Battle of Neighborhoods in Manhattan

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Introduction

- Question: if you are a homebuyer in New York, which neighborhood would you consider purchasing an apartment?

- Trade-off: price and convenience

- Factors to consider: housing price, distance to city center, number of restaurants, number of grocery stores

- Objective: create a ranking of neighborhoods of Manhattan using the above four metrics

Data

- Housing price data
  - StreetEasy Data Dashboard
  - Use median asking price in December 2019
- Venue data
  - Foursquare API
- Distance data
  - Google map
  - Use midtown Manhattan as city center to calculate the distance to center for each neighborhood
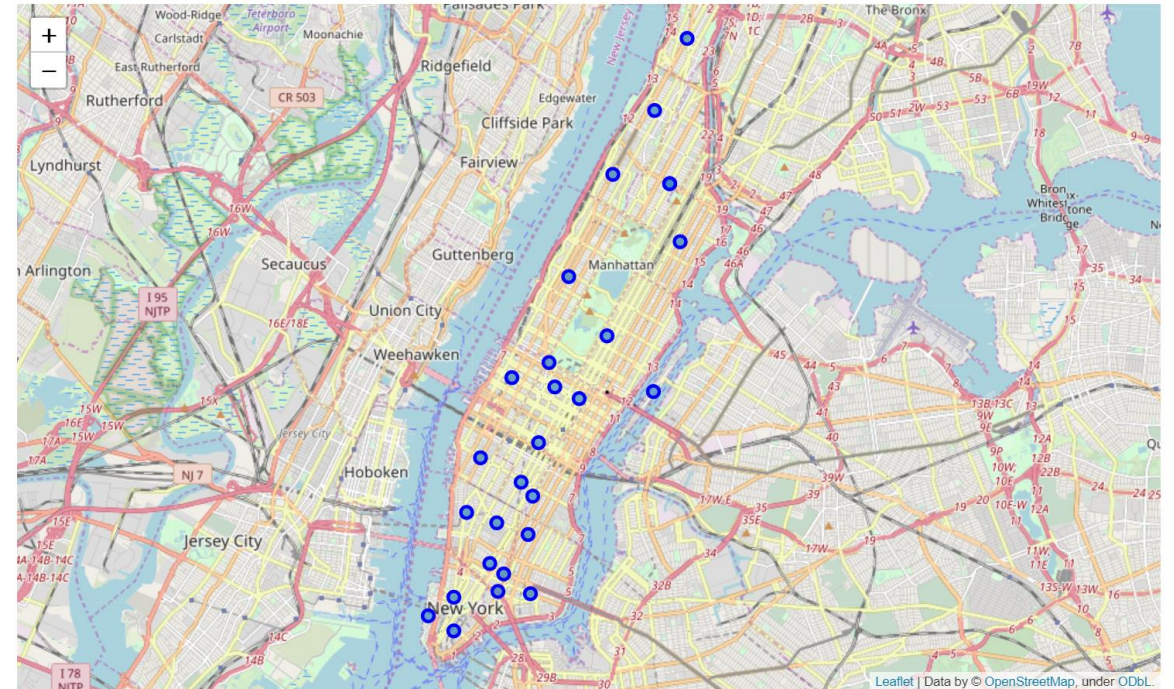
Methodology

- Import and clean data
- Results are 28 neighborhoods in Manhattan

	Neighborhood	Price	DistanceToCenter	Latitude	Longitude
0	Battery Park City	1340000.0	3.8	40.711017	-74.016937
1	Central Harlem	980000.0	4.5	40.807879	-73.945415
2	Central Park South	2345000.0	0.9	40.767750	-73.981318
3	Chelsea	2275000.0	1.4	40.746491	-74.001528
4	Chinatown	1995000.0	3.0	40.716491	-73.996250
6	East Harlem	950000.0	4.3	40.794722	-73.942500
7	East Village	1250000.0	2.4	40.729269	-73.987361
8	Financial District	1397000.0	3.7	40.707612	-74.009378
9	Flatiron	2695000.0	1.1	40.741059	-73.989642
10	Gramercy Park	1715000.0	1.5	40.737925	-73.985932
11	Greenwich Village	1975000.0	1.8	40.731980	-73.996566
12	Hamilton Heights	780000.0	5.6	40.824145	-73.950062
13	Inwood	487500.0	8.9	40.869258	-73.920495
15	Lower East Side	1397500.0	3.3	40.715936	-73.986806
17	Midtown	2225000.0	0.0	40.762268	-73.979544
18	Midtown East	950000.0	0.9	40.759822	-73.972471
19	Midtown South	1565550.0	0.3	40.749842	-73.984251
20	Midtown West	1492500.0	0.9	40.764423	-73.992392
21	Morningside Heights	799000.0	4.3	40.810000	-73.962500
22	Nolita	4750000.0	2.5	40.720370	-73.994582
23	Roosevelt Island	1089000.0	3.4	40.761418	-73.950228
24	Soho	3495000.0	2.5	40.722880	-73.998750
26	Tribeca	4274500.0	3.0	40.715380	-74.009306
27	Upper East Side	1825000.0	2.5	40.773702	-73.964120
28	Upper West Side	1972500.0	2.5	40.787045	-73.975416
29	Washington Heights	547000.0	6.8	40.840198	-73.940221
30	West Harlem	1155000.0	5.1	40.807879	-73.945415
31	West Village	2100000.0	1.9	40.734186	-74.005580

Methodology

- Use geocoder to get latitude and longitude coordinates of each neighborhoods

- Create map of Manhattan neighborhoods using folium

Methodology

- Foursquare data
- Search for two categories: restaurants and grocery stores
- Use limit=100, radius=500 meters
- Results are 2233 restaurants and 310 grocery stores

Methodology

- Summary statistics

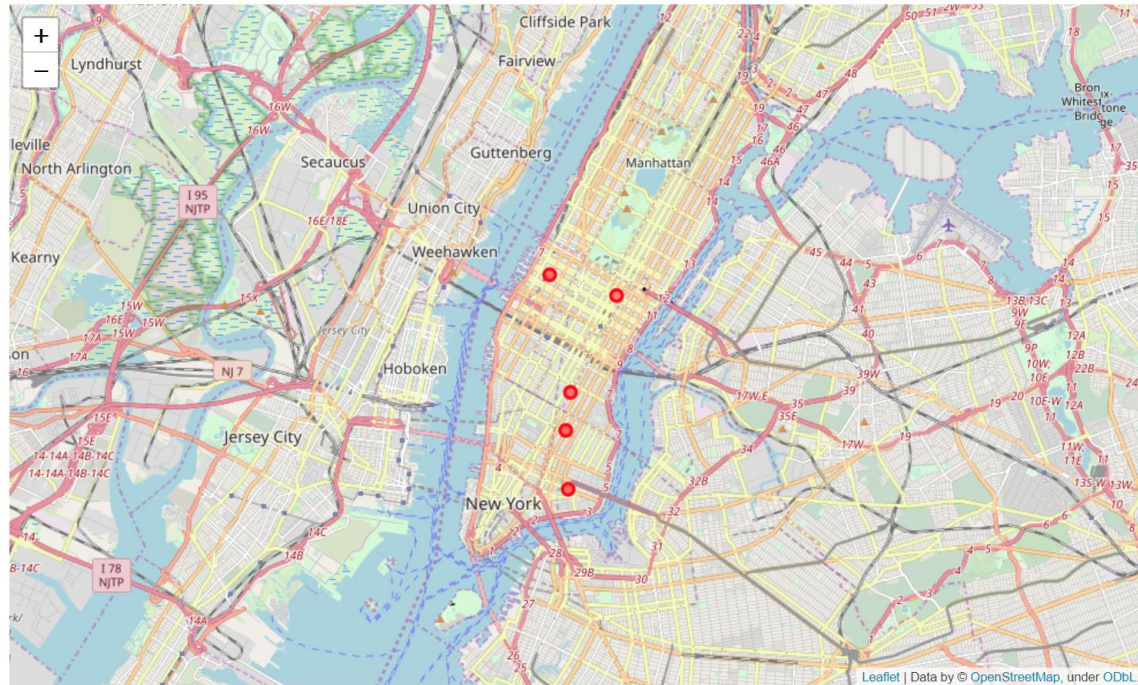|	Price	DistanceToCenter	Latitude	Longitude	NumRestaurant	NumGrocery
count	2.800000e+01	28.000000	28.000000	28.000000	28.000000	28.000000
mean	1.779359e+06	2.957143	40.761105	-73.978035	79.750000	11.071429
std	1.031887e+06	2.012264	0.042684	0.025049	25.383904	13.213149
min	4.875000e+05	0.000000	40.707612	-74.016937	14.000000	1.000000
25%	1.061750e+06	1.475000	40.727672	-73.996329	64.000000	5.000000
50%	1.529025e+06	2.500000	40.754832	-73.985092	100.000000	7.000000
75%	2.131250e+06	3.925000	40.788965	-73.959432	100.000000	11.250000
max	4.750000e+06	8.900000	40.869258	-73.920495	100.000000	65.000000

Methodology

- Rank neighborhoods

- First rank each neighborhoods according to each metric

- Then use equal weight to calculate aggregate score for overall rank

- The results show that the top 5 neighborhoods to consider to purchase an apartment are: **East Village, Midtown West, Lower East Side, Gramercy Park, and Midtown East.**

Methodology

	Neighborhood	Price	DistanceToCenter	Latitude	Longitude	NumRestaurant	NumGrocery	OverallRank
6	East Village	1250000.0	2.4	40.729269	-73.987361	100	15	33.0
17	Midtown West	1492500.0	0.9	40.764423	-73.992392	100	7	41.5
13	Lower East Side	1397500.0	3.3	40.715936	-73.986806	100	16	42.0
9	Gramercy Park	1715000.0	1.5	40.737925	-73.985932	100	10	42.5
15	Midtown East	950000.0	0.9	40.759822	-73.972471	100	3	42.5
16	Midtown South	1565550.0	0.3	40.749842	-73.984251	100	6	44.0
4	Chinatown	1995000.0	3.0	40.716491	-73.996250	100	65	45.5
7	Financial District	1397000.0	3.7	40.707612	-74.009378	100	12	47.0
8	Flatiron	2695000.0	1.1	40.741059	-73.989642	100	11	47.5
10	Greenwich Village	1975000.0	1.8	40.731980	-73.996566	100	9	48.0
14	Midtown	2225000.0	0.0	40.762268	-73.979544	100	6	50.0
2	Central Park South	2345000.0	0.9	40.767750	-73.981318	100	7	51.5
19	Nolita	4750000.0	2.5	40.720370	-73.994582	100	44	51.5
21	Soho	3495000.0	2.5	40.722880	-73.998750	100	13	53.5
27	West Village	2100000.0	1.9	40.734186	-74.005580	100	7	54.5
5	East Harlem	950000.0	4.3	40.794722	-73.942500	49	14	57.5
3	Chelsea	2275000.0	1.4	40.746491	-74.001528	66	10	60.5
24	Upper West Side	1972500.0	2.5	40.787045	-73.975416	64	11	61.5
0	Battery Park City	1340000.0	3.8	40.711017	-74.016937	70	7	64.5
25	Washington Heights	547000.0	6.8	40.840198	-73.940221	49	8	66.5
1	Central Harlem	980000.0	4.5	40.807879	-73.945415	68	5	71.5
26	West Harlem	1155000.0	5.1	40.807879	-73.945415	68	5	74.5
23	Upper East Side	1825000.0	2.5	40.773702	-73.964120	54	5	75.5
11	Hamilton Heights	780000.0	5.6	40.824145	-73.950062	64	1	78.0
18	Morningside Heights	799000.0	4.3	40.810000	-73.962500	38	3	78.5
22	Tribeca	4274500.0	3.0	40.715380	-74.009306	88	6	78.5
12	Inwood	487500.0	8.9	40.869258	-73.920495	41	3	80.0
20	Roosevelt Island	1089000.0	3.4	40.761418	-73.950228	14	1	82.5

Methodology

- Best neighborhoods on the map

Results

- Collect data on the neighborhoods in Manhattan for median housing price, distance to city center, number of restaurants and number of grocery stores

- Rank the neighborhoods by each of the four metrics and combine the ranks by equal weight to get an overall rank

- The top 5 neighborhoods are East Village, Midtown West, Lower East Side, Gramercy Park, and Midtown East.

Discussion

- We can add more metrics to evaluate the neighborhoods
  - Number of subway stations
  - Movie theaters
  - Gyms
  - Bars
  - School rating
- We can also apply different weightings to adjust for individual preferences
- Model is very flexible

Conclusion

- Question: What's the best neighborhood to consider if we want to purchase an apartment in Manhattan?

- We present a simple approach by collecting data of four different metrics: housing price, distance to city center, number of restaurants, and number of grocery stores.

- We then rank the neighborhood by each metric and sum them together to get the overall score.

- We find that the best neighborhood options are East Village, Midtown West, Lower East Side, Gramercy Park, and Midtown East.