Applied Data Science Capstone Project

Optimal Japanese Restaurant Location In Manhattan

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Introduction

- This exercise will seek to show a good location to open up a Japanese restaurant in Manhattan.
- This would be value to anyone looking to open up a Japanese restaurant based on certain criteria that is further discussed in the data section.

Data & Sources

Data

- Number of any restaurant in each neighborhood
- Number of Japanese restaurants in each neighborhood
- Adjusted Gross Income (AGI)
- Zipcodes
- Latitude/Longitude (ie location of neighborhoods and restaurants)

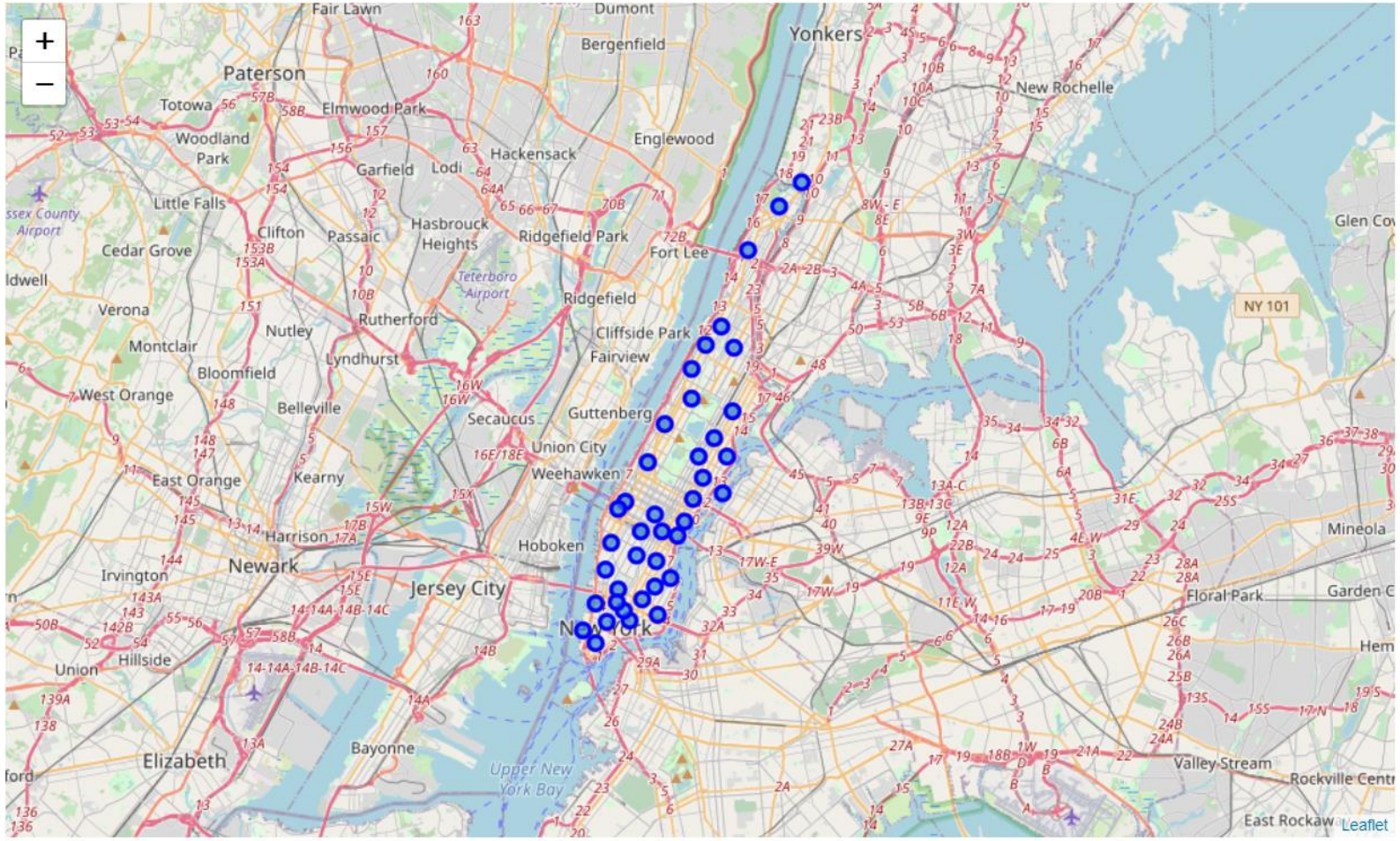
Sources

- Foursqure API
- Source of file from 2014 NYU dataset that has coordinates of each New York City neighborhood
- IRS data to get AGI by zip: https://www.irs.gov/statistics/soi-tax-stats-individual-income-tax-statistics-2017-zip-code-data-soi
- geopy: this will enable mapping coordinates to zip code

Methodology

- As mentioned earlier, we need to capture the following
  - Frequency of types of restaurants in each neighborhood
  - Number of any restaurant in each neighborhood
  - Number of Japenese restuarants in each neighbord
  - Adjusted Gross Income (AGI).
    - Although we do can do this at various income levels, we are looking only at areas where the AGI is 75k+
- In addition, we will assess frequency of restaurants/top restaurants in each neighborhood

Our Focus Is Restricted To These Neighborhoods Within Manhattan.



Using Foursquare API, We Can Pull In All Restaurants In Manhattan Within A Specified Range And Observe: There Are 2K+ Restaurants &122 Types Of Restaurants.

Sample Output From Foursquare

Neighborhood	Neighborhood Latitude	Neighborhood Longitude	Venue	Venue Latitude	Venue Longitude	Venue Category
Marble Hill	40.876551	-73.91066	Arturo's	40.874412	-73.910271	Pizza Place
Marble Hill	40.876551	-73.91066	Tibbett Diner	40.880404	-73.908937	Diner
Marble Hill	40.876551	-73.91066	Dunkin'	40.877136	-73.906666	Donut Shop
Marble Hill	40.876551	-73.91066	Land & Sea Restaurant	40.877885	-73.905873	Seafood Restaurant
Marble Hill	40.876551	-73.91066	Subway Sandwiches	40.874667	-73.909586	Sandwich Place

In Addition, We Can Assess Frequency By Top 10 Restaurants Within Each Neighborhood.

----Battery Park City----

	venue	freq
0	Pizza Place	4.0
1	Italian Restaurant	3.0
2	Burger Joint	2.0
3	Food Court	2.0
4	Mexican Restaurant	2.0
5	Chinese Restaurant	2.0
6	Sandwich Place	2.0
7	Café	1.0
8	Donut Shop	1.0
9	Food Truck	1.0

----Carnegie Hill----

	venue	freq
0	Pizza Place	8.0
1	Bakery	6.0
2	Café	6.0
3	Sushi Restaurant	5.0
4	Italian Restaurant	4.0
5	French Restaurant	3.0
6	Japanese Restaurant	3.0
7	Mexican Restaurant	3.0
8	Food Truck	2.0
9	Restaurant	2.0

----Central Harlem----

	venue	freq
0	Fried Chicken Joint	4.0
1	Deli / Bodega	4.0
2	African Restaurant	3.0
3	Chinese Restaurant	3.0
4	Restaurant	3.0
5	Southern / Soul Food Restaurant	3.0
6	Pizza Place	3.0
7	Seafood Restaurant	3.0
8	American Restaurant	2.0
9	French Restaurant	2.0

In The Dataset, We Can Determine Both The Number Of Japanese Restaurants And Total Restaurants.

Sample Data

	Neighborhood	Total Japanese Restaurants	Total Restaurants
0	Battery Park City	0	26
1	Carnegie Hill	8	69
2	Central Harlem	0	44
3	Chelsea	5	79
4	Chinatown	2	100

We Can Pull In Adjusted Gross Income (AGI) By Zip Code. We Are Restricting This Further To AGI_Stub 3+, Which Indicates AGI >=75K.

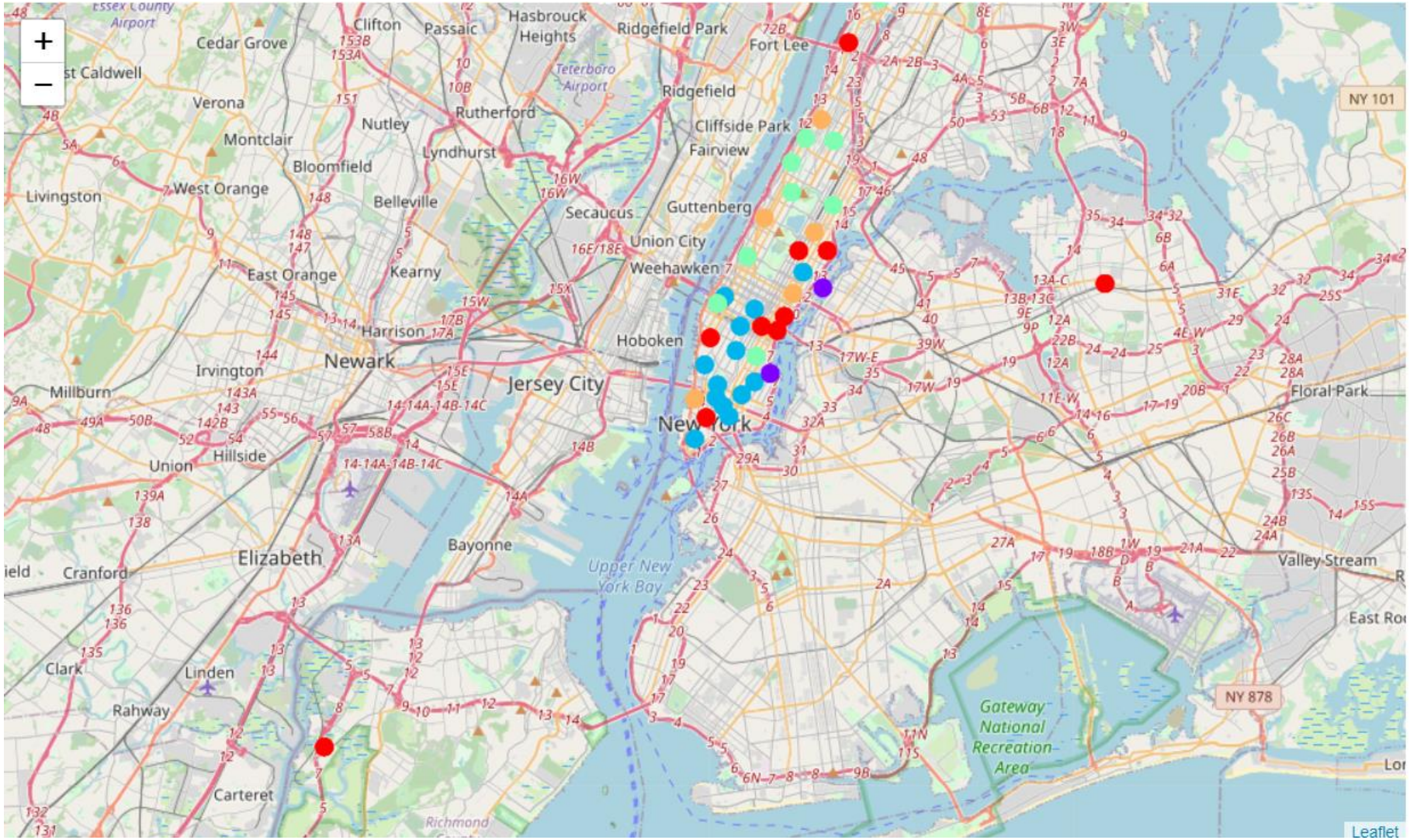
Sample Data

zipcode	agi_stub	AGI Size	Taxable Amount
0	1	104674.48	18101.99
0	2	179775.81	88699.88
0	3	165024.73	105713.99
0	4	148170.87	103993.53
0	5	311313.90	238690.35
0	6	286771.41	245834.21
35004	1	198.89	40.19
35004	2	500.71	266.08
35004	3	565.74	368.80
35004	4	558.94	394.32
35004	5	847.07	646.79
35004	6	228.31	184.89
35005	1	175.06	29.39
35005	2	358.79	173.29
35005	3	281.68	182.16

Cluster Resulting Dataset Using K Means To Review Similar Neighborhoods.

Cluster Labels	Neighborhood	Total Japanese Restaurants	Total Restaurants
4	Carnegie Hill	8	69
3	Central Harlem	0	44
0	Chelsea	5	79
2	Chinatown	2	100
0	Civic Center	4	81
2	Clinton	2	100
3	East Harlem	0	52
2	East Village	8	100
2	Financial District	5	100
2	Flatiron	6	98
3	Gramercy	1	50
2	Greenwich Village	9	100
4	Hamilton Heights	3	61
3	Hudson Yards	0	44
3	Inwood	0	48
2	Lenox Hill	10	100
3	Lincoln Square	0	51
2	Little Italy	2	100
3	Manhattan Valley	2	43
3	Manhattanville	3	44
1	Marble Hill	0	15

…And Mapping The Results.



Results: One Cluster Has Little To None Japanese Restaurants Currently.

	Neighborhood	Total Japanese Restaurants	Total Restaurants
9	Central Harlem	0	44
45	East Harlem	0	52
69	Gramercy	1	50
87	Hudson Yards	0	44
93	Inwood	0	48
105	Lincoln Square	0	51
117	Manhattan Valley	2	43
123	Manhattanville	3	44
147	Morningside Heights	0	41

Results (Cont): Other Clusters Have Many Japanese Restaurants And More Restaurants In General Too.

	Neighborhood	Total Japanese Restaurants	Total Restaurants
15	Chelsea	5	79
33	Civic Center	4	81
153	Murray Hill	9	89
201	Tudor City	5	78
207	Turtle Bay	12	78
213	Upper East Side	5	79
225	Washington Heights	1	75
237	Yorkville	10	87

	Neighborhood	Total Japanese Restaurants	Total Restaurants
27	Chinatown	2	100
39	Clinton	2	100
51	East Village	8	100
57	Financial District	5	100
63	Flatiron	6	98
75	Greenwich Village	9	100
99	Lenox Hill	10	100
111	Little Italy	2	100
135	Midtown	9	100
141	Midtown South	10	100
165	Noho	7	100
177	Soho	2	95
231	West Village	4	100

Discussion: Washington Heights, Chinatown, Clinton, Little Italy, and Soho Are The Better Areas To Consider. These Areas Are Clustered Together And Currently Have High Restaurant Counts And Low Japanese Restaurant Counts.

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99	Lenox Hill	10	100
111	Little Italy	2	100
135	Midtown	9	100
141	Midtown South	10	100
165	Noho	7	100
177	Soho	2	95
231	West Village	4	100

Conclusion

- Based On The Data We Used, There Is Opportunity To Open Up A Japanese Restaurant In Multiple Locations Within Manhattan
- Although Our Data Shows Potential Areas To Open A Japanese Restaurant, Additional Analysis Should Be Done To Address The Following
  - NYC Dataset Is From 2014
  - IRS Dataset Is From 2017
  - Is Foursquare Accurate (ie Are There More Japanese Restaurants In This Location)
  - Marketing: Does This Area Want Japanese Restaurants
- It Would Be Interesting To Add Additional Datapoints Such As Population Density, Race, etc