

APPLIED DATA SCIENCE CAPSTONE

Battle of the Neighbourhoods

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BUSINESS PROBLEM

Mr. John currently stays in **Downtown Toronto** with his family and now has a good job opportunity in the **United States of America**. He needs to move to **New York City** with his family.

Mr. John has never been to New York City and is looking to us to help him find a **good location within New York for him and his family to settle down**. Mr. John and his family are accustomed to the busy downtown life with good options and is looking for a similar location in New York.

We will use Data Science to generate a few most promising neighbourhoods based on this criteria so that Mr. John can take an informed decision and move to New York, USA.

DATA ACQUISITION

Following data sources were extracted to generate the required information:

- New York Neighbourhood data - https://cocl.us/new_york_dataset
- Coordinate of New York and the Boroughs in New York – **GeoPy Library**
- A total of 5 Boroughs (Manhattan, Staten Island, Brooklyn, Bronx and Queens) & 306 neighbourhoods analysed
- Popular venues in the neighbourhoods of New York - **Foursquare API**
 - Nearly 10,000 venues and over 1200+ unique categories were extracted and analysed

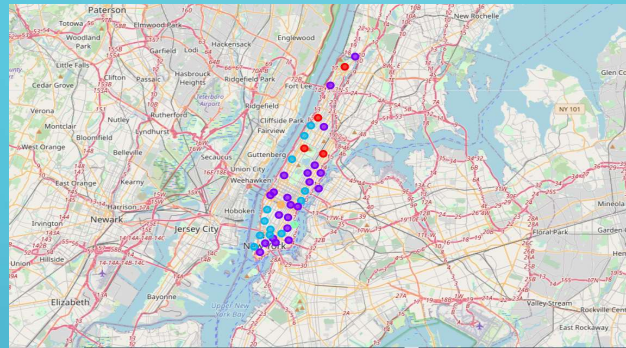
METHODOLOGY

- Analyse one Borough and all its neighbourhood at a time
- Use Foursquare API to explore the neighbourhood
- Fetch the top 100 venues in a radius of 500 meters for each neighbourhood
- Analyse and rank the Top 10 most common venues in each neighbourhood
- Machine Learning - Use K-Means clustering to cluster the neighbourhoods
- End result will be the clustered neighbourhoods in that borough with the top 10 common venues

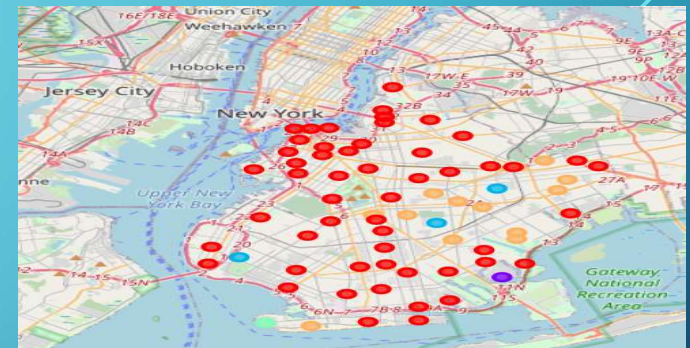
CLUSTERED BOROUGHES

Using K-Means
Clustering to cluster
the neighbourhoods in
New York

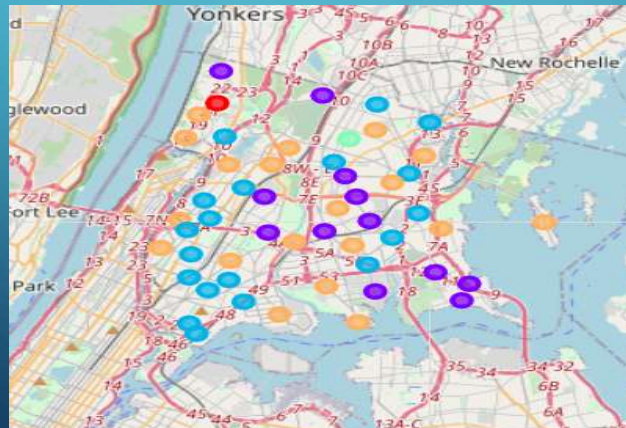
Manhattan



Staten Island



Bronx



Queens



TOP CLUSTERED NEIGHBOURHOODS – MANHATTAN & STATEN ISLAND

Ranking of the top 10 most common venues (by way of frequency in that Neighbourhood) in each of the Neighbourhoods in New York

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	Marble Hill	Sandwich Place	Gym	Coffee Shop	Yoga Studio	Deli / Bodega	Supplement Shop	Steakhouse	Seafood Restaurant	Pizza Place	Pharmacy
1	Chinatown	Chinese Restaurant	Bakery	Cocktail Bar	Optical Shop	American Restaurant	Spa	Coffee Shop	Salon / Barbershop	Dim Sum Restaurant	Noodle House
2	Washington Heights	Café	Bakery	Grocery Store	Chinese Restaurant	Pizza Place	Mobile Phone Shop	Coffee Shop	Supermarket	Shoe Store	Gym
6	Central Harlem	Bar	Chinese Restaurant	Fried Chicken Joint	Gym / Fitness Center	African Restaurant	American Restaurant	French Restaurant	Seafood Restaurant	Gym	Beer Bar
8	Upper East Side	Italian Restaurant	Bakery	Exhibit	Gym / Fitness Center	Spa	American Restaurant	Juice Bar	Pizza Place	Yoga Studio	Wine Shop
9	Yorkville	Coffee Shop	Italian Restaurant	Gym	Bar	Sushi Restaurant	Deli / Bodega	Wine Shop	Mexican Restaurant	Pizza Place	Japanese Restaurant
10	Lenox Hill	Italian Restaurant	Coffee Shop	Pizza Place	Cocktail Bar	Sushi Restaurant	Gym / Fitness Center	Gym	Café	Burger Joint	Thai Restaurant
11	Roosevelt Island	Park	Baseball Field	Gym / Fitness Center	Kosher Restaurant	Greek Restaurant	Restaurant	Coffee Shop	Outdoors & Recreation	Liquor Store	Dog Run
13	Lincoln Square	Plaza	Café	Italian Restaurant	Gym / Fitness Center	Theater	Performing Arts Venue	Concert Hall	American Restaurant	Wine Shop	Indie Movie Theater
14	Clinton	Theater	Gym / Fitness Center	Coffee Shop	Wine Shop	Gym	Spa	Italian Restaurant	Hotel	American Restaurant	Cocktail Bar
15	Midtown	Coffee Shop	Hotel	Clothing Store	Theater	Spa	Gym	Pizza Place	Cuban Restaurant	Mediterranean Restaurant	Fast Food Restaurant
16	Murray Hill	Sandwich Place	Bar	Gym / Fitness Center	Pizza Place	Indian Restaurant	Mediterranean Restaurant	Steakhouse	Hotel	Vietnamese Restaurant	Burger Joint
19	East Village	Pizza Place	Coffee Shop	Bar	Japanese Restaurant	Juice Bar	Vietnamese Restaurant	Cocktail Bar	Greek Restaurant	Gourmet Shop	Filipino Restaurant
20	Lower East Side	Café	Cocktail Bar	Art Gallery	Pharmacy	Chinese Restaurant	Japanese Restaurant	Juice Bar	Latin American Restaurant	Mediterranean Restaurant	Park
22	Little Italy	Chinese Restaurant	Italian Restaurant	Bakery	Thai Restaurant	Hotel	Mediterranean Restaurant	Cosmetics Shop	Café	Spa	Pizza Place

Staten Island

	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	St. George	Clothing Store	Sporting Goods Shop	Bar	Italian Restaurant	Deli / Bodega	Pizza Place	Plaza	Outlet Mall	Donut Shop	Coffee Shop
2	Stapleton	Discount Store	Bank	Sandwich Place	Pizza Place	Mexican Restaurant	Park	Donut Shop	Residential Building (Apartment / Condo)	Restaurant	New American Restaurant
3	Rosebank	Italian Restaurant	Pharmacy	Grocery Store	Museum	Storage Facility	Breakfast Spot	Pizza Place	Café	Cajun / Creole Restaurant	Filipino Restaurant
4	West Brighton	Bar	Coffee Shop	Music Store	Pharmacy	Breakfast Spot	Bank	Italian Restaurant	Gift Shop	German Restaurant	Bus Stop
8	Port Richmond	Rental Car Location	Mexican Restaurant	Deli / Bodega	Construction & Landscaping	Donut Shop	Food Truck	Food & Drink Shop	Food	Flower Shop	Filipino Restaurant
11	Castleton Corners	Pizza Place	Bank	Ice Cream Shop	Go Kart Track	Mini Golf	Grocery Store	Tattoo Parlor	Sandwich Place	Bar	Burger Joint
12	New Springville	Pizza Place	Health & Beauty Service	Chinese Restaurant	Coffee Shop	Mobile Phone Shop	Accessories Store	Shopping Mall	Sandwich Place	Restaurant	Deli / Bodega
13	Travis	Hotel	Deli / Bodega	Baseball Field	Comedy Club	Spanish Restaurant	Bowling Alley	Park	Gym	Gym / Fitness Center	Sports Club
14	New Dorp	Italian Restaurant	Pizza Place	Vietnamese Restaurant	Gym / Fitness Center	Dessert Shop	Deli / Bodega	Coffee Shop	Salon / Barbershop	Sandwich Place	Chinese Restaurant
16	Great Kills	Italian Restaurant	Pizza Place	Bar	Falafel Restaurant	Spanish Restaurant	Train Station	Cosmetics Shop	Pharmacy	Sandwich Place	Food & Drink Shop
17	Eltingville	Pizza Place	Sushi Restaurant	Fast Food Restaurant	Liquor Store	Pharmacy	Bank	Sandwich Place	Italian Restaurant	Donut Shop	Gourmet Shop
18	Annadale	Pizza Place	Dance Studio	Bakery	Diner	Restaurant	Pharmacy	Sports Bar	Liquor Store	Pub	Train Station
19	Woodrow	Pharmacy	Italian Restaurant	Martial Arts Dojo	Pizza Place	Donut Shop	Cosmetics Shop	Coffee Shop	Chinese Restaurant	Gift Shop	Miscellaneous Shop
21	Tompkinsville	Brewery	Gastropub	Supermarket	Mexican Restaurant	Food Truck	Café	Caribbean Restaurant	Check Cashing Service	Chinese Restaurant	Sandwich Place
22	Silver Lake	Indie Theater	American Restaurant	Burger Joint	Golf Course	Farmers Market	French Restaurant	Food Truck	Food & Drink Shop	Food	Flower Shop

TOP CLUSTERED NEIGHBOURHOODS – BROOKLYN & BRONX

Brooklyn

	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
26	East New York	Salon / Barbershop	Pizza Place	Plaza	Event Service	Convenience Store	Food Truck	Metro Station	Caribbean Restaurant	Fried Chicken Joint	Bus Station
28	Canarsie	Caribbean Restaurant	Asian Restaurant	Grocery Store	Gym	Chinese Restaurant	Shipping Store	Thai Restaurant	Entertainment Service	Ethiopian Restaurant	Event Service
29	Flatlands	Pharmacy	Caribbean Restaurant	Fast Food Restaurant	Fried Chicken Joint	Arts & Crafts Store	Electronics Store	Lounge	Paper / Office Supplies Store	Bar	Video Store
32	Coney Island	Baseball Stadium	Caribbean Restaurant	Brewery	Clothing Store	Monument / Landmark	Pizza Place	Food Court	Skating Rink	Farmers Market	Music Venue
47	Prospect Park South	Caribbean Restaurant	Pizza Place	Fast Food Restaurant	Mobile Phone Shop	Grocery Store	Fried Chicken Joint	Mexican Restaurant	Donut Shop	Latin American Restaurant	Food Truck
55	Wingate	Fried Chicken Joint	Fast Food Restaurant	Park	Donut Shop	BBQ Joint	Nightclub	Gym / Fitness Center	Bus Station	Intersection	Pharmacy
56	Rugby	Caribbean Restaurant	Bank	Grocery Store	Pizza Place	Diner	Fast Food Restaurant	Fried Chicken Joint	Seafood Restaurant	Sandwich Place	Mobile Phone Shop
57	Remsen Village	Caribbean Restaurant	Fast Food Restaurant	Deli / Bodega	Donut Shop	Fish Market	Breakfast Spot	Supermarket	Fried Chicken Joint	Café	Sandwich Place
58	New Lots	Chinese Restaurant	Grocery Store	Fried Chicken Joint	Pizza Place	Playground	Park	Bank	Bakery	Breakfast Spot	Salon / Barbershop
59	Paerdegat Basin	Food	Harbor / Marina	Moving Target	Auto Garage	Asian Restaurant	Women's Store	Event Space	Factory	Falafel Restaurant	Farm
67	Highland Park	Spanish Restaurant	Pizza Place	Metro Station	Grocery Store	Gym / Fitness Center	Fried Chicken Joint	Furniture / Home Store	Big Box Store	Garden	Tennis Court
69	Erasmus	Caribbean Restaurant	Grocery Store	Yoga Studio	Juice Bar	Pharmacy	Convenience Store	Donut Shop	School	Music Venue	Bus Line

Bronx

	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	Wakefield	Pharmacy	Ice Cream Shop	Laundromat	Gas Station	Caribbean Restaurant	Donut Shop	Sandwich Place	Dessert Shop	Dive Bar	Doctor's Office
2	Eastchester	Caribbean Restaurant	Deli / Bodega	Diner	Bus Stop	Bus Station	Metro Station	Pizza Place	Platform	Convenience Store	Donut Shop
5	Kingsbridge	Pizza Place	Bar	Mexican Restaurant	Supermarket	Latin American Restaurant	Sandwich Place	Bakery	Spanish Restaurant	Fast Food Restaurant	Donut Shop
9	Baychester	Donut Shop	Other Great Outdoors	Sandwich Place	Fried Chicken Joint	Electronics Store	Bank	Mattress Store	Spanish Restaurant	Pet Store	Men's Store
13	University Heights	Fried Chicken Joint	Pizza Place	Chinese Restaurant	Pharmacy	Bakery	Shoe Store	Fast Food Restaurant	Sandwich Place	Donut Shop	Supermarket
15	Fordham	Mobile Phone Shop	Shoe Store	Bank	Gym / Fitness Center	Spanish Restaurant	Donut Shop	Pizza Place	Fast Food Restaurant	Pharmacy	Supplement Shop
19	Melrose	Pizza Place	Pharmacy	Gym / Fitness Center	Grocery Store	Discount Store	Sandwich Place	Diner	Art Gallery	Mexican Restaurant	Gym
20	Mott Haven	Pizza Place	Spanish Restaurant	Gym	Donut Shop	Latin American Restaurant	Pharmacy	Baseball Field	Mobile Phone Shop	Fish & Chips Shop	Bookstore
21	Port Morris	Furniture / Home Store	Latin American Restaurant	Spanish Restaurant	Restaurant	Food Truck	Storage Facility	Baseball Field	Donut Shop	Brewery	Distillery
22	Longwood	Deli / Bodega	Latin American Restaurant	Fast Food Restaurant	Donut Shop	Grocery Store	Park	Sandwich Place	Diner	Dive Bar	Doctor's Office
24	Morrisania	Discount Store	Pizza Place	Donut Shop	Fast Food Restaurant	Bus Station	Ice Cream Shop	Bowling Alley	Chinese Restaurant	Road	Sandwich Place
30	Westchester Square	Fast Food Restaurant	Pizza Place	Pharmacy	Donut Shop	Sandwich Place	Spanish Restaurant	Park	Building	Metro Station	Mexican Restaurant
36	Pelham Bay	Italian Restaurant	Bank	Sandwich Place	Fast Food Restaurant	Gym / Fitness Center	Chinese Restaurant	Donut Shop	Convenience Store	Construction & Landscaping	Cosmetics Shop

TOP CLUSTERED NEIGHBOURHOODS - QUEENS

Queens

	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	Astoria	Bar	Middle Eastern Restaurant	Mediterranean Restaurant	Greek Restaurant	Hookah Bar	Pizza Place	Seafood Restaurant	Bakery	Pub	Café
1	Woodside	Grocery Store	Thai Restaurant	Latin American Restaurant	Bakery	Filipino Restaurant	Donut Shop	Bar	American Restaurant	Pub	Gourmet Shop
2	Jackson Heights	Latin American Restaurant	Peruvian Restaurant	South American Restaurant	Bakery	Thai Restaurant	Mobile Phone Shop	Mexican Restaurant	Grocery Store	Pharmacy	Diner
3	Elmhurst	Thai Restaurant	Mexican Restaurant	South American Restaurant	Vietnamese Restaurant	Chinese Restaurant	Pizza Place	Gym / Fitness Center	Snack Place	Food Court	Malay Restaurant
4	Howard Beach	Italian Restaurant	Clothing Store	Pharmacy	Sandwich Place	Bagel Shop	Fast Food Restaurant	Concert Hall	Tapas Restaurant	Mexican Restaurant	Shipping Store
5	Corona	Mexican Restaurant	Bakery	Convenience Store	Italian Restaurant	Latin American Restaurant	School	Donut Shop	Supermarket	Restaurant	Chinese Restaurant
6	Forest Hills	Gym / Fitness Center	Gym	Yoga Studio	Pizza Place	Convenience Store	Park	Thai Restaurant	Pharmacy	Video Game Store	Bank
7	Kew Gardens	Chinese Restaurant	Pharmacy	Park	Pizza Place	Bank	Bar	Indian Restaurant	Pet Store	Cosmetics Shop	Spa

CONCLUSION

- Used K-Means clustering technique to do cluster the neighbourhoods of New York
- Analysed each neighbourhood and provided sufficient information to make an informed decision
- Other factors to be considered but not within the scope of this analysis:
 - Affordability
 - Proximity to the workplace