

Coursera Capstone Project

The Battle of Neighbourhoods -Final Report (Week 1 & week 2)

Contents

1. Introduction Section:

- **1.1 Discussion of the "background situation" leading to the problem at hand:**
- **1.2 Problem to be resolved**
- **1.3 Audience for this project.**

2. Data Section:

- **2.1 Data of Current Situation (current residence place)**
- **2.2 Data required to resolve the problem**
- **2.3 Data sources and data manipulation**

3. Methodology section:

- **3.1 Process steps and strategy to resolve the problem**
- **3.2 Data Science Methods, machine learning, mapping tools and exploratory data analysis.**

4. Results Section:

- **Discussion of the results and how they help to take a decision.**

5. Discussion Section:

- **Elaboration and discussion on any observations and/or recommendations for improvement.**

6. Conclusion Section

- **Decision taken and Report Conclusion.**

1.1 Scenario and Background

- ▶ I am a IT Professional residing in Leeds, uk. I currently live within walking distance to many amenities and venues in the area, such as parks, international restaurants, cafes, gyms, food shops and entertainment.
I have been offered a great opportunity to work in Manhattan, NY. Although, I am very excited about it, I am a bit stress toward the process to secure a comparable place to live in Manhattan.
Therefore, I decided to apply the learned skills during the Coursera course to explore ways to make sure my decision is factual and rewarding. Of course, there are alternatives to achieve the answer using available Google and Social media tools, but it rewarding doing it myself with learned tools.
In order to make a comparison and evaluation of the rental options in Manhattan NY, I must set some basis, therefore the apartment in Manhattan must meet the following demands:
apartment must be 2 or 3 bedrooms
desired location is near a metro station in the Manhattan area and within 1.0-mile (1.6 km) radius
price of rent not exceed \$7,000 per month
top amenities in the selected neighbourhood shall be like current residence
desirable to have venues such as coffee shops, restaurants Asian Thai, wine stores, gym and food shops
as a reference, I have included a map of venues near current residence in Leeds.

2. Data Section:

2.1 Data of Current Situation:

- ▶ I Currently reside in the neighbourhood of 'City centre' in Leeds. I use Foursquare to identify the venues around the area of residence which are then shown in the Singapore map shown in methodology and execution in section 3.0. It serves as a reference for comparison with the desired future location in Manhattan NY

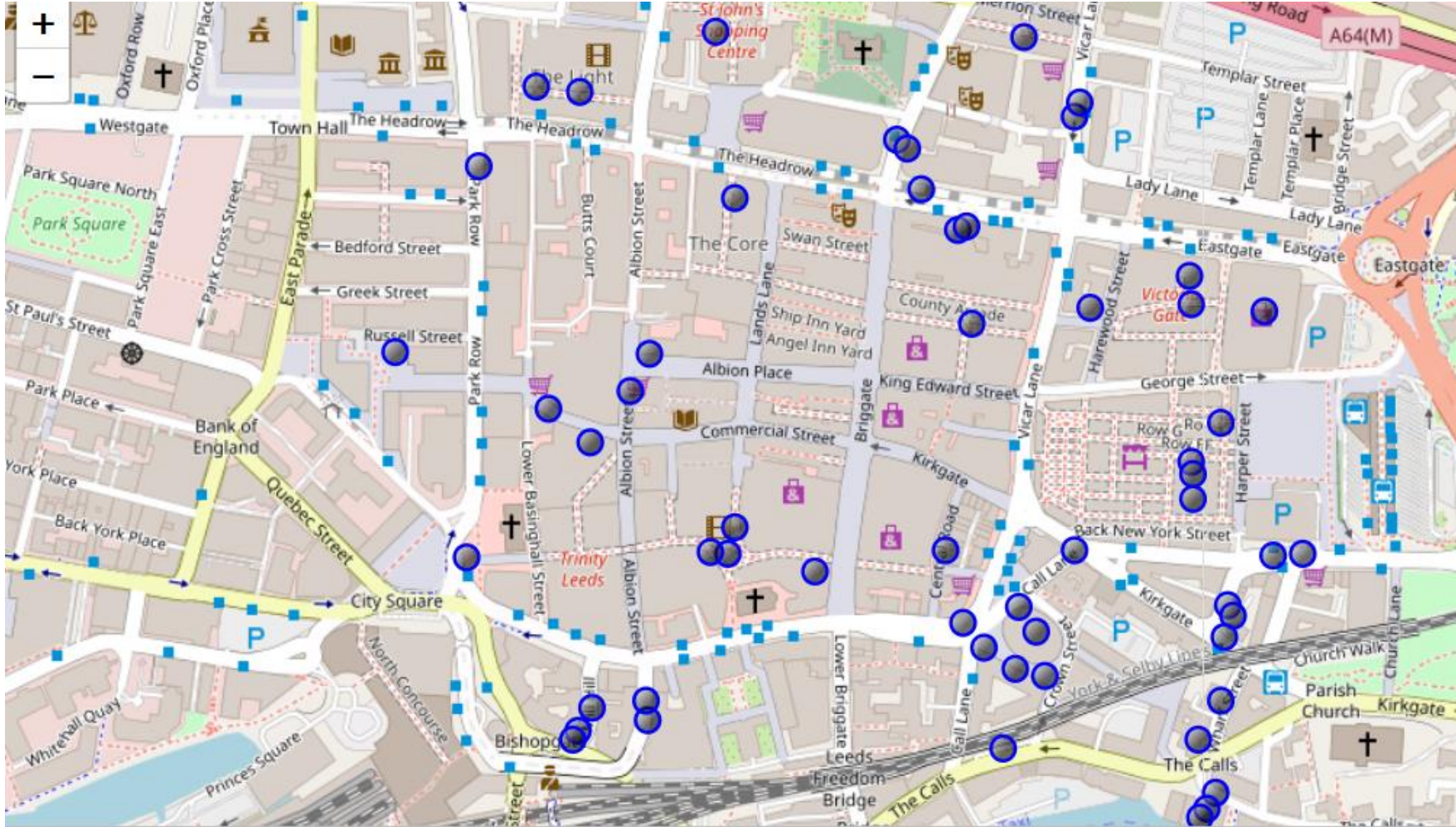
2.2 In order to make a good choice of a similar apartment in Manhattan NY, the following data is required:

- ▶ List/Information on neighbourhood's form Manhattan with their Geodata (latitude and longitude).
- ▶ List/Information about the subway metro stations in Manhattan with geodata.
- ▶ Listed apartments for rent in Manhattan area with descriptions (how many beds, price, location, address)
- ▶ Venues and amenities in the Manhattan neighbourhoods (e.g. top 10)

Venues near current city Leeds,UK

	name	categories	lat	lng
0	Trinity Leeds	Shopping Mall	53.796525	-1.543937
1	Victoria Quarter	Shopping Mall	53.798170	-1.540943
2	Headrow House	Bar	53.798837	-1.541118
3	Mrs Athas	Coffee Shop	53.796542	-1.541268
4	Laynes Espresso	Coffee Shop	53.795323	-1.544939
5	Bundobust	Bar	53.795415	-1.545622
6	Friends of Ham	Bar	53.795470	-1.544944
7	The LEGO Store	Toy / Game Store	53.796535	-1.544166
8	200 Degrees Coffee	Coffee Shop	53.797560	-1.546153
9	Ox Club	Restaurant	53.798862	-1.541013

Map of Leeds residence place with venues in Neighbourhood - for reference



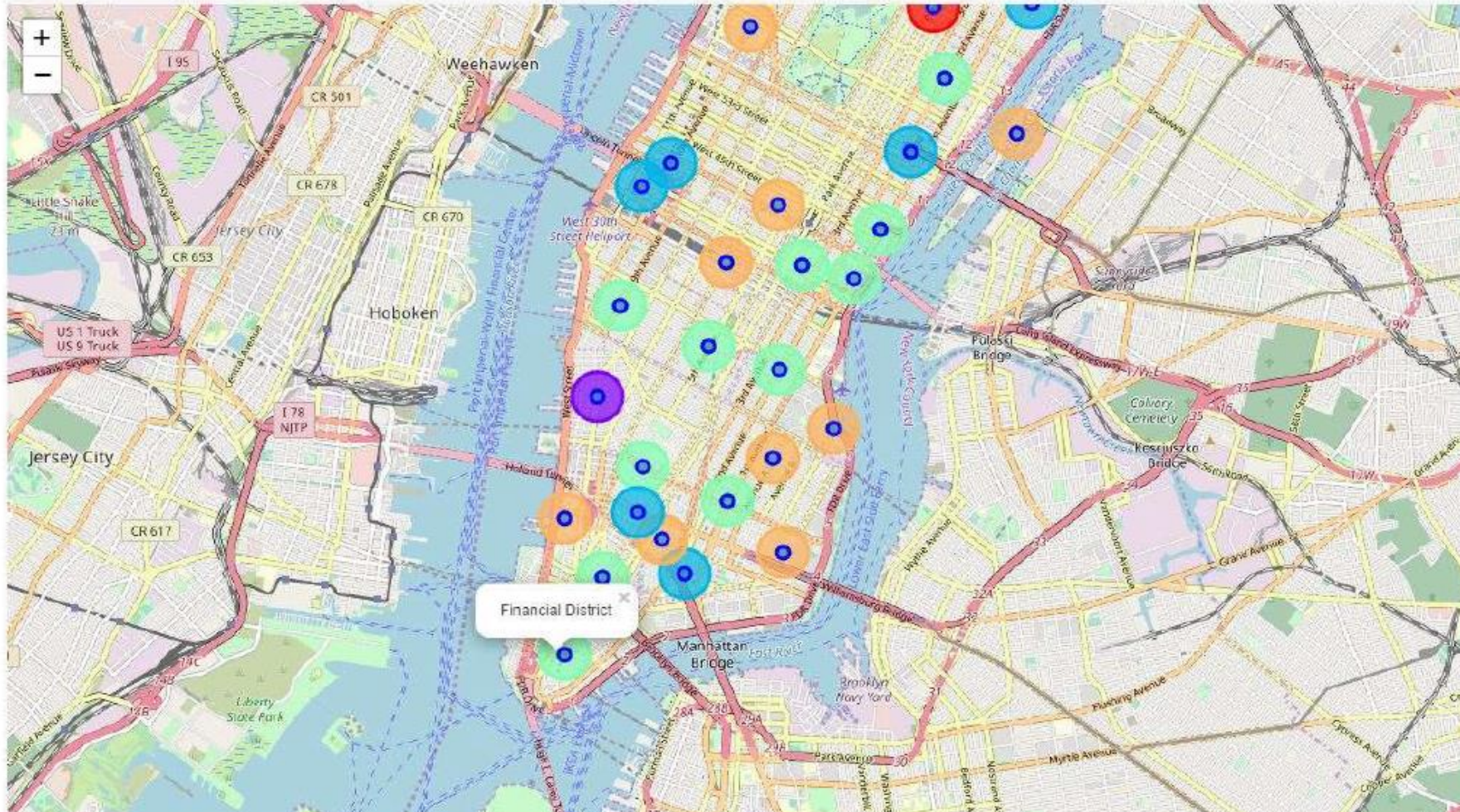
	Borough	Neighbourhood	Latitude	Longitude	Cluster Labels
0	Manhattan	Marble Hill	40.876551	-73.910660	2
1	Manhattan	Chinatown	40.715618	-73.994279	2
2	Manhattan	Washington Heights	40.851903	-73.936900	4
3	Manhattan	Inwood	40.867684	-73.921210	3
4	Manhattan	Hamilton Heights	40.823604	-73.949688	0

MANHATTAN NEIGHBORHOODS

Manhattan Borough neighbourhoods - data with top 10 clustered venues

	Borough	Neighborhood	Latitude	Longitude	Cluster Labels	1st Most Common Venue	2nd Most Common Venue	3rd Most Common Venue	4th Most Common Venue	5th Most Common Venue	6th Most Common Venue	7th Most Common Venue	8th Most Common Venue	9th Most Common Venue	10th Most Common Venue
0	Manhattan	Marble Hill	40.876551	-73.910660	2	Coffee Shop	Discount Store	Yoga Studio	Steakhouse	Supplement Shop	Tennis Stadium	Shoe Store	Gym	Bank	Seafood Restaurant
1	Manhattan	Chinatown	40.715618	-73.994279	2	Chinese Restaurant	Cocktail Bar	Dim Sum Restaurant	American Restaurant	Vietnamese Restaurant	Salon / Barbershop	Noodle House	Bakery	Bubble Tea Shop	Ice Cream Shop
2	Manhattan	Washington Heights	40.851903	-73.936900	4	Café	Bakery	Mobile Phone Shop	Pizza Place	Sandwich Place	Park	Gym	Latin American Restaurant	Tapas Restaurant	Mexican Restaurant
3	Manhattan	Inwood	40.867684	-73.921210	3	Mexican Restaurant	Lounge	Pizza Place	Café	Wine Bar	Bakery	American Restaurant	Park	Frozen Yogurt Shop	Spanish Restaurant
4	Manhattan	Hamilton Heights	40.823604	-73.949688	0	Mexican Restaurant	Coffee Shop	Café	Deli / Bodega	Pizza Place	Liquor Store	Indian Restaurant	Sushi Restaurant	Sandwich Place	Yoga Studio

Map of Manhattan neighbourhoods with top 10 clustered venues

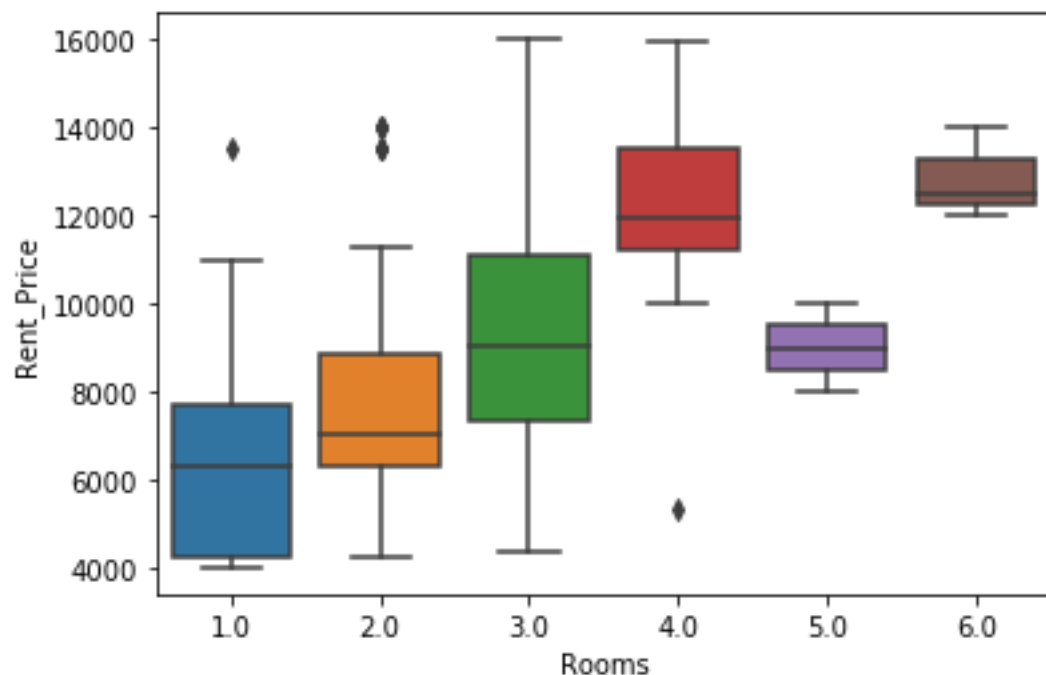


Manhattan places for rent

```
mh_rent=pd.read_csv('MH_rent_latlong.csv')  
mh_rent.head()
```

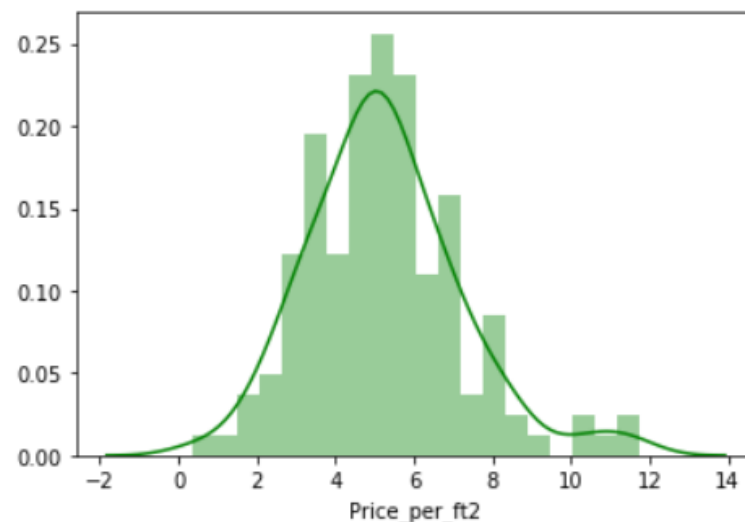
	Address		Area	Price_per_ft2	Rooms	Area-ft2	Rent_Price	Lat	Long
0	West 105th Street	Upper West Side		2.94	5.0	3400	10000	40.799771	-73.966213
1	East 97th Street	Upper East Side		3.57	3.0	2100	7500	40.788585	-73.955277
2	West 105th Street	Upper West Side		1.89	4.0	2800	5300	40.799771	-73.966213
3	CARMINE ST.	West Village		3.03	2.0	1650	5000	40.730523	-74.001873
4	171 W 23RD ST.	Chelsea		3.45	2.0	1450	5000	40.744118	-73.995299

Manhattan Apartment Rent price statistics



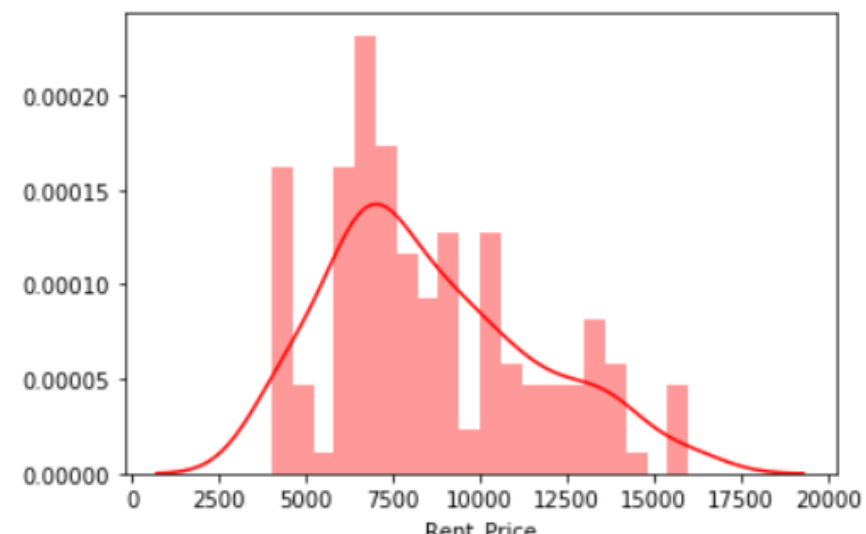
```
import seaborn as sns
sns.distplot(mh_rent['Price_per_ft2'],bins=20,color='green')
```

<matplotlib.axes._subplots.AxesSubplot at 0x7f3246c83f60>

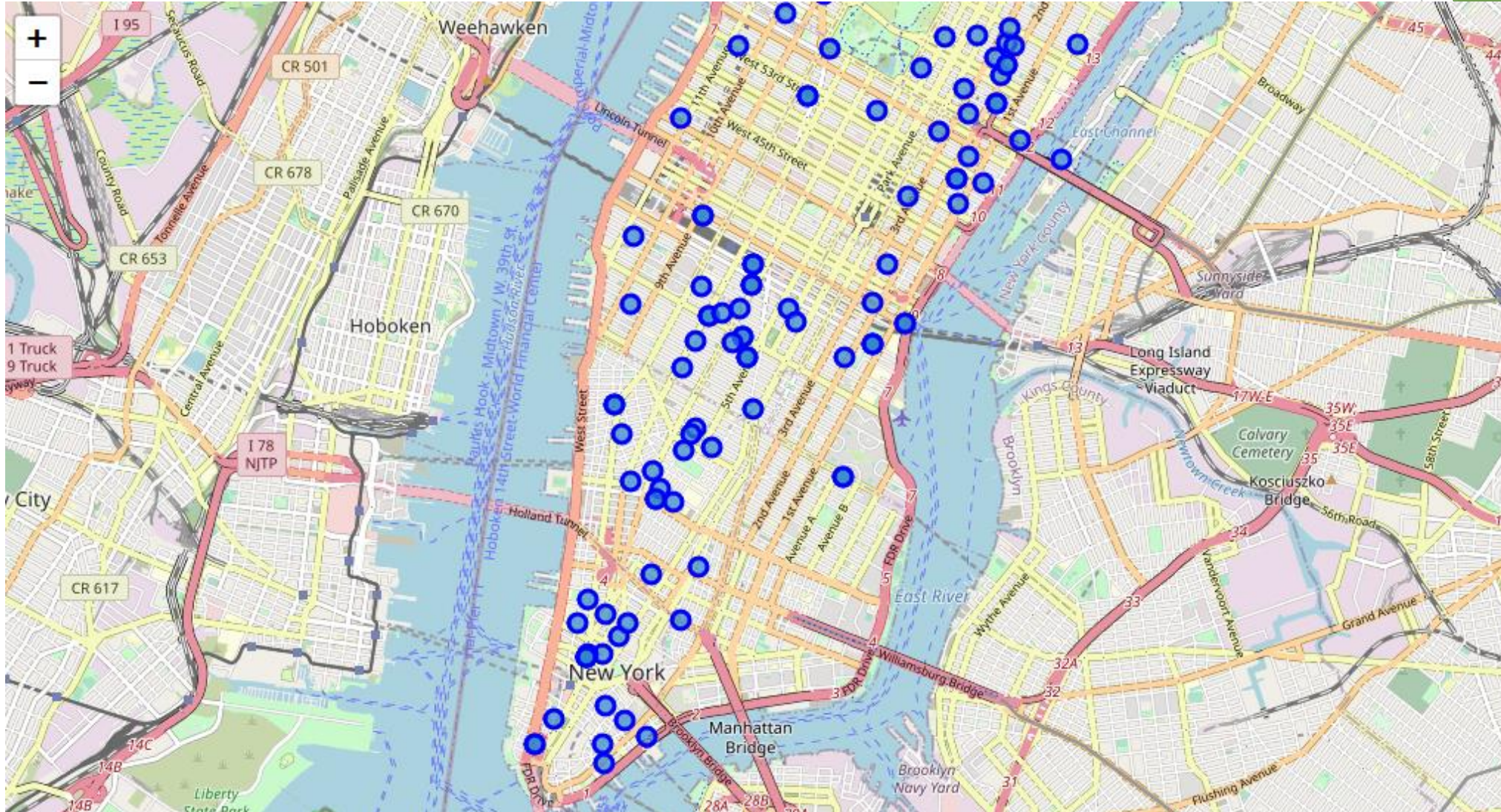


```
import seaborn as sns
sns.distplot(mh_rent['Rent_Price'],bins=20,color='red')
```

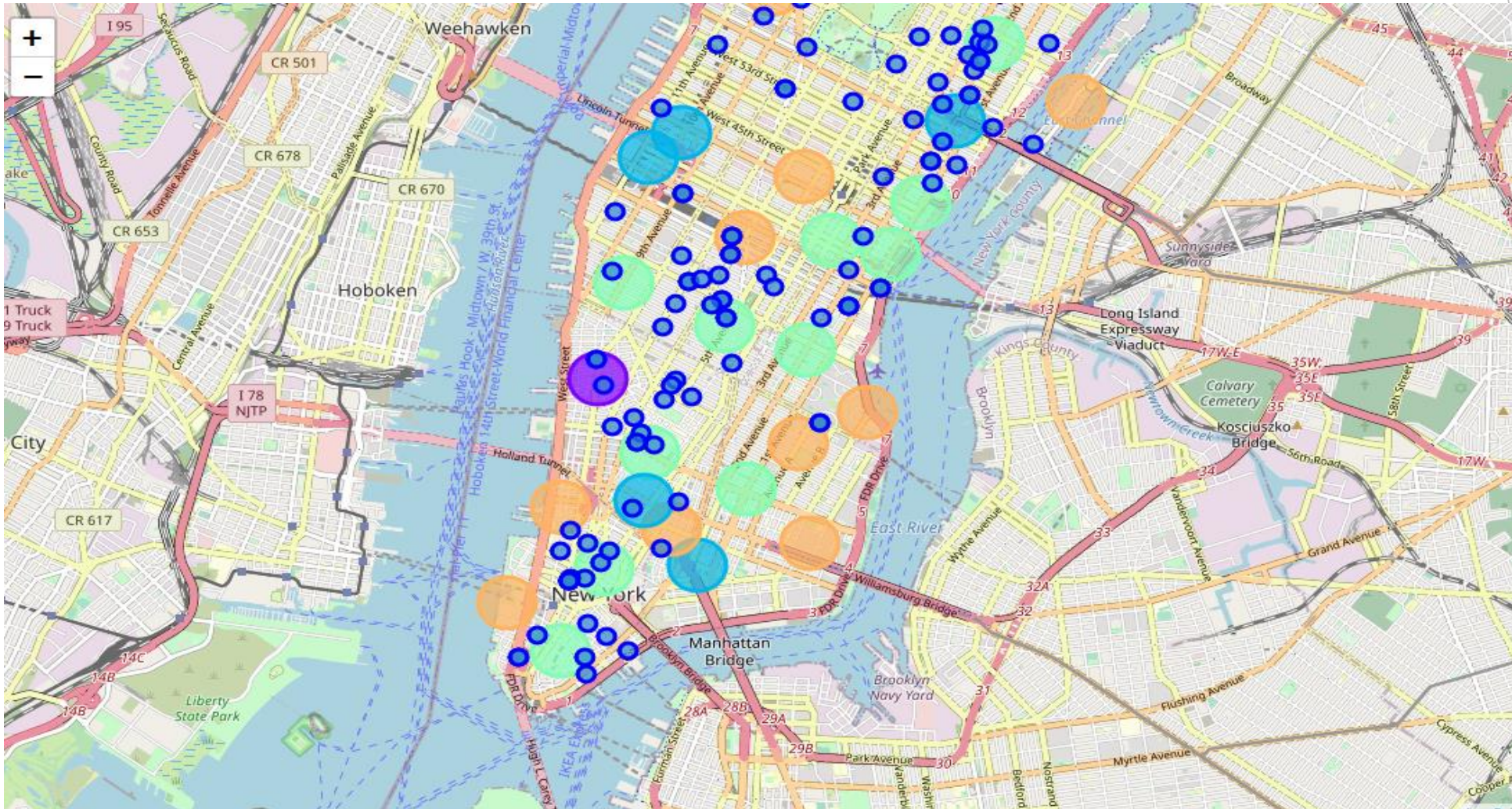
<matplotlib.axes._subplots.AxesSubplot at 0x7f324780c0f0>



Map of Manhattan apartments for rent



Map of Manhattan showing the places for rent and the cluster of venues



Manhattan Subway locations

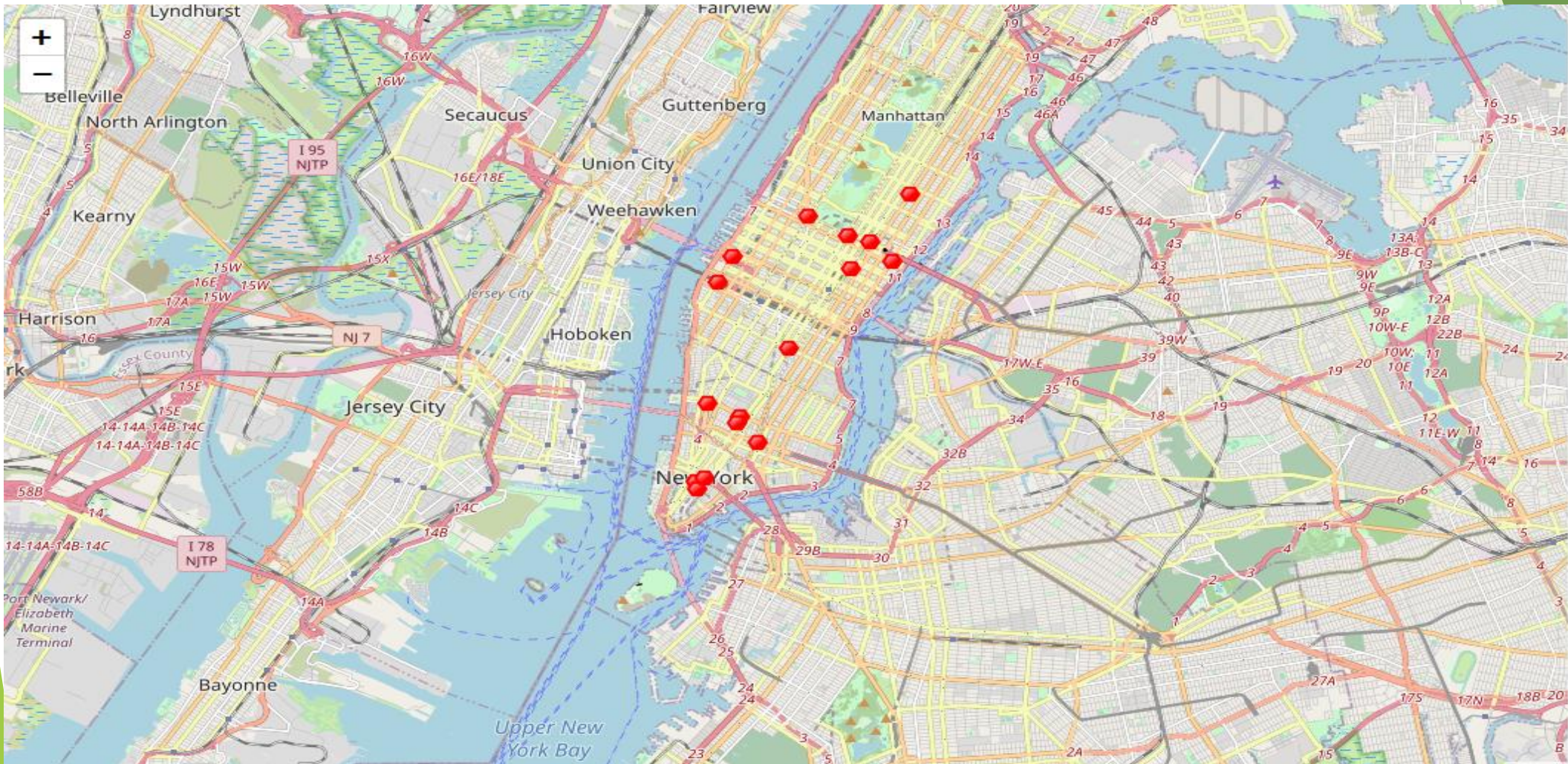
```
# Add columns 'lat' and 'long' to mh dataframe - with random temporary numbers to get started
sLength = len(mh['sub_station'])
lat = pd.Series(np.random.randn(sLength))
long=pd.Series(np.random.randn(sLength))
mh = mh.assign(lat=lat.values)
mh = mh.assign(long=long.values)
```

```
mh=pd.read_csv('MH_subway.csv')
print(mh.shape)
mh.head()
```

(76, 4)

	sub_station	sub_address	lat	long
0	Dyckman Street Subway Station	170 Nagle Ave, New York, NY 10034, USA	40.861857	-73.924509
1	57 Street Subway Station	New York, NY 10106, USA	40.758798	-73.962343
2	Broad St	New York, NY 10005, USA	40.712728	-74.006015
3	175 Street Station	807 W 177th St, New York, NY 10033, USA	40.847991	-73.939785
4	5 Av and 53 St	New York, NY 10022, USA	40.758798	-73.962343

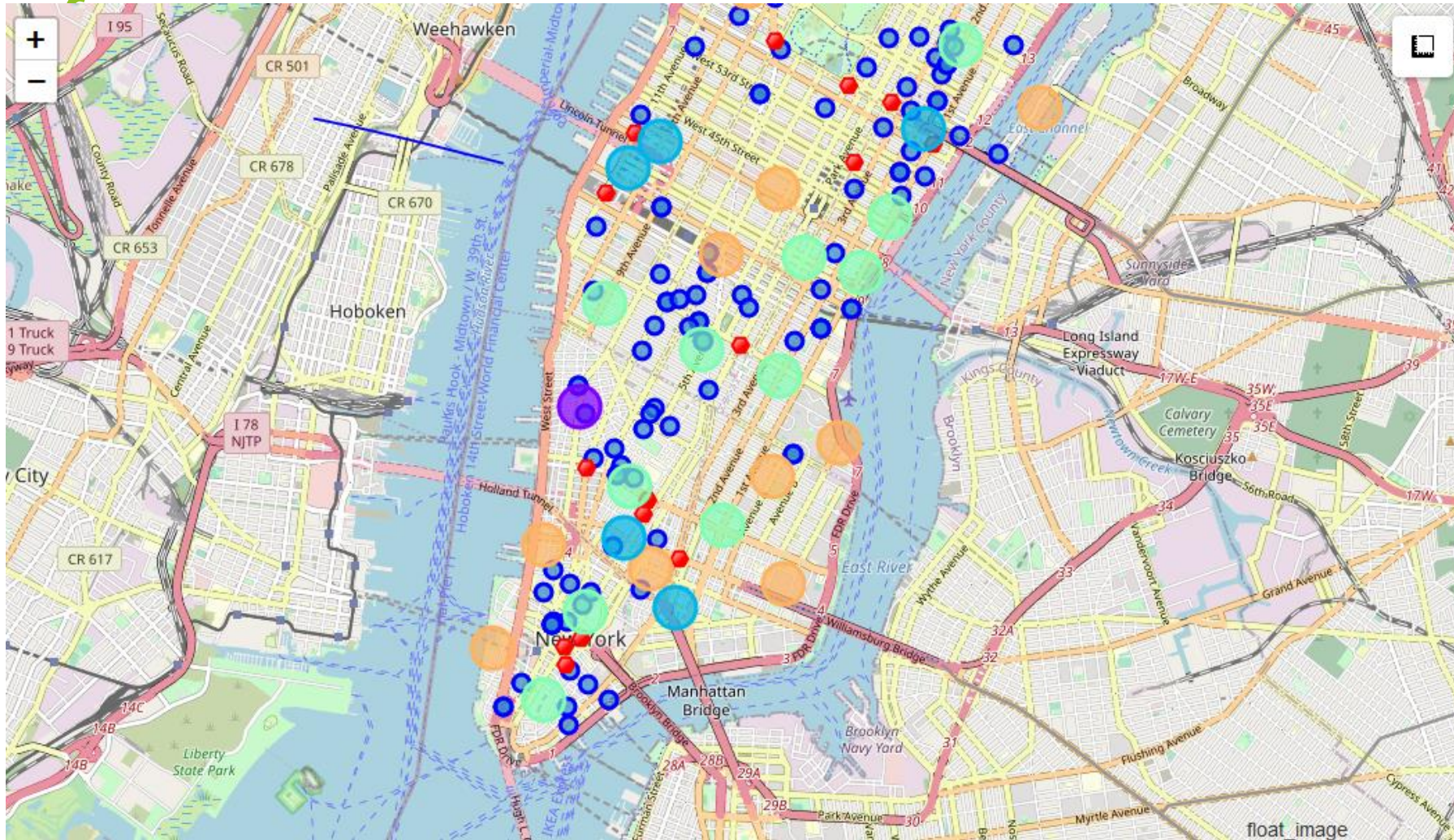
MAP of Manhattan showing the location of subway stations



Map of Manhattan showing places for rent and the subway locations nearby



CONSOLIDATE MAP: Map of Manhattan with rental places, subway locations and cluster



After examining,
I have chosen
two locations
that meet the
requirements
which will assess
to make a
choice.

- ▶ Apartment 1: 305 East 63rd Street in the Sutton Place Neighbourhood and near 'subway 59th Street' station, Cluster # 2 Monthly rent: 7500 Dollars
- ▶ Apartment 2: 19 Dutch Street in the Financial District Neighbourhood and near 'Fulton Street Subway' station, Cluster # 3 Monthly rent: 6935 Dollars

Venues for Apartment 1 - Cluster 2

```
## kk is the cluster number to explore
kk = 2
manhattan_merged.loc[manhattan_merged['Cluster Labels'] == kk, manhattan_merged.columns[[1] + list(range(5, manhattan_merged.shape[1]))]]
```

	Neighborhood	1st Most Common Venue	2nd Most Common Venue	3rd Most Common Venue	4th Most Common Venue	5th Most Common Venue	6th Most Common Venue	7th Most Common Venue	8th Most Common Venue	9th Most Common Venue	10th Most Common Venue
0	Marble Hill	Coffee Shop	Discount Store	Yoga Studio	Steakhouse	Supplement Shop	Tennis Stadium	Shoe Store	Gym	Bank	Seafood Restaurant
1	Chinatown	Chinese Restaurant	Cocktail Bar	Dim Sum Restaurant	American Restaurant	Vietnamese Restaurant	Salon / Barbershop	Noodle House	Bakery	Bubble Tea Shop	Ice Cream Shop
6	Central Harlem	African Restaurant	Seafood Restaurant	French Restaurant	American Restaurant	Cosmetics Shop	Chinese Restaurant	Event Space	Liquor Store	Beer Bar	Gym / Fitness Center
9	Yorkville	Coffee Shop	Gym	Bar	Italian Restaurant	Sushi Restaurant	Pizza Place	Mexican Restaurant	Deli / Bodega	Japanese Restaurant	Pub
14	Clinton	Theater	Italian Restaurant	Coffee Shop	American Restaurant	Gym / Fitness Center	Hotel	Wine Shop	Spa	Gym	Indie Theater
23	Soho	Clothing Store	Boutique	Women's Store	Shoe Store	Men's Store	Furniture / Home Store	Italian Restaurant	Mediterranean Restaurant	Art Gallery	Design Studio
26	Morningside Heights	Coffee Shop	American Restaurant	Park	Bookstore	Pizza Place	Sandwich Place	Burger Joint	Café	Deli / Bodega	Tennis Court
34	Sutton Place	Gym / Fitness Center	Italian Restaurant	Furniture / Home Store	Indian Restaurant	Dessert Shop	American Restaurant	Bakery	Juice Bar	Boutique	Sushi Restaurant
39	Hudson Yards	Coffee Shop	Italian Restaurant	Hotel	Theater	American Restaurant	Café	Gym / Fitness Center	Thai Restaurant	Restaurant	Gym

Venues for Apartment 2 - Cluster 3

kk is the cluster number to explore

kk = 3

```
manhattan_merged.loc[manhattan_merged['Cluster Labels'] == kk, manhattan_merged.columns[[1] + list(range(5, manhattan_merged.shape[1]))]]
```

	Neighborhood	1st Most Common Venue	2nd Most Common Venue	3rd Most Common Venue	4th Most Common Venue	5th Most Common Venue	6th Most Common Venue	7th Most Common Venue	8th Most Common Venue	9th Most Common Venue	10th Most Common Venue
3	Inwood	Mexican Restaurant	Lounge	Pizza Place	Café	Wine Bar	Bakery	American Restaurant	Park	Frozen Yogurt Shop	Spanish Restaurant
5	Manhattanville	Deli / Bodega	Italian Restaurant	Seafood Restaurant	Mexican Restaurant	Sushi Restaurant	Beer Garden	Coffee Shop	Falafel Restaurant	Bike Trail	Other Nightlife
10	Lenox Hill	Sushi Restaurant	Italian Restaurant	Coffee Shop	Gym / Fitness Center	Pizza Place	Burger Joint	Deli / Bodega	Gym	Sporting Goods Shop	Thai Restaurant
12	Upper West Side	Italian Restaurant	Bar	Bakery	Vegetarian / Vegan Restaurant	Indian Restaurant	Coffee Shop	Cosmetics Shop	Wine Bar	Mexican Restaurant	Sushi Restaurant
16	Murray Hill	Sandwich Place	Hotel	Japanese Restaurant	Gym / Fitness Center	Coffee Shop	Salon / Barbershop	Burger Joint	French Restaurant	Bar	Italian Restaurant
17	Chelsea	Coffee Shop	Italian Restaurant	Ice Cream Shop	Bakery	Nightclub	Theater	Art Gallery	Seafood Restaurant	American Restaurant	Hotel
18	Greenwich Village	Italian Restaurant	Sushi Restaurant	French Restaurant	Clothing Store	Chinese Restaurant	Café	Indian Restaurant	Bakery	Seafood Restaurant	Electronics Store
27	Gramercy	Italian Restaurant	Restaurant	Thrift / Vintage Store	Cocktail Bar	Bagel Shop	Coffee Shop	Pizza Place	Mexican Restaurant	Grocery Store	Wine Shop
29	Financial District	Coffee Shop	Hotel	Gym	Wine Shop	Steakhouse	Bar	Italian Restaurant	Pizza Place	Park	Gym / Fitness Center
31	Noho	Italian Restaurant	French Restaurant	Cocktail Bar	Gift Shop	Bookstore	Grocery Store	Mexican Restaurant	Hotel	Sushi Restaurant	Coffee Shop
32	Civic Center	Gym / Fitness Center	Bakery	Italian Restaurant	Cocktail Bar	French Restaurant	Sandwich Place	Coffee Shop	Gym	Yoga Studio	Park

Result and Conclusion:

Apartment 1 rent cost is US\$7500 slightly above the US\$7000 budget. Apt 1 is located 400 meters from subway station at 59th Street and workplace (Park Ave and 53rd) is another 600 meters away. I can walk to workplace and use subway for other places around. Venues for this apt are as of Cluster 2 and it is in a fine district in the East side of Manhattan.

Apartment 2 rent cost is US\$6935, just under the US\$7000 budget. Apt 2 is located 60 meters from subway station at Fulton Street, but I will have to ride the subway daily to work, possibly 40-60 min ride. Venues for this apt are as of Cluster 3.

“Thank You”

