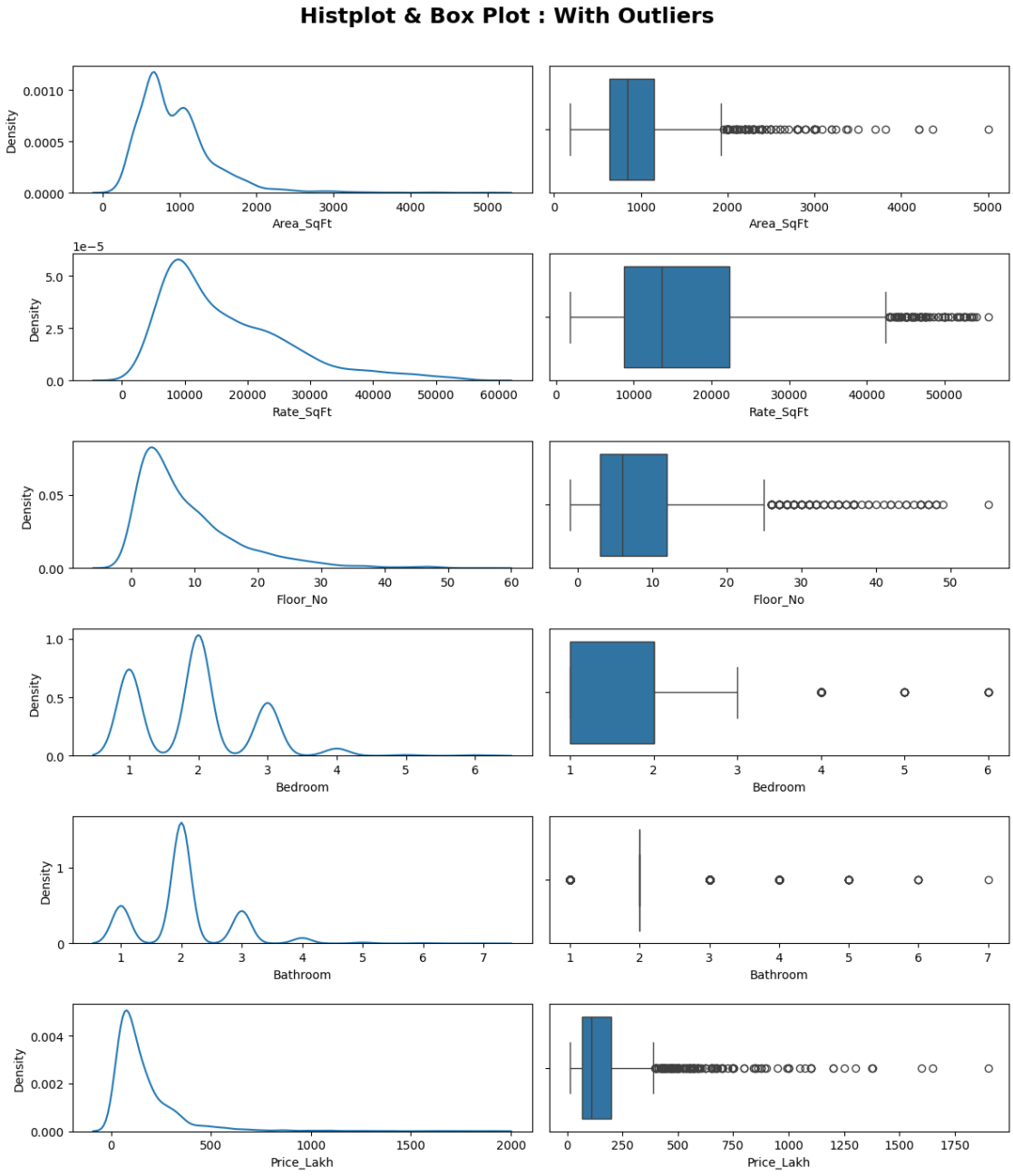
0.4 3. Data Visualization

0.4.1 3.1 Set the rcParams for all next Visualization

[ ]:
```
rcParams = {'xtick.labelsize':'14','ytick.labelsize':'14','axes.labelsize':'16'}
```

0.4.2 3.2 Hunting Outliers

[ ]:
```
fig, ax = plt.subplots(6,2, figsize = (12,14))

fig.suptitle('Histplot & Box Plot : With Outliers', size = 18,␣
 ↪fontweight="bold")
sns.kdeplot(ax= ax[0,0], data = mum_prop, x = 'Area_SqFt')
sns.boxplot(ax= ax[0,1], data = mum_prop, x = 'Area_SqFt')
sns.kdeplot(ax= ax[1,0], data = mum_prop, x = 'Rate_SqFt')
sns.boxplot(ax= ax[1,1], data = mum_prop, x = 'Rate_SqFt')
sns.kdeplot(ax= ax[2,0], data = mum_prop, x = 'Floor_No')
sns.boxplot(ax= ax[2,1], data = mum_prop, x = 'Floor_No')
sns.kdeplot(ax= ax[3,0], data = mum_prop, x = 'Bedroom')
sns.boxplot(ax= ax[3,1], data = mum_prop, x = 'Bedroom')
sns.kdeplot(ax= ax[4,0], data = mum_prop, x = 'Bathroom')
sns.boxplot(ax= ax[4,1], data = mum_prop, x = 'Bathroom')
sns.kdeplot(ax= ax[5,0], data = mum_prop, x = 'Price_Lakh')
sns.boxplot(ax= ax[5,1], data = mum_prop, x = 'Price_Lakh')

pylab.rcParams.update(rcParams)
fig.tight_layout()
fig.subplots_adjust(top=0.93)
plt.show()

#fig.savefig('Outliers', dpi = 500)
```



0.5 Obeservation :

Based on data following colums has most outliers & mostly left skewed data:

- Price_Lakh
- Area_SqFt
- Rate_SqFt
- Floor_No

0.6 4. Heatmap

[ ]:
```
fig = plt.figure(figsize=(10,8))

sns.heatmap(mum_prop.corr(), annot = True, cmap='YlGnBu', linewidth=.5)
fig.suptitle('Heatmap Mumbai Property Data',fontsize=18, fontweight="bold")
pylab.rcParams.update(rcParams)
fig.tight_layout()
plt.show()

#fig.savefig('Heatmap', dpi = 250)
```

0.7 5. Exploratory Data Analysis

Convert all variable into following categories

1 Binary Variables
2 Ordinal Varibles
3 Continous Data
4 Target Variable

0.7.1 5.1 Checking for Binary, Oridinal, Continous Data & Target Column

[ ]:
```
num_columns = mum_prop.describe().columns
categorical_cols = mum_prop.describe(include= 'object').columns
```

[ ]:
```
mum_prop.nunique()
```

[ ]:
```
Property_Name     894
Location         1294
Region            209
Property_Age       12
Availability        2
Area_Tpye           4
Area_SqFt         696
Rate_SqFt        1990
Floor_No           52
Bedroom             6
Bathroom            7
Price_Lakh        467
dtype: int64
```

[ ]:
```
binary_variables = [i  for i in mum_prop.columns  if (len(mum_prop[i].unique())
 ↪== 2)]
```

[ ]:
```
binary_variables
```

[ ]:
```
['Availability']
```

```
[ ]: ordinal_variables=[i for i in mum_prop.columns if ((len(mum_prop[i].unique()) >
     ↪2 ) and (len(mum_prop[i].unique()) <= 53))]
```

```
[ ]: ordinal_variables
```

```
[ ]: ['Property_Age', 'Area_Tpye', 'Floor_No', 'Bedroom', 'Bathroom']
```

```
[ ]: continous_variable = [i for i in mum_prop.columns if ((len(mum_prop[i].
     ↪unique()) > 53))]
     continous_variable = continous_variable[3:-1] # Remove Price and Location from
     ↪data
```

```
[ ]: continous_variable
```

```
[ ]: ['Area_SqFt', 'Rate_SqFt']
```

```
[ ]: target_variable = 'Price_Lakh'
```

```
[ ]: target_variable
```

```
[ ]: 'Price_Lakh'
```

0.8 6. Binary Variable

```
[ ]: print(binary_variables)
     print('Element in binary category :', len(binary_variables))
```

```
['Availability']
Element in binary category : 1
```

0.8.1 6.1 Availability Count

```
[ ]: fig = plt.figure(figsize=(6,8))

     plot = sns.barplot(data =mum_prop , x = mum_prop.Availability.value_counts().
     ↪index,
                        y = mum_prop.Availability.value_counts().values)
     for bar in plot.patches:
         plot.annotate(format(bar.get_height(), '.0f'),(bar.get_x() + bar.
     ↪get_width()/2, bar.get_height()),
                       ha='center', va='center', size=15, xytext=(0,8),
     ↪textcoords='offset points')

     fig.suptitle('Availability : Counts',fontsize=18, fontweight="bold")
     plt.xlabel('Availability',)
     plt.ylabel('Count')

     pylab.rcParams.update(rcParams)
```

```
fig.tight_layout()
plt.show()

#fig.savefig('Availability_Bar', dpi = 500)
```

0.9 7. Ordinal Variables

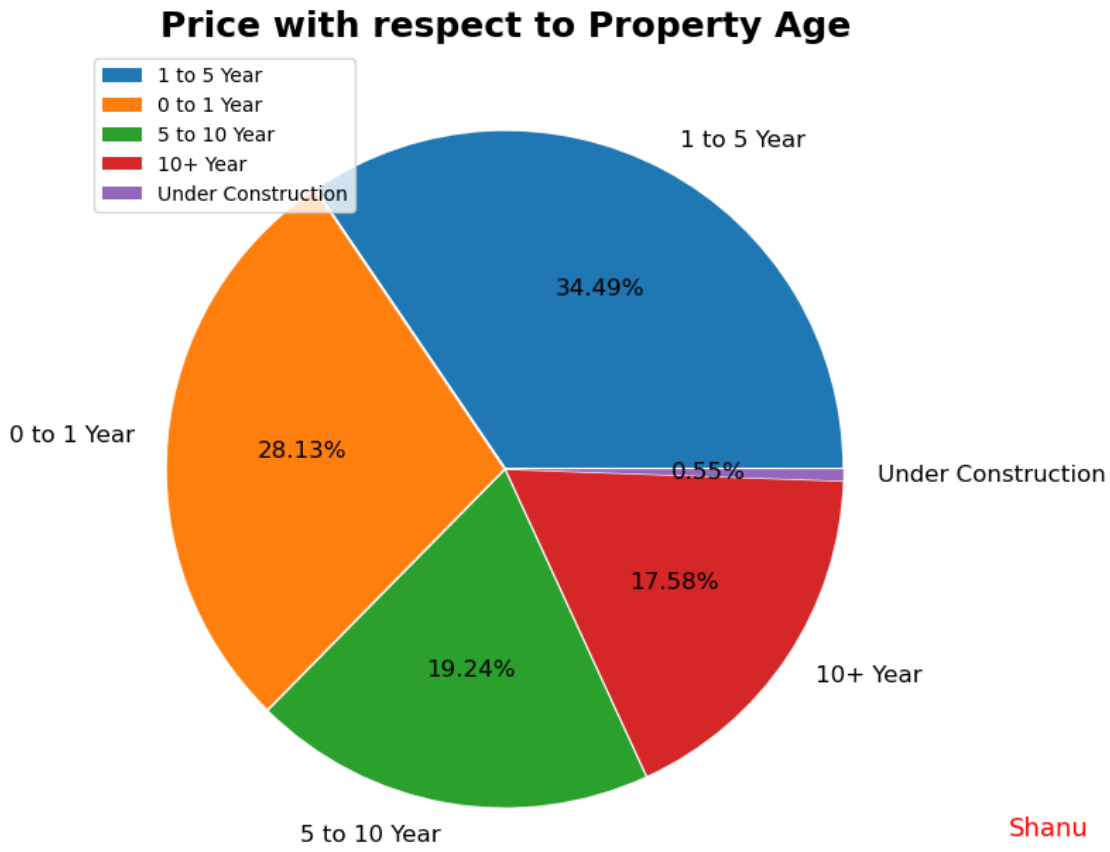
[ ]:
```
print(ordinal_variables)
print('Number of ordinal features is :', len(ordinal_variables))
```

```
['Property_Age', 'Area_Tpye', 'Floor_No', 'Bedroom', 'Bathroom']
Number of ordinal features is : 5
```

0.9.1 7.1 Price with respect to Property Age

[ ]:
```
fig = plt.figure(figsize=(10,6))

sns.barplot(data = mum_prop , x = mum_prop.groupby('Property_Age').median().
 ↪Price_Lakh , y = mum_prop.groupby('Property_Age').median().index)
fig.suptitle('Price with respect to Property Age', fontsize= 18,␣
 ↪fontweight="bold")
fig.text(0.9, 0.15, 'Shanu',fontsize = 13, color ='blue')
pylab.rcParams.update(rcParams)
fig.tight_layout()
plt.show()

#fig.savefig('Property_Age_Price_Bar', dpi = 500)
```

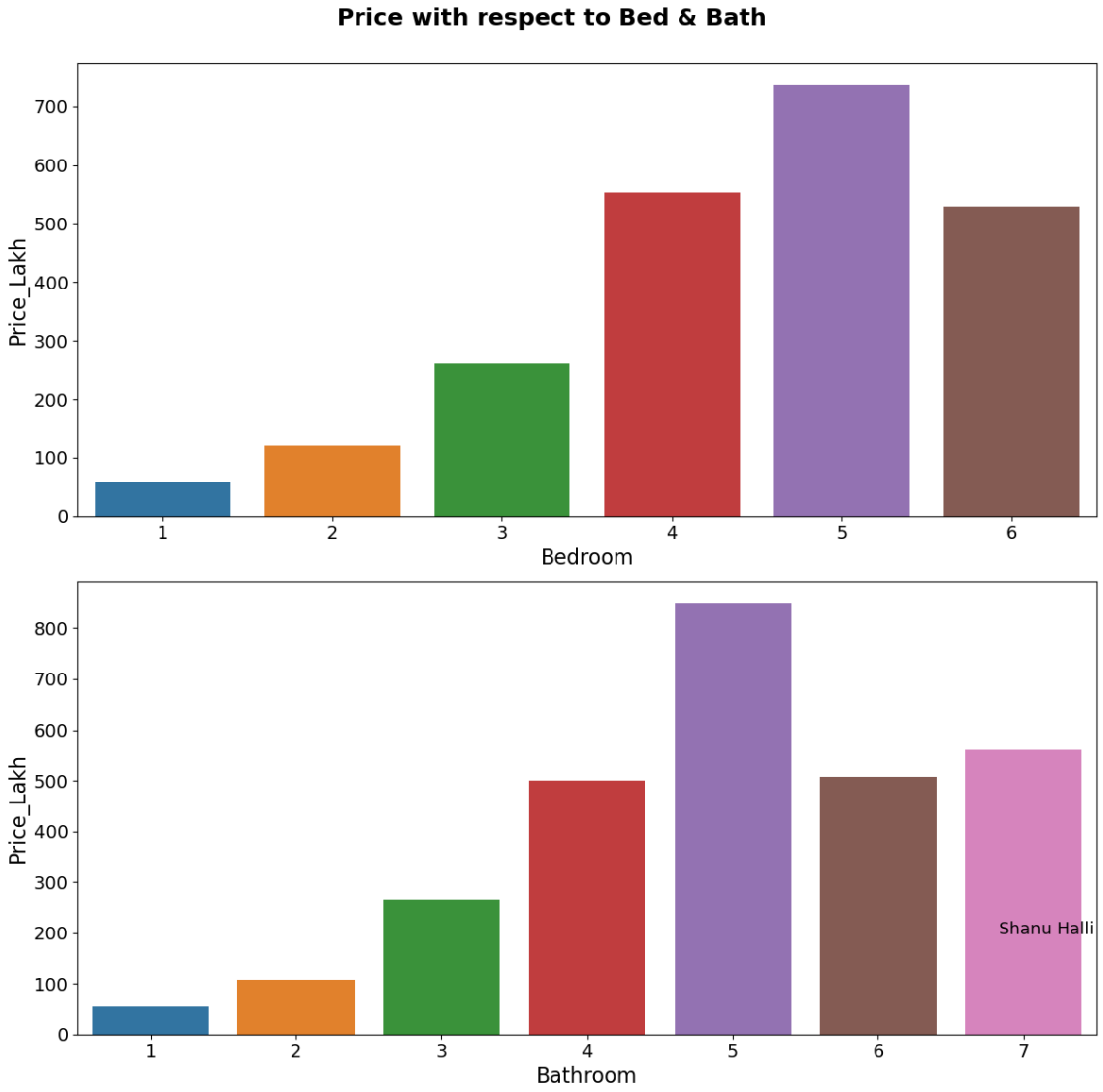
[ ]:
```
fig = plt.figure(figsize = (8,8))
plt.pie(mum_prop['Property_Age'].value_counts(),
       labels=['1 to 5 Year','0 to 1 Year','5 to 10 Year','10+ Year','Under␣
 ↪Construction'],
       autopct= '%.2f%%', textprops = {'size':'large'},explode = [0.005,0.005,0.
 ↪005,0.005,0.005])
plt.legend(loc= 'upper left')
plt.title("Price with respect to Property Age", fontsize = 18, fontweight =␣
 ↪'bold')
fig.text(0.9, 0.15, 'Shanu', fontsize = 13, color ='red')

pylab.rcParams.update(rcParams)
fig.tight_layout()
fig.subplots_adjust(top=0.93)
plt.show()

#fig.savefig('Price_Age_Distribution', dpi = 500)
```



[ ]:
```
fig = plt.figure(figsize=(12,6))
fig.suptitle('Price with respect to Property Age', size = 18, fontweight="bold")
fig.text(0.9, 0.15, 'Shanu Halli',fontsize = 13, color ='blue')

sns.scatterplot(data = mum_prop , x = mum_prop['Property_Age'], y =␣
 ↪mum_prop['Price_Lakh'])
plt.xlabel("Property Age", size=16)
plt.ylabel("Price (Lakhs)", size=16)
plt.xticks(rotation=90)

pylab.rcParams.update(rcParams)
fig.tight_layout()
plt.show()

#fig.savefig('Property_Age_Price_Scatter', dpi = 500)
```

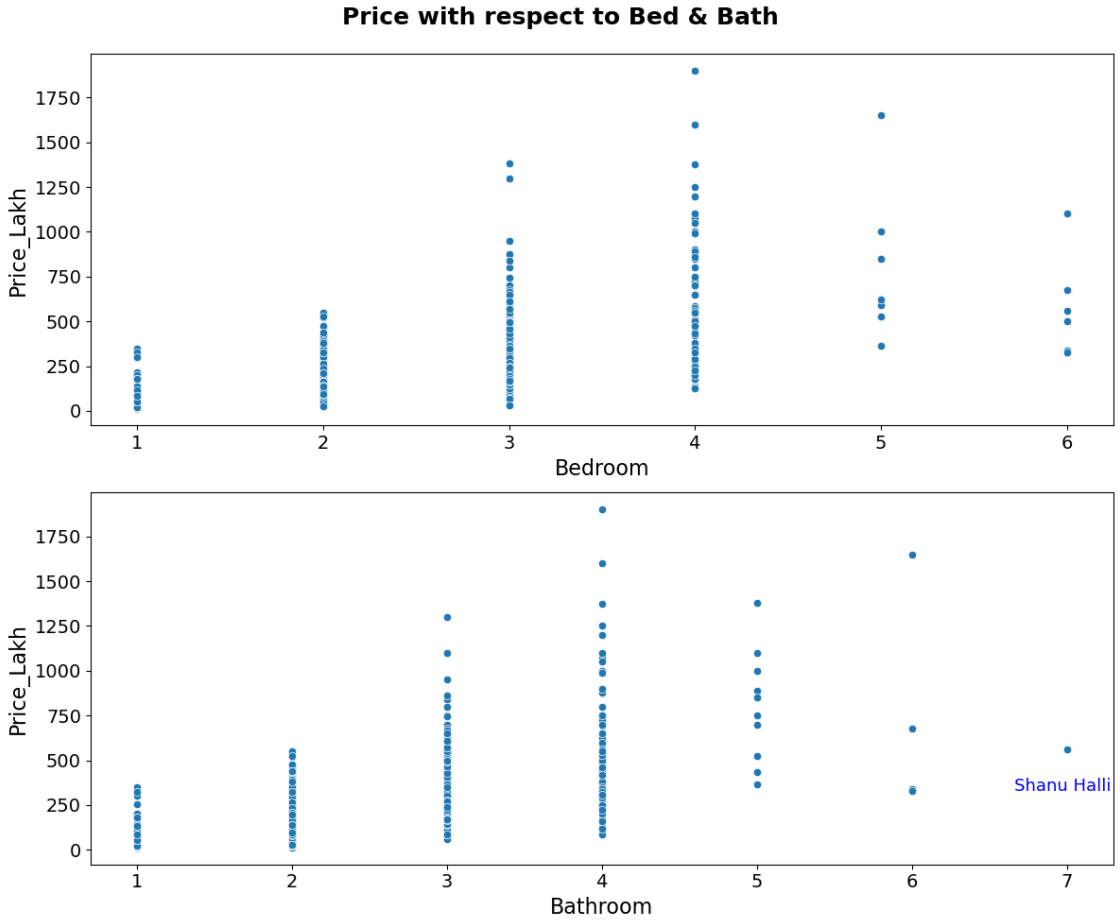
0.9.2 7.2 Price with respect to Bed & Bath

[ ]:
```
fig, ax = plt.subplots(2,1, figsize = (12,12))

sns.barplot(ax= ax[0], data =mum_prop , x = mum_prop.groupby('Bedroom').
 ↪median().index, y = mum_prop.groupby('Bedroom').median().Price_Lakh)
sns.barplot(ax= ax[1], data = mum_prop , x = mum_prop.groupby('Bathroom').
 ↪median().index, y = mum_prop.groupby('Bathroom').median().Price_Lakh)
fig.suptitle('Price with respect to Bed & Bath', size = 18, fontweight="bold")
fig.text(0.9, 0.15, 'Shanu Halli', fontsize = 13, color ='black')

pylab.rcParams.update(rcParams)
fig.tight_layout()
fig.subplots_adjust(top=0.93)
plt.show()

#fig.savefig('BednBath_Price_Bar', dpi = 500)
```



[ ]:
```
fig, ax = plt.subplots(2,1, figsize = (12,10))

sns.scatterplot(ax= ax[0], data = mum_prop , x = mum_prop['Bedroom'], y =␣
↪mum_prop['Price_Lakh'])
sns.scatterplot(ax= ax[1], data = mum_prop , x = mum_prop['Bathroom'], y =␣
↪mum_prop['Price_Lakh'])
fig.suptitle('Price with respect to Bed & Bath', size = 18, fontweight="bold")
fig.text(0.9, 0.15, 'Shanu Halli', fontsize = 13, color ='blue')

pylab.rcParams.update(rcParams)
fig.tight_layout()
fig.subplots_adjust(top=0.93)
plt.show()
```

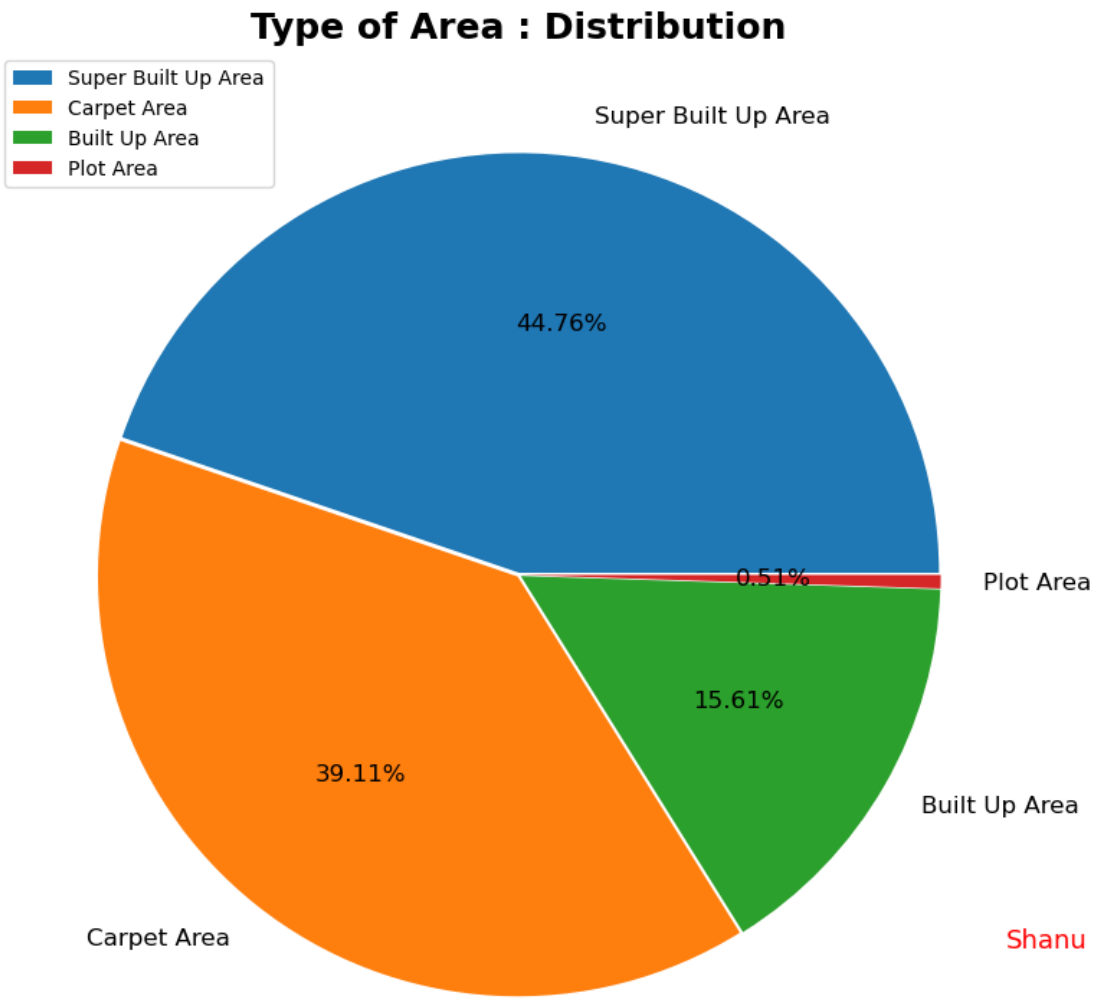
```
#fig.savefig('Bed_Bath_Price_Scatter', dpi = 500)
```



0.9.3 7.3 Area Type Distribution

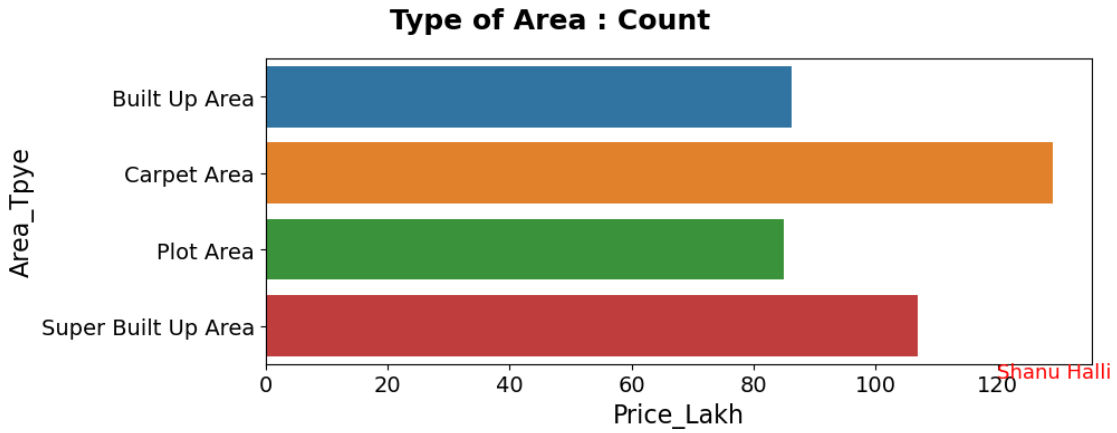
[ ]:
```
fig = plt.figure(figsize = (8,8))
plt.pie(mum_prop['Area_Tpye'].value_counts(),
       labels=['Super Built Up Area','Carpet Area','Built Up Area','Plot Area'],
       autopct= '%.2f%%', textprops = {'size':'large'},explode = [0.005,0.005,0.
 ↪005,0.005])
plt.legend(loc= 'upper left')
plt.title("Type of Area : Distribution", fontsize = 18, fontweight = 'bold')
fig.text(0.9, 0.15, 'Shanu', fontsize = 13, color ='red')

pylab.rcParams.update(rcParams)
fig.tight_layout()
fig.subplots_adjust(top=0.93)
plt.show()
```

```
#fig.savefig('Area_Type_Distribution', dpi = 500)
```



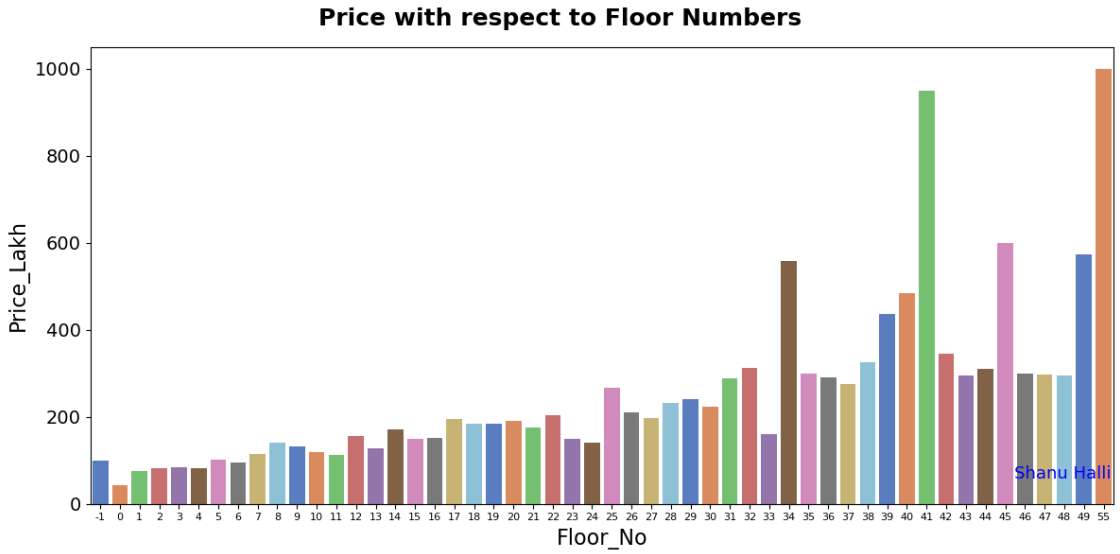
[ ]:
```
fig = plt.figure(figsize=(10,4))

sns.barplot(data =mum_prop , x =mum_prop.groupby('Area_Tpye').median().
  ↪Price_Lakh, y =mum_prop.groupby('Area_Tpye').median().index)
fig.suptitle('Type of Area : Count', fontsize= 18, fontweight="bold")
fig.text(0.9, 0.15, 'Shanu Halli', fontsize = 13, color ='red')
pylab.rcParams.update(rcParams)
fig.tight_layout()
plt.show()
```

```
#fig.savefig('Area_Type_Count_Bar', dpi = 500)
```

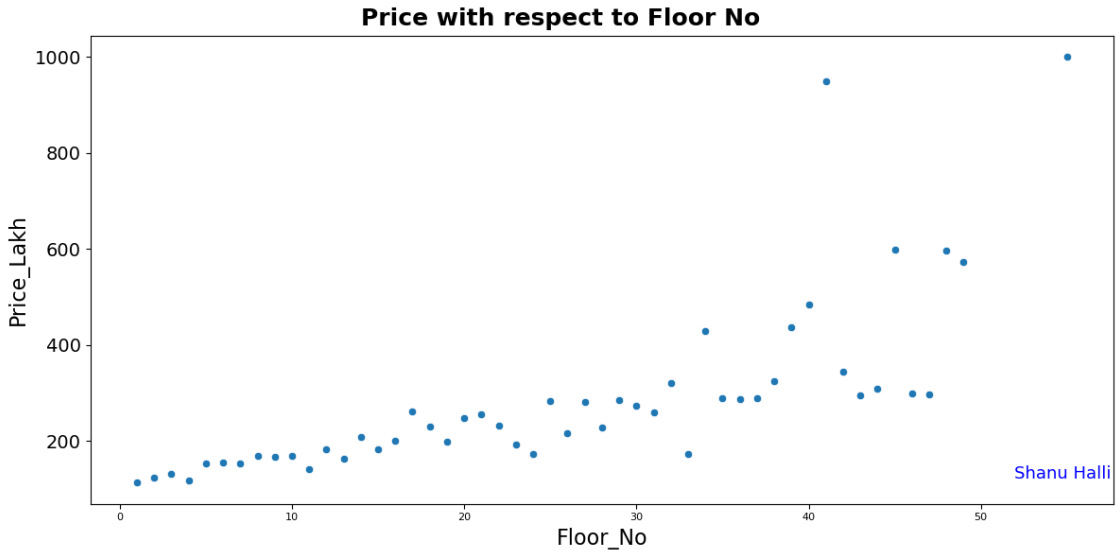


0.9.4 7.4 Price with respect to Floor Numbers

[ ]:
```
fig = plt.figure(figsize=(12,6))
params = {'xtick.labelsize':'8','ytick.labelsize':'14','axes.labelsize':'16'}

sns.barplot(data= mum_prop, x= mum_prop.groupby('Floor_No').median().index, y=␣
 ↪mum_prop.groupby('Floor_No').median().Price_Lakh, palette= 'muted')
fig.suptitle('Price with respect to Floor Numbers', fontsize= 18,␣
 ↪fontweight="bold")
fig.text(0.9, 0.15, 'Shanu Halli', fontsize = 13, color ='blue')
pylab.rcParams.update(params)
fig.tight_layout()
plt.show()

#fig.savefig('Property_Floor_Numbers_Bar', dpi = 500)
```



[ ]:
```
fig = plt.figure(figsize=(12,6))

group_full = mum_prop.groupby('Floor_No')['Price_Lakh'].mean()
group = group_full.reset_index()
group = group[group['Floor_No'] > 0]
group = group[group['Floor_No'] < 60]

x = group['Floor_No']
y = group['Price_Lakh']
fig.suptitle('Price with respect to Floor No', fontsize= 18 , fontweight='bold')
fig.text(0.9, 0.15, 'Shanu Halli', fontsize = 13, color ='blue')
sns.scatterplot(x=x, y=y)

pylab.rcParams.update(rcParams)
fig.tight_layout()
fig.subplots_adjust(top=0.93)
plt.show()

#fig.savefig('FloorNo_Price_Scatter', dpi = 500)
```



0.9.5 From above visualization we have concluded following points for higher Price.

1. As number of bedroom increased price also has incresed
2. As floor number goes higher price also increased
3. 4 BHK and 5 BHK price higher
4. Plot Area criteria is higher price
5. Upcoming New Project prices are higher

0.10 8. Continous Variables

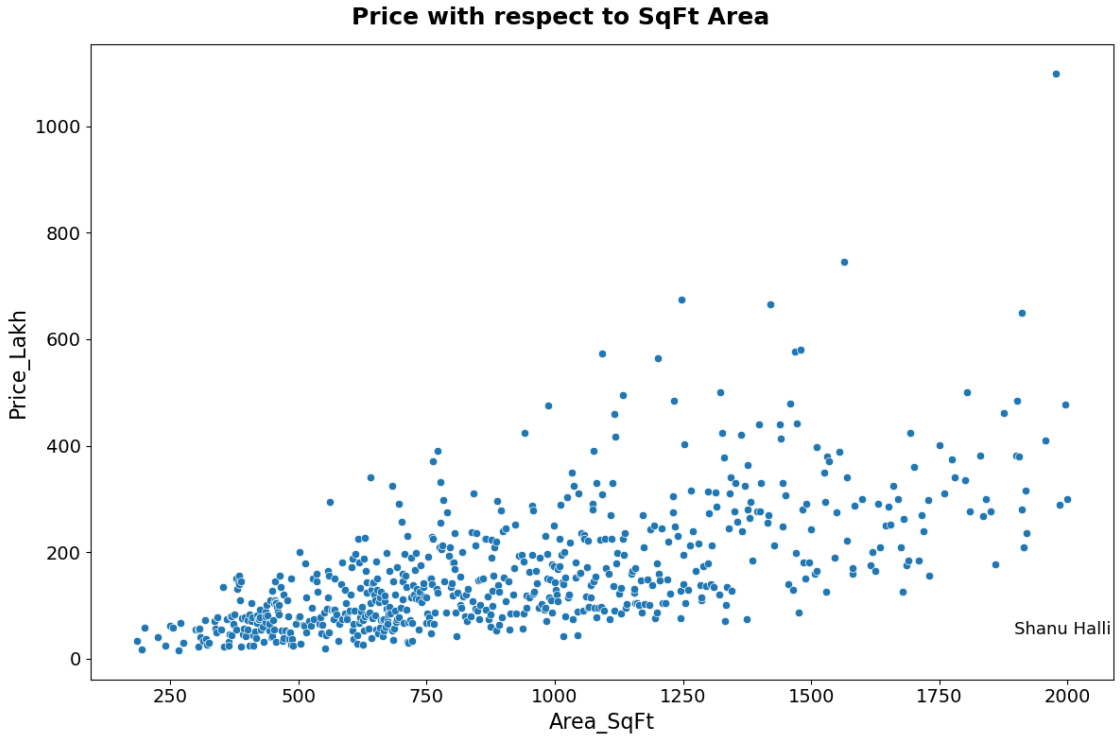
[ ]:
```
for i in continous_variable:
    print("Length of", i,":", len(mum_prop[i].unique()))
```

```
Length of Area_SqFt : 696
Length of Rate_SqFt : 1990
```

0.10.1 8.1 Price with respect to SqFt Area

[ ]:
```
fig = plt.figure(figsize=(12,8))

group_full = mum_prop.groupby('Area_SqFt')['Price_Lakh'].mean()
group = group_full.reset_index()
group = group[group['Area_SqFt'] > 0]
group = group[group['Area_SqFt'] < 2000]

x = group['Area_SqFt']
y = group['Price_Lakh']
fig.suptitle('Price with respect to SqFt Area', fontsize= 18 ,␣
 ↪fontweight='bold')
```

```
fig.text(0.9, 0.15, 'Shanu Halli', fontsize = 13, color ='black')
sns.scatterplot(x=x, y=y)

pylab.rcParams.update(rcParams)
fig.tight_layout()
fig.subplots_adjust(top=0.93)
plt.show()

#fig.savefig('SqFt_Area_Price_Scatter', dpi = 500)
```

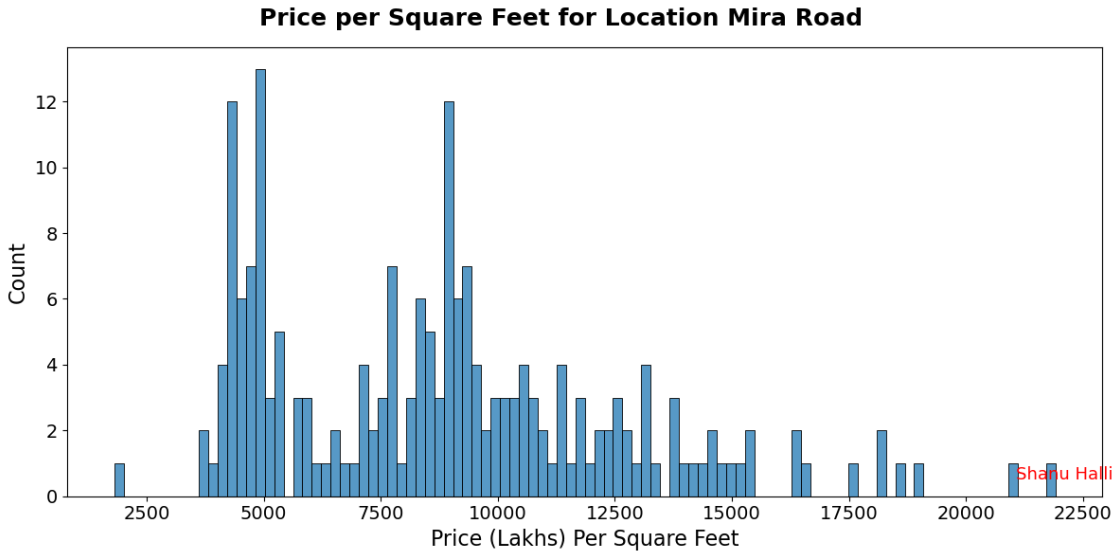


0.10.2 8.2 Data visualization for 'Rate_SqFt' for Location 'Mira Road'

Note here its normal distribuation of data so outlier removal using stad deviation and mean works perfectly here

[ ]:
```
fig = plt.figure(figsize=(12,6))
fig.suptitle('Price per Square Feet for Location Mira Road', size = 18,␣
 ↪fontweight="bold")
fig.text(0.9, 0.15, 'Shanu Halli', fontsize = 13, color ='red')

sns.histplot(mum_prop[mum_prop.Region == "Mira Road"].Rate_SqFt ,bins=100)
plt.xlabel("Price (Lakhs) Per Square Feet")
plt.ylabel("Count")
```

```
pylab.rcParams.update(rcParams)
fig.tight_layout()
plt.show()

#fig.savefig('Rate_SqFt_Bar', dpi = 500)
```



0.11 9. Target Varible

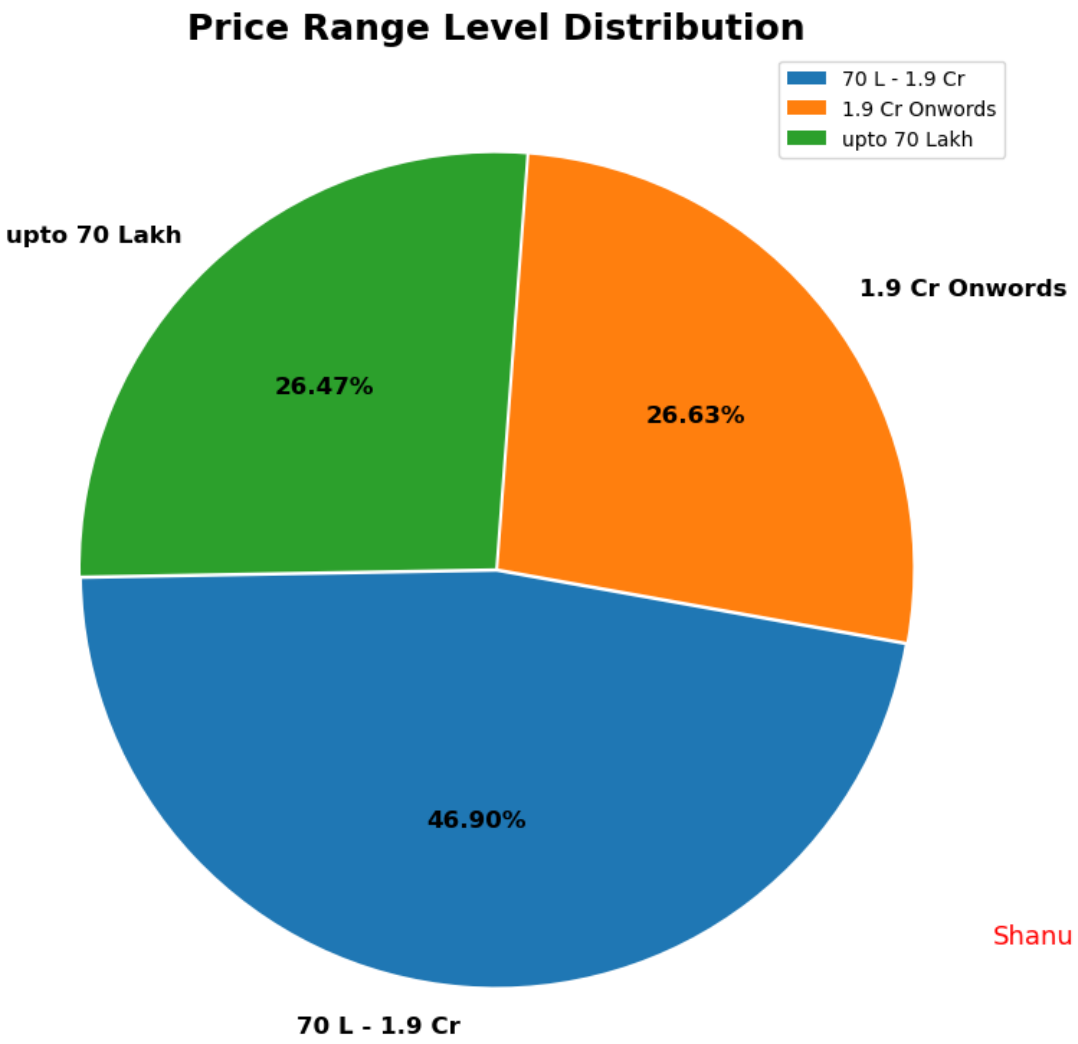
[ ]:
```
mum_prop['Price_Cat'] = pd.cut(x = mum_prop['Price_Lakh'], bins =␣
↪[13,70,190,16500], labels=['Low','Medium','High'], right = False)
mum_prop.Price_Cat.value_counts()
```

[ ]:
```
Medium    1187
High       674
Low        670
Name: Price_Cat, dtype: int64
```

0.11.1 Checking for Imbalanced or balanced dataset with regards to the Target

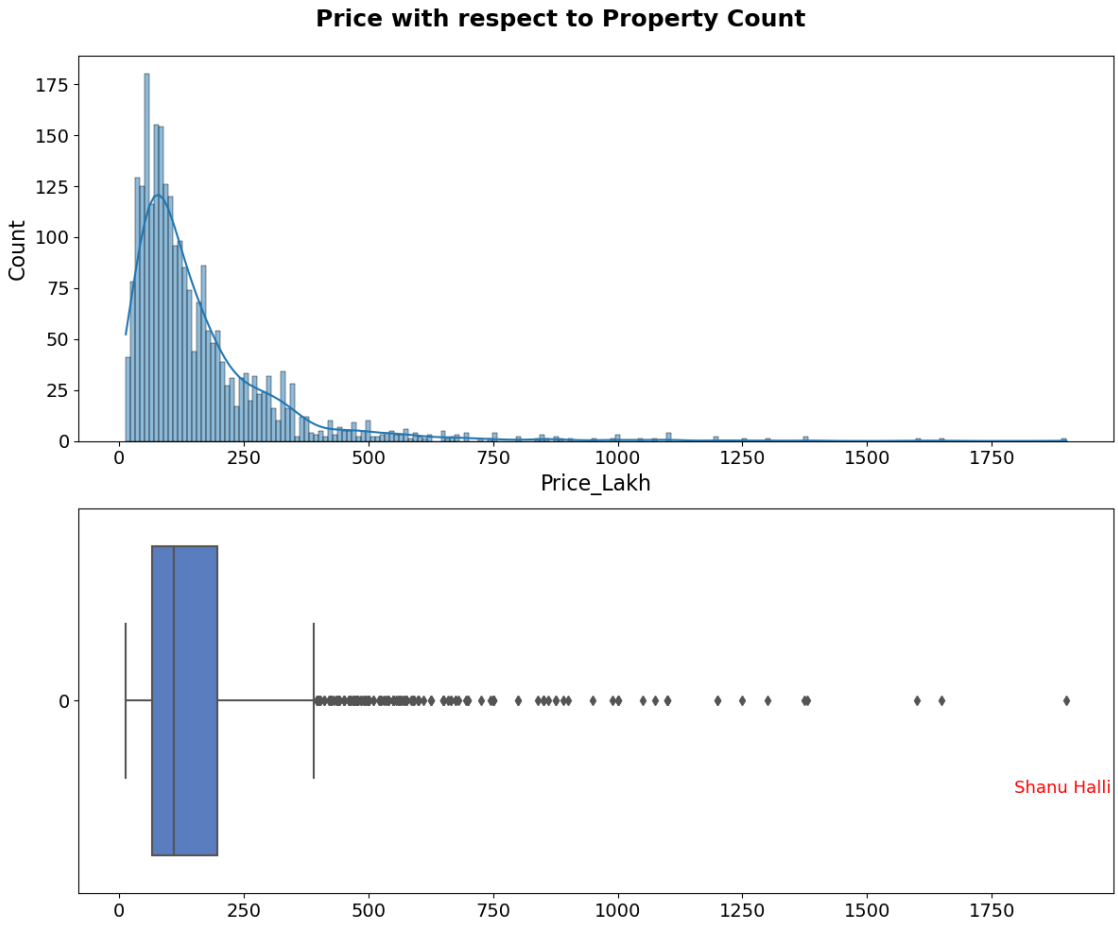
[ ]:
```
fig = plt.figure(figsize = (8,8))

plt.pie(mum_prop['Price_Cat'].value_counts(), labels= ['70 L - 1.9 Cr','1.9 Cr␣
↪Onwords','upto 70 Lakh'],
        explode= [0.005,0.005,0.005], autopct= '%.2f%%', startangle= 181,␣
↪textprops= {'size':'large','fontweight':'bold'})
plt.legend(loc= 'upper right')
plt.title("Price Range Level Distribution", fontsize = 18, fontweight = 'bold')
```

```
fig.text(0.9, 0.15, 'Shanu', fontsize = 13, color ='red')

pylab.rcParams.update(rcParams)
fig.tight_layout()
fig.subplots_adjust(top=0.93)
plt.show()

#fig.savefig('Price_Range_Distribution', dpi = 500)
```



[ ]:
```
fig, ax = plt.subplots(2,1, figsize = (12,10))

fig.suptitle('Price with respect to Property Count', size = 18,␣
 ↪fontweight="bold")
```

```
fig.text(0.9, 0.15, 'Shanu Halli', fontsize = 13, color ='red')
sns.histplot(ax= ax[0],data=mum_prop["Price_Lakh"], kde =  True, bins = 200)
sns.boxplot(ax= ax[1], data=mum_prop["Price_Lakh"], orient="h", palette='muted')

pylab.rcParams.update(rcParams)
fig.tight_layout()
fig.subplots_adjust(top=0.93)
plt.show()

#fig.savefig('Price_Count_Bar', dpi = 500)
```

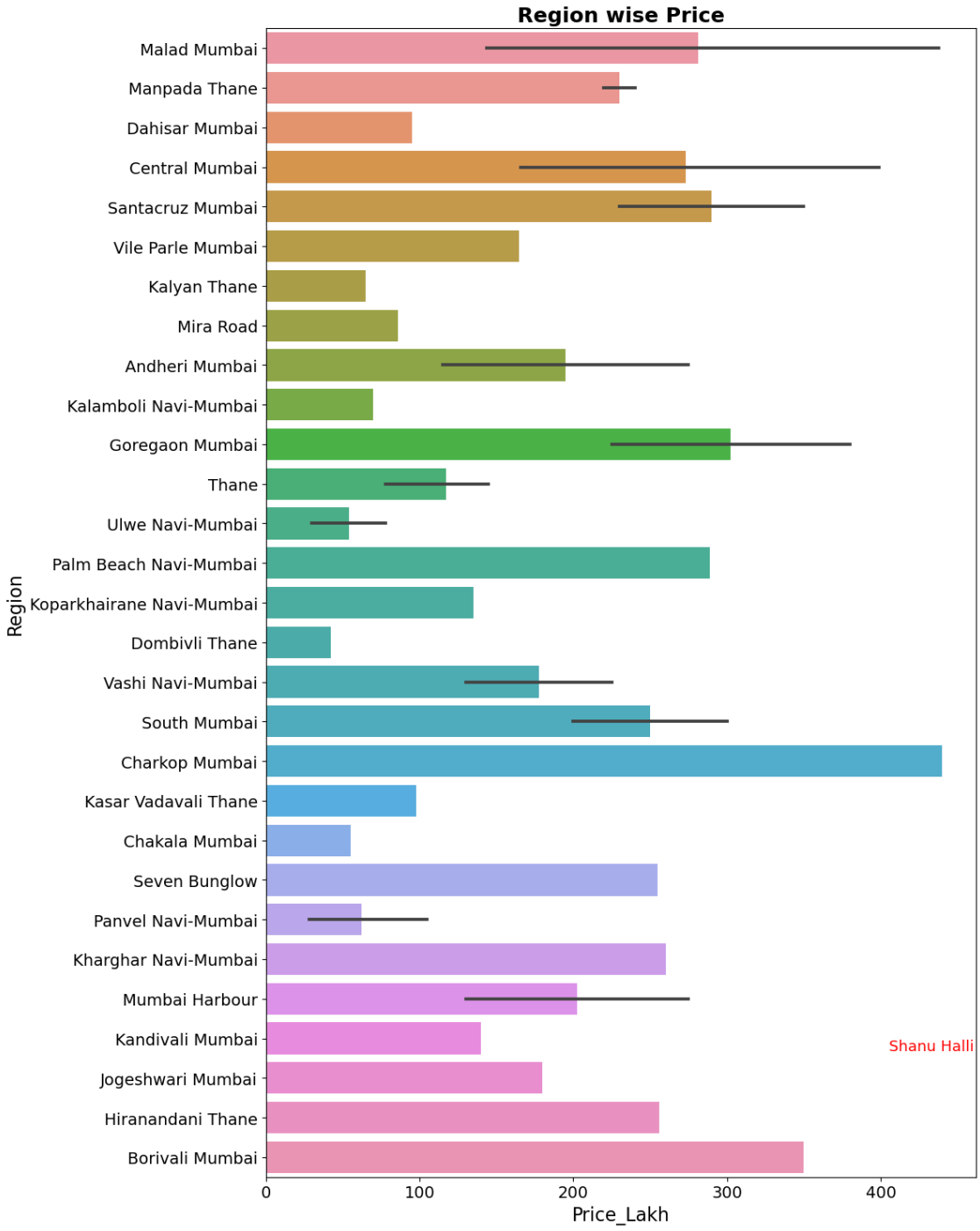


0.12 10. Bar plot Region wise Price

[ ]:
```
import plotly.graph_objects as px
import plotly.express as go
import numpy as np

x = mum_prop['Region']
```

```
y = mum_prop['Price_Lakh']

plot = px.Figure(data=[px.Bar(x=x, y=y)])
plot.
 ↪update_layout(xaxis=dict(rangeselector=dict(buttons=list([dict(count=1,stepmode="backward"))
                                rangeslider=dict(visible=True)),width=900,␣
 ↪height=900)

plot.show()
```

[ ]:
```
fig  = plt.figure(figsize=(12,15))
sns.barplot(x='Price_Lakh',y='Region',data=mum_prop.head(50))
plt.title('Region wise Price', size = 18, fontweight="bold")
fig.text(0.9, 0.15, 'Shanu Halli', fontsize = 13, color ='red')

pylab.rcParams.update(rcParams)
fig.tight_layout()
plt.show()

#fig.savefig('Region_wise_Price_Bar', dpi = 500)
```


Region wise Price
Malad Mumbai
Manpada Thane
Dahisar Mumbai
Central Mumbai
Santacruz Mumbai
Vile Parle Mumbai
Kalyan Thane
Mira Road
Andheri Mumbai
Kalamboli Navi-Mumbai
Goregaon Mumbai
Thane
Ulwe Navi-Mumbai
Palm Beach Navi-Mumbai
Koparkhairane Navi-Mumbai
Dombivli Thane
Vashi Navi-Mumbai
South Mumbai
Charkop Mumbai
Kasar Vadavali Thane
Chakala Mumbai
Seven Bunglow
Panvel Navi-Mumbai
Kharghar Navi-Mumbai
Mumbai Harbour
Kandivali Mumbai
Jogeshwari Mumbai
Hiranandani Thane
Borivali Mumbai
Region
0
100
200
300
400
Price_Lakh
Shanu Halli

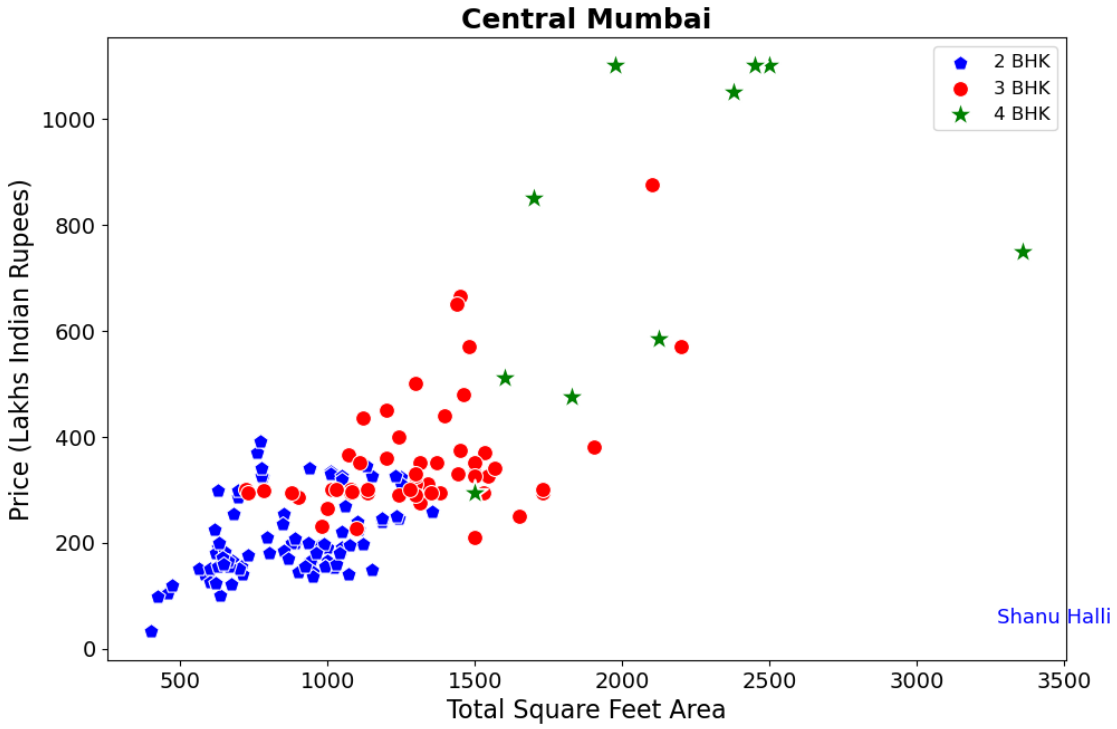
0.13 11. Check for a given Region how does the 2 BHK and 3 BHK Property Prices look like

[ ]:
```
mum_prop.Region.nunique()
```

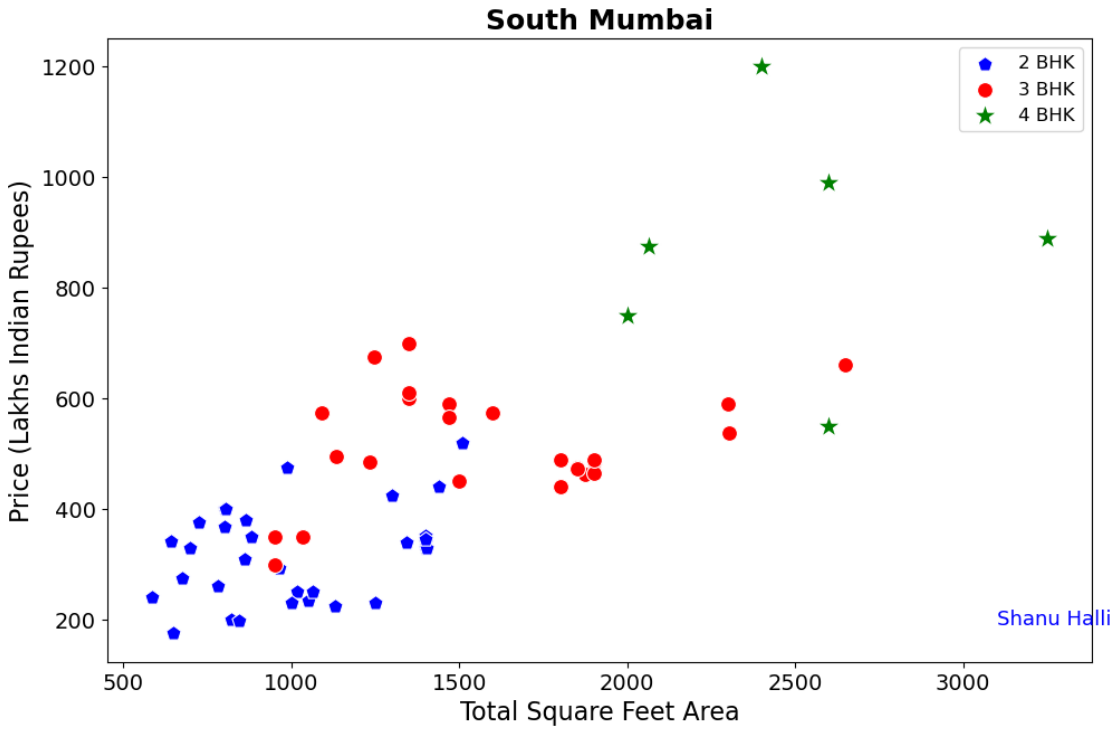
[ ]:
```
145
```

[ ]:
```
def plot_scatter_chart1(mum_prop,Region):
    fig  = plt.figure(figsize=(10,7))
    bhk2 = mum_prop[(mum_prop.Region==Region) & (mum_prop.Bedroom==2)]
    bhk3 = mum_prop[(mum_prop.Region==Region) & (mum_prop.Bedroom==3)]
    bhk4 = mum_prop[(mum_prop.Region==Region) & (mum_prop.Bedroom==4)]
    plt.rcParams['figure.figsize'] = (14,12)
    sns.scatterplot(x=bhk2.Area_SqFt,y=bhk2.
 ↪Price_Lakh,marker='p',color='blue',label='2 BHK',s=100)
    sns.scatterplot(x=bhk3.Area_SqFt,y=bhk3.
 ↪Price_Lakh,marker='o',color='red',label='3 BHK',s=100)
    sns.scatterplot(x=bhk4.Area_SqFt,y=bhk4.
 ↪Price_Lakh,marker='*',color='green',label='4 BHK',s=300)
    plt.xlabel("Total Square Feet Area", )
    plt.ylabel("Price (Lakhs Indian Rupees)")
    plt.title(Region, fontsize = 18, fontweight="bold")
    fig.text(0.9, 0.15, 'Shanu Halli', fontsize = 13, color ='blue')


    pylab.rcParams.update(rcParams)
    plt.legend(fontsize = 12)
    fig.tight_layout()
    fig.subplots_adjust(top=0.90)
    #fig.savefig(Region, dpi = 500)
```

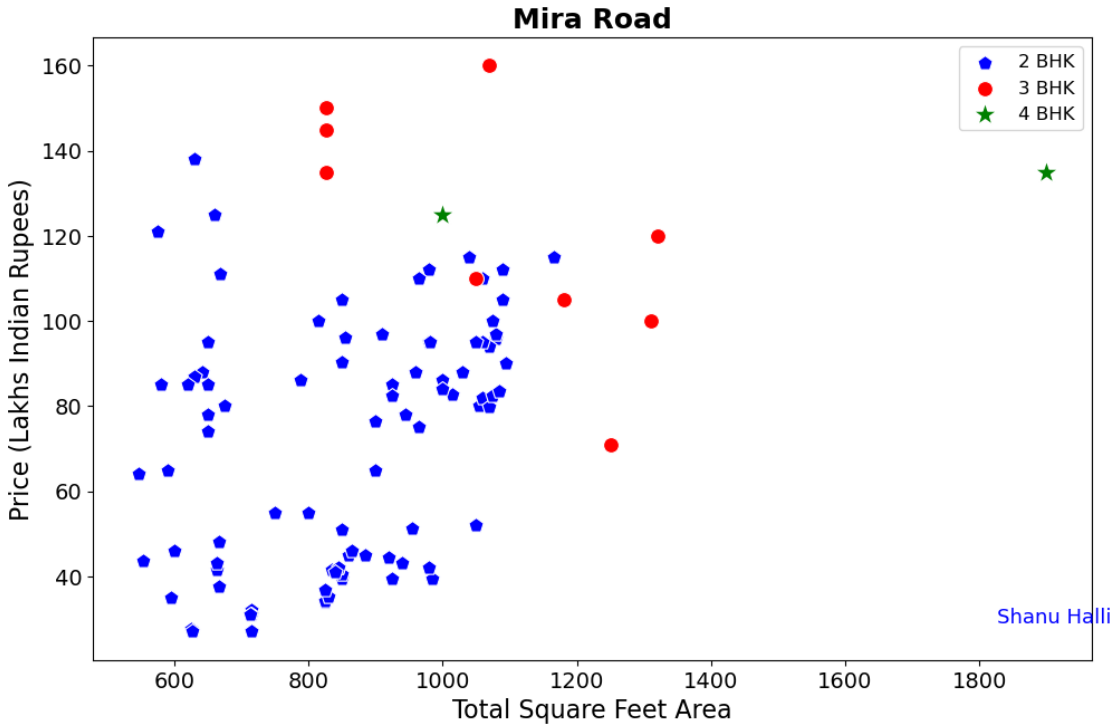
[ ]:
```
plot_scatter_chart1(mum_prop,"Central Mumbai")
```



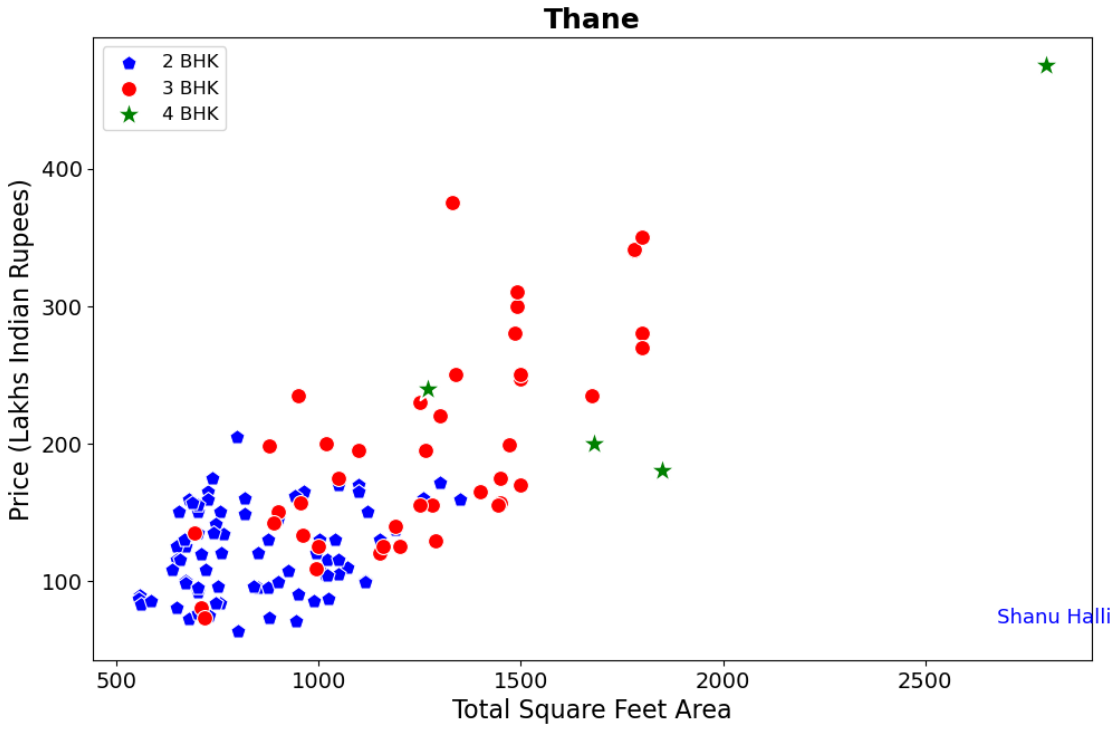
[ ]:
```
plot_scatter_chart1(mum_prop,"South Mumbai")
```



[ ]:
```
plot_scatter_chart1(mum_prop,"Mira Road")
```



[ ]:
```
plot_scatter_chart1(mum_prop,"Thane")
```



0.14 12. Location Map (Geocoders)

[ ]:
```
df = pd.read_csv('Map_Location.csv')

lat   = list(df['Latitude'])
lon   = list(df['Longitude'])
name  = list(df['Property_Name'])
add   = list(df['Location'])
price = list(df['Price'])
age   = list(df['Property_Age'])
avail = list(df['Availability'])
rate  = list(df['Rate_SqFt'])

gmap  = folium.Map(location=[19.15940, 73.07068], zoom_start=11)
fg    = folium.FeatureGroup(name="My Map").add_to(gmap)
```

[ ]:
```
for lat,lon,name,add,price,age,avail,rate in␣
 ↪zip(lat,lon,name,add,price,age,avail,rate):
   html = f"""<p style="color:green" > Property Name : {name}<p/>
              <p style="color:green" > Address : {add}<p/>
              <p style="color:red" > Price : {price}<p/>
              <p style="color:red" > Rate per SqFt : {rate}<p/>
              <p style="color:blue" > Property Age : {age}<p/>
```

```
                <p style="color:blue" > Availability : {avail}<p/>
            """
    iframe = folium.IFrame(html, width=250, height=270)
    popup  = folium.Popup(iframe, max_width=300)
    marker = folium.Marker([lat,lon], popup=(popup)).add_to(gmap)
    gmap.add_child(marker)

gmap.add_child(fg)
#gmap.save("mumbai_property.html")
```

[ ]: <folium.folium.Map at 0x230a97582b0>

1 The End !!