

Capstone Project - The Battle of Neighborhoods (Week 2)

1. Business Problem section
2. Data section
3. Methodology
4. Discussion
5. Conclusion

1. Business Problem section

- How could we provide support to a client to purchase a suitable place for his new restaurant in Manhattan, NY, USA in this uncertain economic and financial scenario? Currently he is doing a profitable Indian restaurant in Tampa FL and he is planning to start a new restaurant in Manhattan, NY.
- Since he currently runs a profitable business in Tampa he is expecting a similar neighborhood in Manhattan, NY also.
- To solve this business problem, we are going to cluster Manhattan, NY neighborhoods in order to most common recommend venues. While selecting the place there are key points to consider like he needs to check out how many Indian restaurants are there in that specific location? If incase there are already two Indian restaurants which have good ratings, will it be risky to open new one near these restaurants? What all factors will help him to run his business above average?

2. Data Section:

Description of the data and its sources that will be used to solve the problem

- My client currently reside in the neighborhood of 'Tampa,FL' in USA. I use Foursquare to identify the venues around the area of residence which are then shown in the 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.
- In order to make a good choice of a similar restaurant in Manhattan NY, the following data is required: List/Information on neighborhoods form Manhattan with their Geodata (latitude and longitude. List/Information about the subway metro stations in Manhattan with geodata. Venues and amenities in the Manhattan neighborhoods (e.g. top 10) is worked out during lab exercise during the course. The clustering of neighborhoods and mapping will be shown in methodology. Foursquare is used to find the avenues at Manhattan neighborhoods in general and a cluster is created to later be able to search for the venues depending of the location shown.

3. Methodology

How the data will be used to solve the problem

- The data will be used as follows: Use Foursquare and geopy data to map top 10 venues for all Manhattan neighborhoods and clustered in groups (as per Course LAB) Use foursquare and geopy data to map the location of subway metro stations , separately and on top of the above clustered map in order to be able to identify the venues and amenities near each metro station, or explore each subway location separately use Foursquare and geopy data to map the location of rental places, in some form, linked to the subway locations. I use Foursquare to identify the venues around the area of Tampa, FL and compare those venues with clustered groups in Manhattan, NY.

- Tampa,FL Map - Current residence and venues in neighborhood

	name	categories	lat	lng
0	Eddie and Sam's Pizza	Pizza Place	27.949044	-82.459184
1	HOTEL BAR	American Restaurant	27.946245	-82.458302
2	Gin Joint	Speakeasy	27.949345	-82.458486
3	SoFresh	Restaurant	27.949004	-82.458581
4	First Watch	Breakfast Spot	27.948712	-82.459507
5	The Anchor Bar Downtown	Bar	27.949115	-82.458899
6	Pita Pit	Sandwich Place	27.949119	-82.458979
7	Bamboozle Cafe	Vietnamese Restaurant	27.948543	-82.459354
8	Starbucks	Coffee Shop	27.946399	-82.457884
9	European Wax Center Downtown Tampa	Health & Beauty Service	27.946602	-82.458795

MANHATTAN NEIGHBORHOODS - DATA AND MAPPING

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

- Now, let's get the top 100 venues that are in Marble Hill within a radius of 500 meters.

	name	categories	lat	lng
0	Arturo's	Pizza Place	40.874412	-73.910271
1	Bikram Yoga	Yoga Studio	40.876844	-73.906204
2	Tibbett Diner	Diner	40.880404	-73.908937
3	Dunkin'	Donut Shop	40.877136	-73.906666
4	Starbucks	Coffee Shop	40.877531	-73.905582

Most Common venue's in Manhattan

	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	Battery Park City	Park	Coffee Shop	Hotel	Gym	Wine Shop	Italian Restaurant	Clothing Store	Plaza	Memorial Site	Burger Joint
1	Carnegie Hill	Pizza Place	Coffee Shop	Café	Cosmetics Shop	Grocery Store	Bar	Spa	French Restaurant	Japanese Restaurant	Yoga Studio
2	Central Harlem	African Restaurant	Public Art	Cosmetics Shop	French Restaurant	Chinese Restaurant	Seafood Restaurant	Gym / Fitness Center	American Restaurant	Park	Southern / Soul Food Restaurant
3	Chelsea	Coffee Shop	Italian Restaurant	Ice Cream Shop	Nightclub	Bakery	American Restaurant	Hotel	Seafood Restaurant	Theater	Tapas Restaurant
4	Chinatown	Chinese Restaurant	Cocktail Bar	American Restaurant	Vietnamese Restaurant	Bubble Tea Shop	Noodle House	Bar	Dumpling Restaurant	Ice Cream Shop	Hotpot Restaurant

Let's create a new data frame that includes the cluster as well as the top 10 venues for each neighborhood

	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	4	Discount Store	Coffee Shop	Yoga Studio	Seafood Restaurant	Gym	Tennis Stadium	Big Box Store	Supplement Shop	Steakhouse	Shoe Store
1	Manhattan	Chinatown	40.715618	-73.994279	1	Chinese Restaurant	Cocktail Bar	American Restaurant	Vietnamese Restaurant	Bubble Tea Shop	Noodle House	Bar	Dumpling Restaurant	Ice Cream Shop	Hotpot Restaurant
2	Manhattan	Washington Heights	40.851903	-73.936900	4	Café	Bakery	Mobile Phone Shop	Grocery Store	Pizza Place	Chinese Restaurant	Latin American Restaurant	Mexican Restaurant	Tapas Restaurant	Shoe Store
3	Manhattan	Inwood	40.867684	-73.921210	4	Lounge	Mexican Restaurant	Café	Pizza Place	Wine Bar	Deli / Bodega Park		American Restaurant	Frozen Yogurt Shop	Chinese Restaurant
4	Manhattan	Hamilton Heights	40.823604	-73.949688	4	Mexican Restaurant	Café	Coffee Shop	Pizza Place	Yoga Studio	Sushi Restaurant	Caribbean Restaurant	Chinese Restaurant	School	Bakery

Examine Clusters

- Cluster label 0

	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
8	Upper East Side	Italian Restaurant	Exhibit	Coffee Shop	Gym / Fitness Center	Bakery	Art Gallery	Juice Bar	Spa	Hotel	Cocktail Bar
13	Lincoln Square	Gym / Fitness Center	Theater	Café	Concert Hall	Plaza	Italian Restaurant	Opera House	Performing Arts Venue	French Restaurant	Indie Movie Theater
14	Clinton	Theater	Gym / Fitness Center	American Restaurant	Italian Restaurant	Hotel	Wine Shop	Cocktail Bar	Spa	Food Court	Lounge
18	Greenwich Village	Italian Restaurant	Sushi Restaurant	French Restaurant	Clothing Store	Seafood Restaurant	Indian Restaurant	Café	Gourmet Shop	Cosmetics Shop	Bakery
21	Tribeca	Park	Italian Restaurant	Café	Spa	American Restaurant	Boutique	Wine Shop	Wine Bar	Gym	Coffee Shop
24	West Village	Italian Restaurant	Cosmetics Shop	New American Restaurant	Gastropub	Wine Bar	Jazz Club	American Restaurant	Bakery	French Restaurant	Park
27	Gramercy	Italian Restaurant	Bagel Shop	Bar	Thrift / Vintage Store	Pizza Place	Cocktail Bar	Hotel	American Restaurant	Mexican Restaurant	Thai Restaurant
31	Noho	Italian Restaurant	Cocktail Bar	French Restaurant	Boutique	Grocery Store	Art Gallery	Gift Shop	Hotel	Rock Club	Coffee Shop
32	Civic Center	Italian Restaurant	Gym / Fitness Center	French Restaurant	Sandwich Place	Coffee Shop	Bakery	Yoga Studio	Spa	Cocktail Bar	Park
35	Turtle Bay	Italian Restaurant	Sushi Restaurant	Hotel	Steakhouse	Wine Bar	Coffee Shop	French Restaurant	Park	Café	Japanese Restaurant
39	Hudson Yards	American Restaurant	Coffee Shop	Italian Restaurant	Gym / Fitness Center	Theater	Café	Hotel	Dog Run	Gym	Park

Cluster label 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
1	Chinatown	Chinese Restaurant	Cocktail Bar	American Restaurant	Vietnamese Restaurant	Bubble Tea Shop	Noodle House	Bar	Dumpling Restaurant	Ice Cream Shop	Hotpot Restaurant
6	Central Harlem	African Restaurant	Public Art	Cosmetics Shop	French Restaurant	Chinese Restaurant	Seafood Restaurant	Gym / Fitness Center	American Restaurant	Park	Southern / Soul Food Restaurant
10	Lenox Hill	Coffee Shop	Italian Restaurant	Sushi Restaurant	Gym / Fitness Center	Pizza Place	Burger Joint	Gym	Sporting Goods Shop	Salad Place	Turkish Restaurant
12	Upper West Side	Italian Restaurant	Bar	Wine Bar	Coffee Shop	Mediterranean Restaurant	Vegetarian / Vegan Restaurant	Burger Joint	Indian Restaurant	Bakery	Bookstore
15	Midtown	Hotel	Clothing Store	Steakhouse	Theater	Cocktail Bar	Food Truck	Spa	American Restaurant	Bookstore	Japanese Restaurant
16	Murray Hill	Sandwich Place	Japanese Restaurant	Coffee Shop	Hotel	French Restaurant	Gym	Bar	Italian Restaurant	Jewish Restaurant	Juice Bar
19	East Village	Bar	Wine Bar	Chinese Restaurant	Mexican Restaurant	Ice Cream Shop	Ramen Restaurant	Coffee Shop	Cocktail Bar	Vegetarian / Vegan Restaurant	Pizza Place
22	Little Italy	Bakery	Café	Clothing Store	Italian Restaurant	Sandwich Place	Mediterranean Restaurant	Ice Cream Shop	Seafood Restaurant	Salon / Barbershop	Massage Studio
23	Soho	Clothing Store	Boutique	Women's Store	Shoe Store	Men's Store	Art Gallery	Mediterranean Restaurant	Italian Restaurant	Furniture / Home Store	Yoga Studio
30	Carnegie Hill	Pizza Place	Coffee Shop	Café	Cosmetics Shop	Grocery Store	Bar	Spa	French Restaurant	Japanese Restaurant	Yoga Studio
33	Midtown South	Korean Restaurant	Hotel	Hotel Bar	Coffee Shop	Japanese Restaurant	Cosmetics Shop	Italian Restaurant	Gym / Fitness Center	Bakery	Cocktail Bar
34	Sutton Place	Gym / Fitness Center	Italian Restaurant	Indian Restaurant	Furniture / Home Store	American Restaurant	Gym	Juice Bar	Dessert Shop	Yoga Studio	Cupcake Shop
38	Flatiron	Yoga Studio	Japanese Restaurant	Gym	Gym / Fitness Center	American Restaurant	Cosmetics Shop	Clothing Store	New American Restaurant	Salon / Barbershop	Sporting Goods Shop

- Cluster label 2

	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
37	Stuyvesant Town	Bar	Park	Playground	German Restaurant	Basketball Court	Baseball Field	Fountain	Harbor / Marina	Cocktail Bar	Coffee Shop

- Cluster label 3

	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
5	Manhattanville	Coffee Shop	Mexican Restaurant	Italian Restaurant	Park	Chinese Restaurant	Seafood Restaurant	Dumpling Restaurant	Bar	Bus Station	Burger Joint
17	Chelsea	Coffee Shop	Italian Restaurant	Ice Cream Shop	Nightclub	Bakery	American Restaurant	Hotel	Seafood Restaurant	Theater	Tapas Restaurant
26	Morningside Heights	Coffee Shop	American Restaurant	Park	Bookstore	Café	Food Truck	Deli / Bodega	Burger Joint	New American Restaurant	Tennis Court
28	Battery Park City	Park	Coffee Shop	Hotel	Gym	Wine Shop	Italian Restaurant	Clothing Store	Plaza	Memorial Site	Burger Joint
29	Financial District	Coffee Shop	Gym	Wine Shop	Hotel	Steakhouse	Pizza Place	Café	Bar	American Restaurant	Park

- Cluster label 4

	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	Discount Store	Coffee Shop	Yoga Studio	Seafood Restaurant	Gym	Tennis Stadium	Big Box Store	Supplement Shop	Steakhouse	Shoe Store
2	Washington Heights	Café	Bakery	Mobile Phone Shop	Grocery Store	Pizza Place	Chinese Restaurant	Latin American Restaurant	Mexican Restaurant	Tapas Restaurant	Shoe Store
3	Inwood	Lounge	Mexican Restaurant	Café	Pizza Place	Wine Bar	Deli / Bodega	Park	American Restaurant	Frozen Yogurt Shop	Chinese Restaurant
4	Hamilton Heights	Mexican Restaurant	Café	Coffee Shop	Pizza Place	Yoga Studio	Sushi Restaurant	Caribbean Restaurant	Chinese Restaurant	School	Bakery
7	East Harlem	Mexican Restaurant	Bakery	Latin American Restaurant	Deli / Bodega	Thai Restaurant	Convenience Store	Café	Taco Place	Street Art	Steakhouse
9	Yorkville	Gym	Italian Restaurant	Bar	Coffee Shop	Pizza Place	Sushi Restaurant	Deli / Bodega	Japanese Restaurant	Ice Cream Shop	Diner
11	Roosevelt Island	Sandwich Place	Deli / Bodega	Coffee Shop	Dog Run	Café	Farmers Market	Supermarket	Metro Station	Outdoors & Recreation	Dry Cleaner
20	Lower East Side	Café	Chinese Restaurant	Coffee Shop	Ramen Restaurant	Japanese Restaurant	Cocktail Bar	Shoe Store	Bakery	Art Gallery	Sandwich Place
25	Manhattan Valley	Indian Restaurant	Coffee Shop	Pizza Place	Yoga Studio	Playground	Spa	Café	Mexican Restaurant	Deli / Bodega	Bar
36	Tudor City	Park	Mexican Restaurant	Greek Restaurant	Café	Sushi Restaurant	Deli / Bodega	Pizza Place	Hotel	Dog Run	Asian Restaurant

4. DISCUSSION

- Let's discuss the above mentioned problem statements. Firstly he needs to choose a suitable location for the restaurant. Let's say he wants to open a new Indian Restaurant in Manhattan, NY. Manhattan, NY real estate is very costly. So assuming that he wants to rent a place for his new restaurant. And now he needs to figure out how many restaurants are there in say neighborhood A, B, C, etc. If there are more than two Indian restaurants in a neighborhood then that would be a great risk to open new restaurant of same cuisine in that neighborhood. Selecting a place where there is less or no restaurant would be of great choice, considering the rent of neighborhood too. Why I'm emphasizing that there should be less restaurants is, so that he will face less competition with same cuisine restaurants. He needs to look for a place where many people frequently visit so that his business is above average. Places like Downtown, Movie theatre, Malls & Gas stations would help his business running. Restaurants ratings, checking of customers might help in deciding location crowd. I would also suggest that since he currently runs a profitable business in Tampa he should find a similar type of neighborhood in Manhattan, NY also.

Examine a particular Cluster

- After examining several cluster data, I concluded that cluster # 4 resembles closer the Tampa, FL. Therefore providing guidance as to where to look for the future restaurant in Manhattan, NY. In cluster 4 we have 9 neighborhoods and these neighborhoods suits most with top ten neighborhoods in current business place.

Conclusion

- I feel this Capstone project presented me a great opportunity to practice and apply the Data Science tools and methodologies learned. This project has shown me a practical application to resolve a real situation that has impacting personal and financial impact using Data Science tools.

Thank you!