Toronto Housing Market

Housing market in Toronto is hot. During this pandemic, I have heard demand for housing has been increased and prices has gone up, so it's not a bad idea to check this. I was not able to obtain recent data and only data I was able to get was from Kaggle which is provided to public by Toronto Real Estate Board. I created this analysis so once TREBB release new dataset I have my code ready.

```

```

Set up - Imports and Reading

```
# Importing Libraries

import pandas as pd
import numpy as np

import matplotlib.pyplot as plt
%matplotlib inline
import seaborn as sns
sns.set(color_codes=True)
import itertools
import folium
from folium import Map
```

```
# Reading database
```

```
database=pd.read_csv('properties.csv')
database.head()

```

	Unnamed: 0	Address	AreaName	Price ($)	lat	lng
0	0	86 Waterford Dr Toronto, ON	Richview	999888	43.679882	-79.544266
1	1	#80 - 100 BEDDOE DR Hamilton, ON	Chedoke Park B	399900	43.250000	-79.904396
2	2	213 Bowman Street Hamilton, ON	Ainslie Wood East	479000	43.251690	-79.919357
3	3	102 NEIL Avenue Hamilton, ON	Greenford	285900	43.227161	-79.767403
4	6	#1409 - 230 King St Toronto, ON	Downtown	362000	43.651478	-79.368118

Clean up

```
# Cleaning data with unacceptable latitude and longitude values, and reasonable lower price
database=database.drop(database[abs(database.lat>90)].index)
database=database.drop(database[abs(database.lng>180)].index)
database=database.dropna()
database=database.drop(database[database['Price ($)']<100000].index)
```

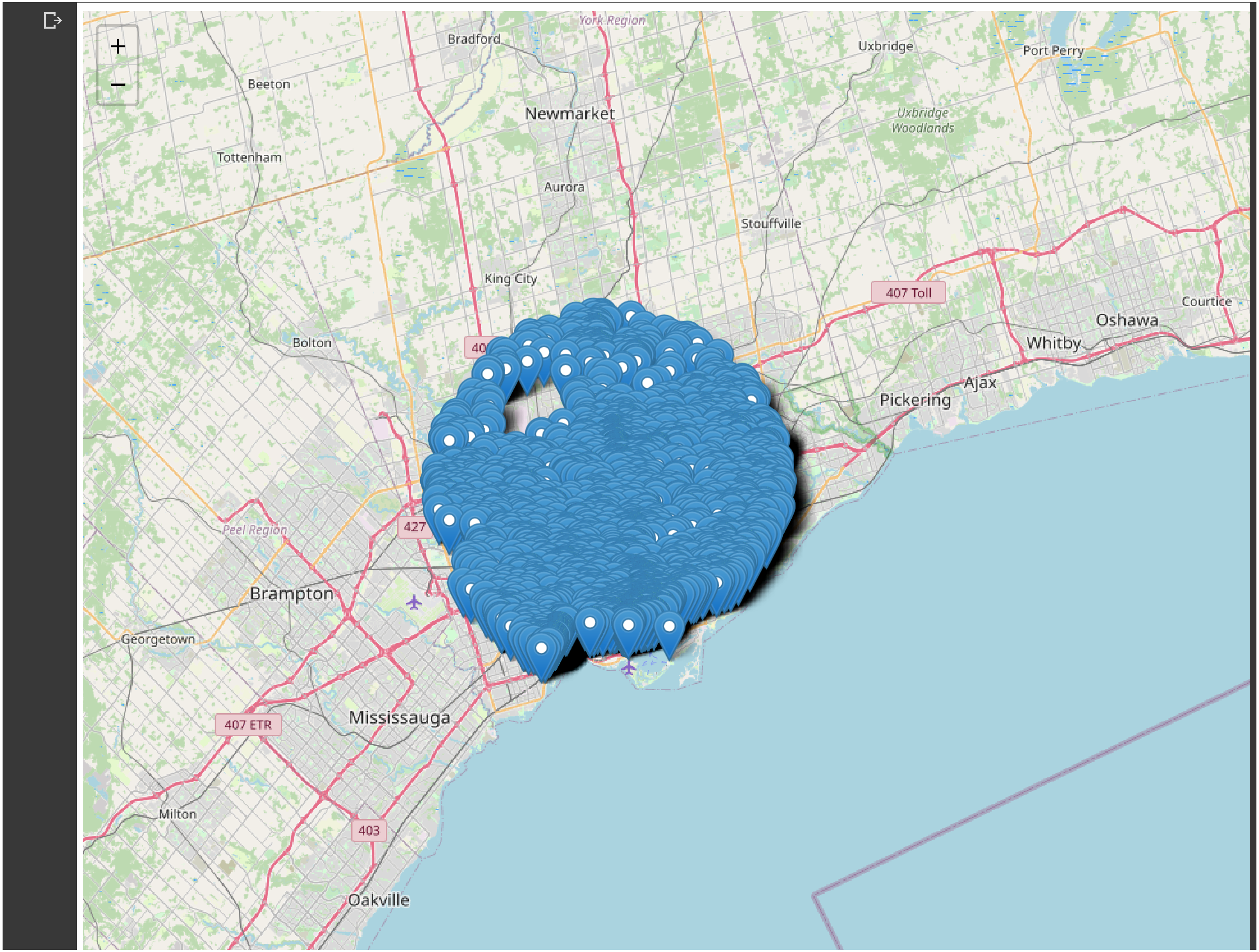
```
print(database.size)
print(database.shape)
database['Price ($)'].max()
```

```
133716
(22286, 6)
32500000
```

The dataset seems to have areaname, but I don't know the all the areas in Greater Toronto Area, so I decided to clean it up with lat and lng information

```
# Finding distance from the centre of Toronto. I pick Allen road and eEnglinton as the centre
# and I am going to find 40km range away from this point. This point coordinate
# are : lat (43.73976) and long (-79.42126)


# here a distance finder function has been created:

from geopy.distance import geodesic
def distance_finder (lat, lng):
  centre = (43.73976, -79.42126)
  point= (lat,lng)
  distance= geodesic(centre, point).km
  return distance

# lambda operation on Database
database['Distance']=database.apply(lambda x: distance_finder(x['lat'],x['lng']), axis=1)
# df is the area of my interest
df=database[database['Distance']<15]


```

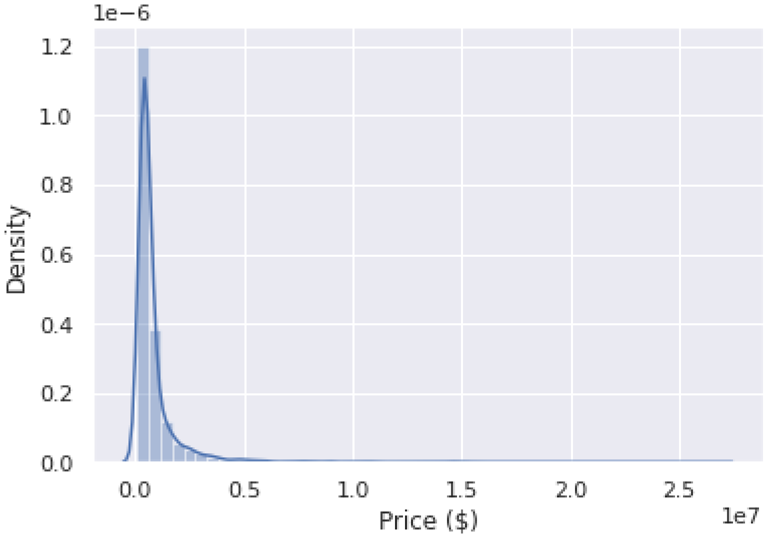
```
# since the data set includes all the transaction in Ontario, I would like to check there is no record outside of the -
# region of my interest

locations = df[['lat', 'lng']]
locationlist = locations.values.tolist()
len(locationlist)


map = folium.Map(location=[43.73976, -79.42126], zoom_start=10)
for i in range(0, len(locationlist)):
    folium.Marker(locationlist[i]).add_to(map)
map



```


+
−
York Region
Bradford
Beeton
Newmarket
Tottenham
Aurora
Uxbridge
Port Perry
Uxbridge Woodlands
Stouffville
King City
407 Toll
Courtice
Oshawa
Whitby
Bolton
Ajax
Pickering
427
Peel Region
Brampton
Georgetown
407 ETR
Mississauga
Milton
403
Oakville

Analysis

```
#quick sns distribution graph
ax = sns.distplot(df['Price ($)'])
# Show data is skewed
```

```
/usr/local/lib/python3.7/dist-packages/seaborn/distributions.py:2557: FutureWarning: `distplot` is a deprecated functio
  warnings.warn(msg, FutureWarning)
```

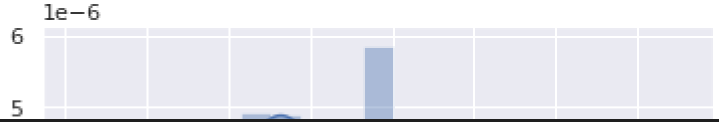


```
#checking dataset
df.describe()
```

	Unnamed: 0	Price ($)	lat	lng	Distance
count	4590.000000	4.590000e+03	4590.000000	4590.000000	4590.000000
mean	39078.920915	8.258964e+05	43.715426	-79.405040	9.271488
std	29697.845972	1.179302e+06	0.063987	0.077623	3.561755
min	0.000000	1.000000e+05	43.615078	-79.605835	0.229304
25%	6175.250000	3.499000e+05	43.656661	-79.447968	6.692606
50%	36149.500000	4.990000e+05	43.708008	-79.399605	10.194123
75%	74069.750000	7.990000e+05	43.767937	-79.369514	11.833238
max	120600.000000	2.680000e+07	43.874107	-79.235939	14.988489

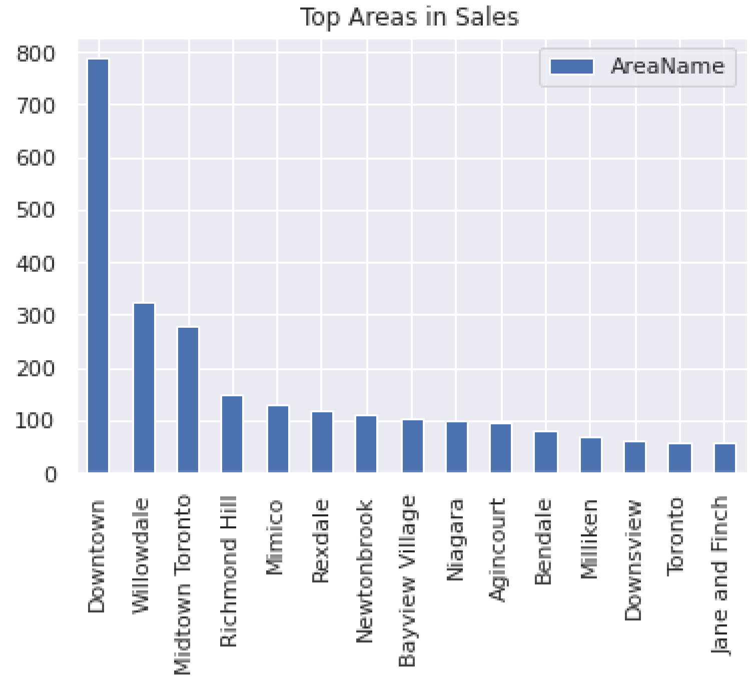
```
# I am focusing near price mean region.


df_1=df[((df['Price ($)']<5.299000e+05) & (df['Price ($)']>2.5e5))]
ax = sns.distplot(df_1['Price ($)'])
```

```
/usr/local/lib/python3.7/dist-packages/seaborn/distributions.py:2557: FutureWarning: `distplot` is a deprecated functio
  warnings.warn(msg, FutureWarning)
```



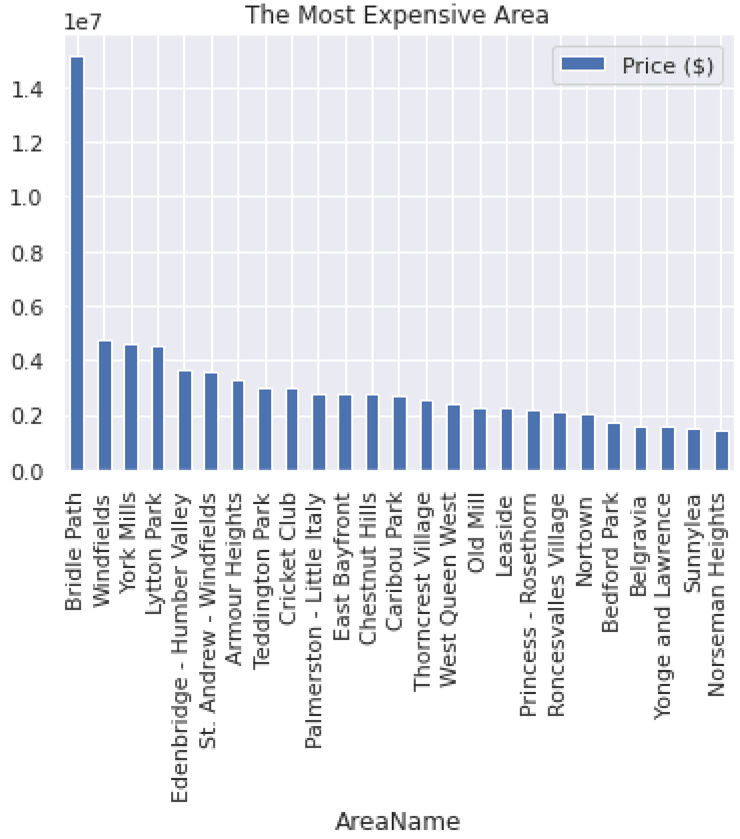
```
# I would like to now what are the hottest neighbourhoods in sale.

Area= pd.DataFrame(df['AreaName'].value_counts())
Area.sort_values(by='AreaName')
Area[0:15].plot(kind='bar', title='Top Areas in Sales')
```

```
<matplotlib.axes._subplots.AxesSubplot at 0x7f158a658a50>
```



```
# I would like to know what are the most expensive neighbourhoods.

AreaPrice=pd.DataFrame(df.groupby('AreaName')['Price ($)'].mean())
AreaPrice=AreaPrice.sort_values(by='Price ($)', ascending=False)
AreaPrice[0:25].plot(kind='bar', title='The Most Expensive Area')

```

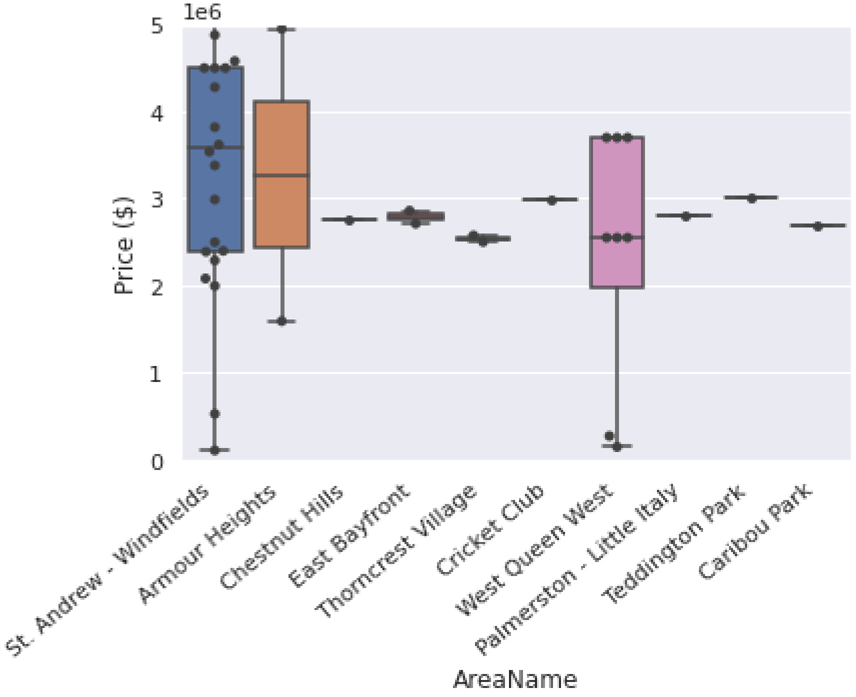
```
<matplotlib.axes._subplots.AxesSubplot at 0x7f158a521390>
```



```
# Is it possible to buy a cheap house in expensive area?

# Here I am creating df1 as data frame for 5 to 15 most expensive areas (Top 5 are too expensive).
a=AreaPrice[5:15].index
df1=pd.DataFrame()
df1 = df[df.AreaName.isin(a)]
```

```
# From following box graph, I can see Leaside and Nortown are expensive neighbourhoods with few affordable houses.


box = sns.boxplot(x='AreaName', y='Price ($)', data=df1)
box = sns.swarmplot(x='AreaName', y='Price ($)', data=df1, color=".25")
box.set_ylim([0, 0.5e7])
box.set_xticklabels(box.get_xticklabels(), rotation=40, ha="right")
```

```
[Text(0, 0, 'St. Andrew - Windfields'),
 Text(0, 0, 'Armour Heights'),
 Text(0, 0, 'Chestnut Hills'),
 Text(0, 0, 'East Bayfront'),
 Text(0, 0, 'Thorncrest Village'),
 Text(0, 0, 'Cricket Club'),
 Text(0, 0, 'West Queen West'),
 Text(0, 0, 'Palmerston - Little Italy'),
 Text(0, 0, 'Teddington Park'),
 Text(0, 0, 'Caribou Park')]
```

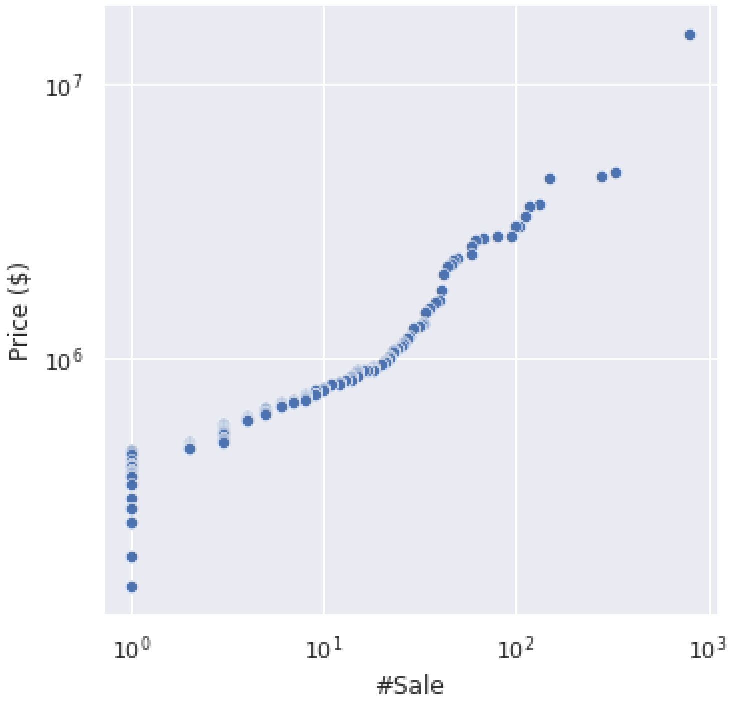


```
# I created a table with average price and number of sales for each area, called result1
Area['Area']=Area.index
Area=Area.rename({'AreaName':'#Sale'}, axis=1)
AreaPrice['AreaName']=Area.index
result = pd.merge(Area, AreaPrice, on=Area['Area'])
result1=result[['#Sale', 'Price ($)']]
```

```
result1=result[['#Sale', 'Price ($)']]




```

```
# this graph shows number of sales vs price
cc = sns.cubehelix_palette(rot=-.2, as_cmap=True)
cv = sns.relplot(
    data=result1,
    x='#Sale', y='Price ($)',
    palette=cc, sizes=(5, 100),
)

cv.ax.xaxis.grid(True, "minor", linewidth=.05)
cv.ax.yaxis.grid(True, "minor", linewidth=.05)
cv.set(xscale='log', yscale='log')
```

```
<seaborn.axisgrid.FacetGrid at 0x7f158ef1ed50>
```


Price ($)
10^7
10^6
10^0
10^1
10^2
10^3
#Sale