RECOMMENDING INITIAL TARGET NEIGHBORHOOD FOR PRODUCT SALES

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INTRODUCTION

- Any company who wants to sell a product specific to particular business needs target business venues or locations to send their salesperson where they could find relevant businesses for best response.

- For example, a company developed a new much efficient kind of coffee dispenser. So it will need to contact or sell the product to businesses in optimal neighborhoods where most of the coffee shops are available and is sufficiently populated to reduce the transportation cost, increase the number of target shops and increasing the number of consumers directly affected.

- Similarly, we can determine these initial target areas for the for other companies with new products.

DATA SOURCES

Following data sources will be needed to extract/generate the required information:

- demographic data of New York from **Kaggle**

- number of business/venues and their type and location in every neighborhood will be obtained using **Foursquare API**

DATA AFTER CLEANING AND FEATURE SELECTION

	Borough	NTA Name	Population	Latitude	Longitude
0	Manhattan	Marble Hill-Inwood	46746	40.876298	-73.910429
1	Manhattan	Central Harlem North-Polo Grounds	75282	40.807879	-73.945415
2	Manhattan	Hamilton Heights	48520	40.824145	-73.950062
3	Manhattan	Manhattanville	22950	40.815778	-73.951554
4	Manhattan	Morningside Heights	55929	40.810000	-73.962500

Neighborhood Population Data

Venues Data

	NTA Name	Latitude	Longitude	Venue	Venue Latitude	Venue Longitude	Venue Category
0	Marble Hill-Inwood	40.876298	-73.910429	Arturo's	40.874412	-73.910271	Pizza Place
1	Marble Hill-Inwood	40.876298	-73.910429	Bikram Yoga	40.876844	-73.906204	Yoga Studio
2	Marble Hill-Inwood	40.876298	-73.910429	Tibbett Diner	40.880404	-73.908937	Diner
3	Marble Hill-Inwood	40.876298	-73.910429	Starbucks	40.877531	-73.905582	Coffee Shop
4	Marble Hill-Inwood	40.876298	-73.910429	Dunkin'	40.877136	-73.906666	Donut Shop
...	...	...	...	...	...	...	...
2372	park-cemetery-etc-Manhattan	40.744249	-74.006425	Chelsea Piers Fitness	40.746645	-74.010057	Gym / Fitness Center
2373	park-cemetery-etc-Manhattan	40.744249	-74.006425	Top of The Standard	40.740818	-74.008116	Roof Deck
2374	park-cemetery-etc-Manhattan	40.744249	-74.006425	Apple West 14th Street	40.741270	-74.005389	Electronics Store
2375	park-cemetery-etc-Manhattan	40.744249	-74.006425	Sikkema Jenkins	40.747592	-74.005983	Art Gallery
2376	park-cemetery-etc-Manhattan	40.744249	-74.006425	PH-D at Dream Downtown	40.742347	-74.003356	Nightclub

2377 rows × 7 columns
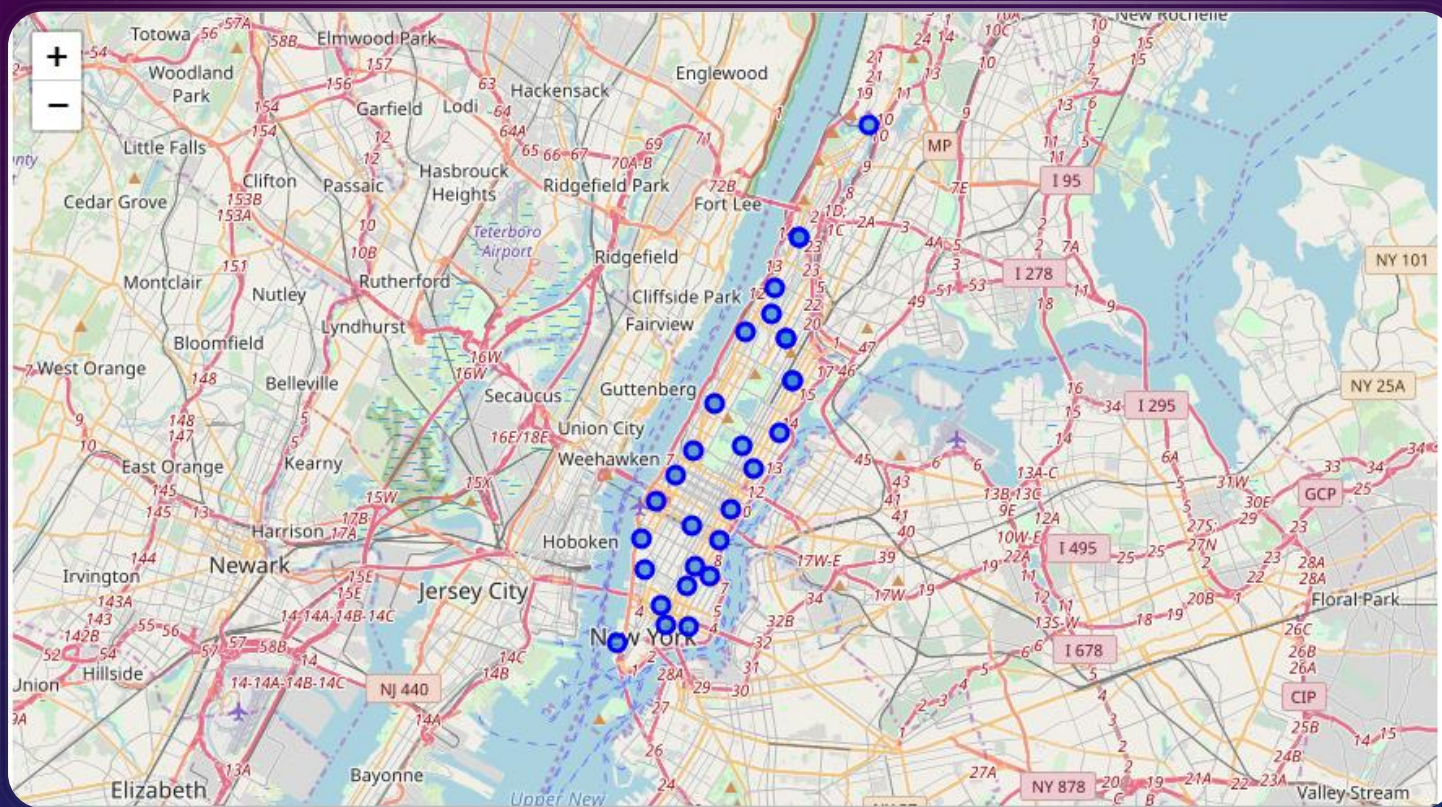
NEIGHBORHOODS OF MANHATTAN

PROBLEM

- Let's take the required business as coffee shop (for new efficient coffee dispenser machine), we will require to sell more coffee machine as well as a greater number of people should be influenced.

METHODOLOGY

So first, we collect all the neighborhoods with required businesses and create a business score column for them. This score will prefer number of coffee shops over the population of the neighborhood. Thus, we will calculate it as:

- business score of the neighborhood = Population x (No. of coffee shops) ^2

So, generalizing this method, business score of neighborhoods for any category of business will be:

- business score of the neighborhood = Population x (No. of business of the category) ^2

We then select the top n number of neighborhoods sorted by business score from the list according to requirement n.

ANALYSIS

	NTA Name	Accessories Store	Afghan Restaurant	African Restaurant	American Restaurant	Amphitheater	Animal Shelter	Antique Shop	Arepa Restaurant	Art Gallery	...	Video Game Store	Video Store	Viet Res
0	Battery Park City-Lower Manhattan	0	0	0	1	0	0	0	0	0	...	0	0	
1	Central Harlem North-Polo Grounds	0	0	3	1	1	0	0	0	1	...	1	0	
2	Central Harlem South	0	0	3	1	1	0	0	0	1	...	1	0	
3	Chinatown	0	0	0	0	0	1	0	0	0	...	0	0	
4	Clinton	0	0	0	2	0	0	0	0	0	...	0	0	
5	East Harlem North	0	0	0	0	0	0	0	0	0	...	0	0	
6	East Harlem South	0	0	0	0	0	0	0	0	0	...	0	0	
7	East Village	0	0	0	1	0	0	0	1	0	...	1	0	

- Encoded list of neighborhoods with number of different venues category in it

ANALYSIS

```
recommendations=recommend_location('Coffee Shop').reset_index(drop=True)
recommendations
```

|	Borough	NTA Name	Population	Latitude	Longitude	Coffee Shop	business_score
0	Manhattan	Lenox Hill-Roosevelt Island	80771	40.766437	-73.959017	7	3957779
1	Manhattan	Yorkville	77942	40.778007	-73.948202	5	1948550
2	Manhattan	Battery Park City-Lower Manhattan	39699	40.711017	-74.016937	7	1945251
3	Manhattan	Lower East Side	72957	40.715936	-73.986806	5	1823925
4	Manhattan	Upper East Side-Carnegie Hill	61207	40.773702	-73.964120	5	1530175

- Recommended neighborhoods following for coffee shops

ANALYSIS


```
recommended_venues=manhattan_venues[manhattan_venues['NTA Name'].apply(lambda x: x in recommended_neighborhoods) * manhatta
recommended_venues
```

	NTA Name	Latitude	Longitude	Venue	Venue Latitude	Venue Longitude	Venue Category
1430	Battery Park City-Lower Manhattan	40.711017	-74.016937	Le District Coffee	40.713284	-74.015854	Coffee Shop
1451	Battery Park City-Lower Manhattan	40.711017	-74.016937	Blue Bottle Coffee	40.710589	-74.012371	Coffee Shop
1459	Battery Park City-Lower Manhattan	40.711017	-74.016937	Starbucks Reserve	40.714170	-74.015434	Coffee Shop
1464	Battery Park City-Lower Manhattan	40.711017	-74.016937	Joe Coffee	40.712526	-74.013137	Coffee Shop
1493	Battery Park City-Lower Manhattan	40.711017	-74.016937	Boundless Plains Espresso	40.707990	-74.013894	Coffee Shop
1500	Battery Park City-Lower Manhattan	40.711017	-74.016937	Laughing Man Coffee & Tea	40.714754	-74.017368	Coffee Shop
1507	Battery Park City-Lower Manhattan	40.711017	-74.016937	Nobletree Coffee	40.710037	-74.011839	Coffee Shop
1636	Lower East Side	40.715936	-73.986806	Cafe Grumpy	40.715069	-73.989952	Coffee Shop
1639	Lower East Side	40.715936	-73.986806	Little Canal	40.714317	-73.990361	Coffee Shop
1649	Lower East Side	40.715936	-73.986806	Blue Bottle Coffee	40.719140	-73.985224	Coffee Shop
1667	Lower East Side	40.715936	-73.986806	GrandLo Cafe	40.716885	-73.985680	Coffee Shop
1713	Lower East Side	40.715936	-73.986806	Caffe Vita Coffee Roasting Co.	40.719752	-73.988529	Coffee Shop
1741	Lenox Hill-Roosevelt Island	40.766437	-73.959017	The Coffee Inn	40.766767	-73.956515	Coffee Shop

- List of all the venues in the recommended neighborhoods for coffee shop category
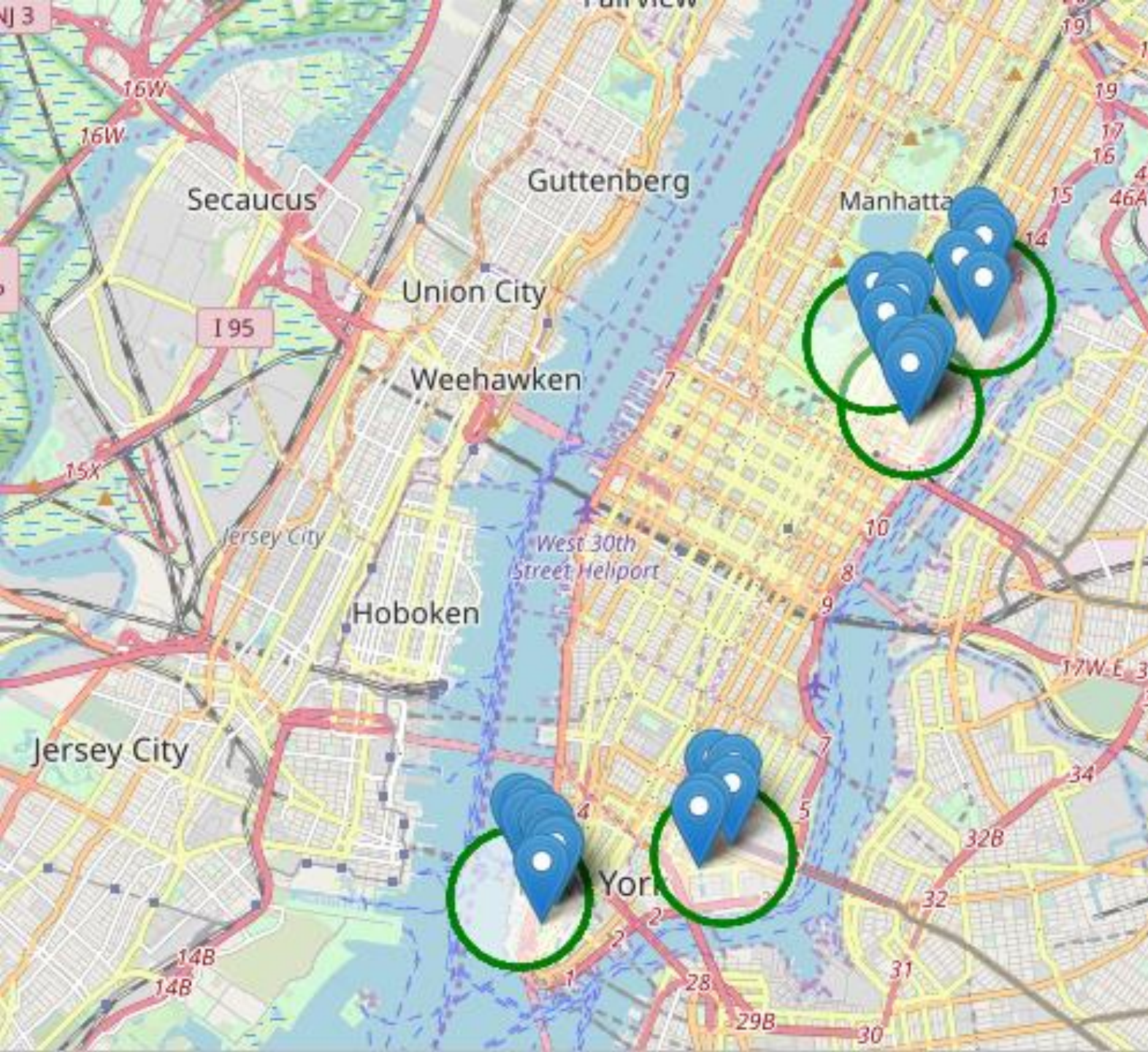
ANALYSIS

- Recommended Venue locations for coffee shop category

RESULTS AND DISCUSSION

- So, for the new coffee dispenser machine manufactured by the company, to have large influence on the basis of both number of coffee shops in and the population of the neighborhood, we came to conclusion that Lenox Hill-Roosevelt Island, Yorkville, Battery Park City-Lower Manhattan, Lower East Side and Upper East Side-Carnegie Hill will be the best five.

- We can use the same for other categories of businesses like gym, video store, restaurants etc. to get the target locations for initial sales of the good to have wide influence and least transportation costs.

CONCLUSION

- We were required to get the recommendations for initial target neighborhoods for sending the new product manufactured/created by any company for most sales and influence. Following the given methodology of weighted products with population and number of businesses/venues in neighborhood, we successfully got recommendations for a new coffee dispenser machine.