

The background features abstract, overlapping green geometric shapes, primarily triangles and polygons, in various shades of green, creating a modern and dynamic visual effect.

Project: Battle of the Neighbourhoods

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Introduction

- ▶ **Background:** Building a good chain of outlets for any business is a necessity in the current world to survive as a brand. Correct time of expansion depends upon the brand, which usually depends on the quality of products and services as good quality of products and services gain them the necessary funding to expand. Correct placement of the outlet/branch in a given neighbourhood is a very important step which must be done with all the necessary background studies done as one wrong placement can result into huge loss, and thus we decided to deal with this particular problem. Our area of concern for this project will be the state of New York.
- ▶ **Problem Statement:** Keeping in mind the problem stated in the background study, and for a sample client in our scenario, i.e., a Pizza Place owner. Thus the problem statement can be stated as:
"To find the best locations in New York State for the expansion of a Pizza Place based in Carnegie Hill, Manhattan, NY."
- ▶ **Interest:** Our current client is very much interested in the project as he will get a narrowed down list of all the places where he can possibly expand, based on location.

Any other business who wish to expand their business might also be interested in this project based on the success/satisfaction of our current client.

Data Acquisition and Cleaning

► Data Sources:

The neighbourhoods in New York State along with their Latitude and Longitude values in [this](#) JSON file.

All the nearby venues in the form of JSON data from [Foursquare](#) API.

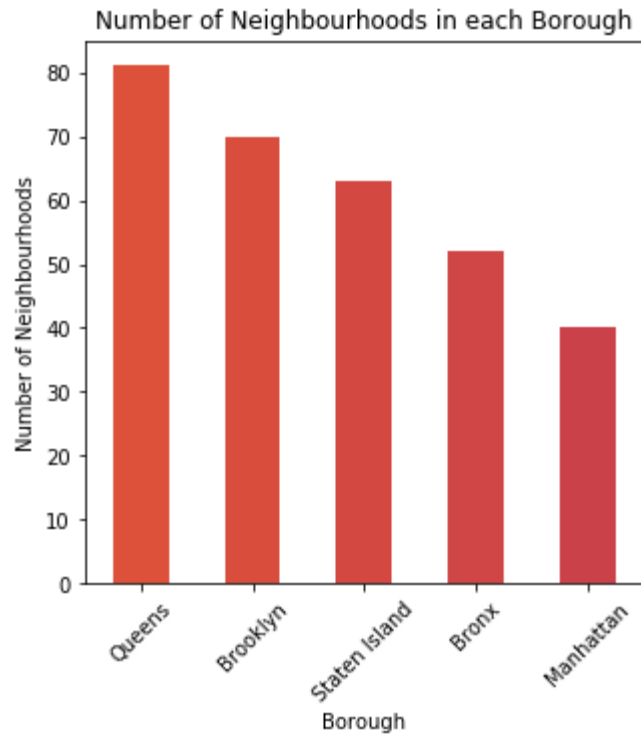
► Data Cleaning and Feature Selection:

New York State JSON file consists of co-ordinates and Neighbourhood name along with Borough name for each neighbourhood which we retrieve for our purpose.

Foursquare API call JSON response consists of co-ordinates, venue name and venue category that we retrieve for our purpose

Exploratory Data Analysis

- Following graph and table suggest number of neighbourhoods in each Borough of New York State:



1. Queens: 81
2. Brooklyn: 70
3. Staten Island: 63
4. Bronx: 52
5. Manhattan: 40

Exploratory Data Analysis(contd.)

- Below map picturizes each neighbourhood in New York State in each Borough:



Most Common Venues in Neighbourhoods of Bronx (only 5 Neighbourhoods)

	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	Allerton	Pizza Place	Supermarket	Deli / Bodega	Donut Shop	Breakfast Spot	Pharmacy	Spa	Fast Food Restaurant	Electronics Store	Smoke Shop
1	Baychester	Donut Shop	Pet Store	Bank	Men's Store	Mattress Store	Spanish Restaurant	Fast Food Restaurant	Electronics Store	Supermarket	Fried Chicken Joint
2	Bedford Park	Diner	Pizza Place	Chinese Restaurant	Deli / Bodega	Pharmacy	Mexican Restaurant	Bus Station	Spanish Restaurant	Sandwich Place	Supermarket
3	Belmont	Italian Restaurant	Pizza Place	Deli / Bodega	Bakery	Bank	Donut Shop	Mexican Restaurant	Grocery Store	Dessert Shop	Sandwich Place
4	Bronxdale	Breakfast Spot	Bank	Chinese Restaurant	Performing Arts Venue	Park	Paper / Office Supplies Store	Eastern European Restaurant	Spanish Restaurant	Mexican Restaurant	Deli / Bodega

Most Common Venues in Neighbourhoods of Manhattan (only 5 Neighbourhoods)

	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	Memorial Site	Boat or Ferry	Plaza	Playground	Shopping Mall	Mexican Restaurant
1	Carnegie Hill	Coffee Shop	Pizza Place	Café	Yoga Studio	Wine Shop	Bookstore	Gym	Bar	Japanese Restaurant	Shipping Store
2	Central Harlem	African Restaurant	Chinese Restaurant	Seafood Restaurant	Cosmetics Shop	French Restaurant	Bar	American Restaurant	Food Truck	Beer Bar	Gym / Fitness Center
3	Chelsea	Art Gallery	Coffee Shop	Café	Bakery	Ice Cream Shop	American Restaurant	Italian Restaurant	Seafood Restaurant	Market	Park
4	Chinatown	Chinese Restaurant	Bakery	Bubble Tea Shop	Cocktail Bar	Coffee Shop	Ice Cream Shop	Salon / Barbershop	American Restaurant	Optical Shop	Vietnamese Restaurant

Most Common Venues in Neighbourhoods of Brooklyn (only 5 Neighbourhoods)

	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	Bath Beach	Pharmacy	Pizza Place	Chinese Restaurant	Gas Station	Sushi Restaurant	Italian Restaurant	Asian Restaurant	Bubble Tea Shop	Fast Food Restaurant	Burger Joint
1	Bay Ridge	Spa	Pizza Place	Italian Restaurant	Greek Restaurant	Gym / Fitness Center	Bar	American Restaurant	Middle Eastern Restaurant	Hookah Bar	Ice Cream Shop
2	Bedford Stuyvesant	Pizza Place	Coffee Shop	Café	Bar	Tiki Bar	Deli / Bodega	Discount Store	Park	Cocktail Bar	New American Restaurant
3	Bensonhurst	Sushi Restaurant	Dessert Shop	Ice Cream Shop	Flower Shop	Italian Restaurant	Donut Shop	Bakery	Noodle House	Liquor Store	Cha Chaan Teng
4	Bergen Beach	Harbor / Marina	Donut Shop	Baseball Field	Playground	Athletics & Sports	Fish & Chips Shop	Farm	Farmers Market	Fast Food Restaurant	Field

Most Common Venues in Neighbourhoods of Queens (only 5 Neighbourhoods)

	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	Arverne	Surf Spot	Sandwich Place	Metro Station	Board Shop	Bus Stop	Thai Restaurant	Bed & Breakfast	Donut Shop	Coffee Shop	Beach
1	Astoria	Bar	Middle Eastern Restaurant	Mediterranean Restaurant	Greek Restaurant	Hookah Bar	Indian Restaurant	Deli / Bodega	Bakery	Seafood Restaurant	Café
2	Astoria Heights	Playground	Italian Restaurant	Plaza	Bus Station	Bowling Alley	Supermarket	Laundromat	Bakery	Cocktail Bar	Burger Joint
3	Auburndale	Bar	Discount Store	Fast Food Restaurant	Furniture / Home Store	Supermarket	Noodle House	Sushi Restaurant	Korean Restaurant	Miscellaneous Shop	Italian Restaurant
4	Bay Terrace	Clothing Store	Cosmetics Shop	Lingerie Store	Mobile Phone Shop	Shoe Store	Donut Shop	Women's Store	American Restaurant	Kids Store	Movie Theater

Most Common Venues in Neighbourhoods of Staten Island (only 5 Neighbourhoods)

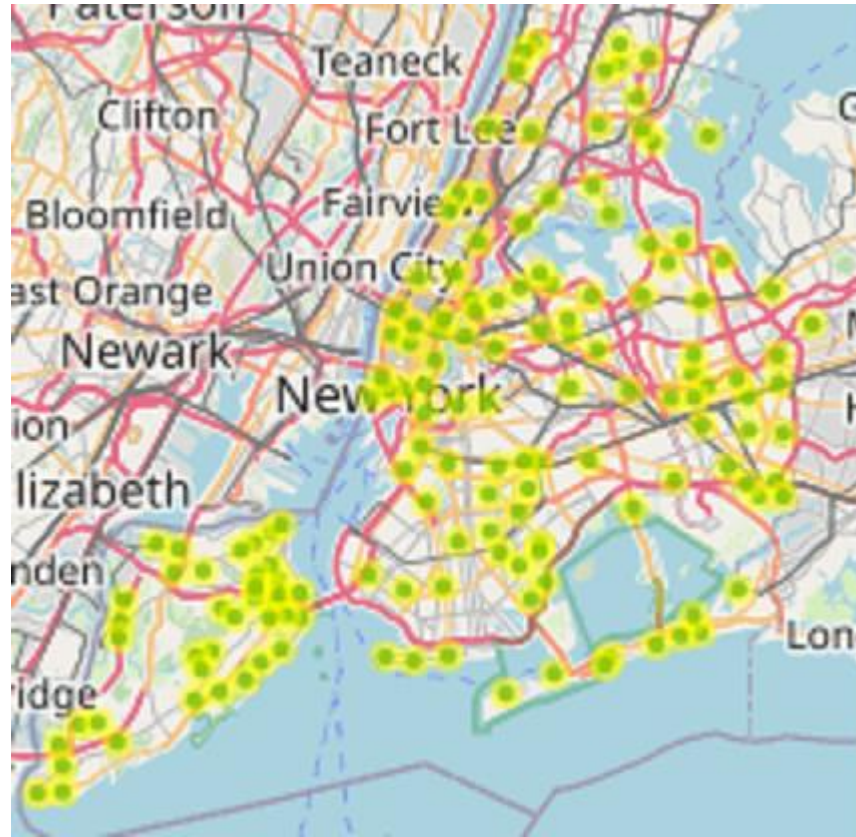
	Neighborhood	1st Most Common Venue	2nd Most Common Venue	3rd Most Common Venue	4th Most Common Venue	5th Most Common Venue	6th Most Common Venue	7th Most Common Venue	8th Most Common Venue	9th Most Common Venue	10th Most Common Venue
0	Annadale	Park	Sports Bar	Pizza Place	Train Station	Restaurant	Diner	Pharmacy	Food	Eastern European Restaurant	Fish & Chips Shop
1	Arden Heights	Coffee Shop	Pizza Place	Pharmacy	Deli / Bodega	Yoga Studio	Falafel Restaurant	Food & Drink Shop	Food	Flower Shop	Fish & Chips Shop
2	Arlington	Bus Stop	Deli / Bodega	Boat or Ferry	Grocery Store	Frame Store	Food Truck	Food & Drink Shop	Food	Flower Shop	Fish & Chips Shop
3	Arrochar	Bus Stop	Deli / Bodega	Italian Restaurant	Polish Restaurant	Bagel Shop	Middle Eastern Restaurant	Supermarket	Mediterranean Restaurant	Sandwich Place	Outdoors & Recreation
4	Bay Terrace	Italian Restaurant	Supermarket	Donut Shop	Shipping Store	Home Service	Playground	Train Station	Sushi Restaurant	Salon / Barbershop	Flower Shop

Predictive Procedure

- First we collect all the neighbourhoods where our venue of concern, i.e., “Pizza Place” doesn’t come under top 10 most common place so as to make sure our client doesn’t place their new outlet in a region where their product is already very common. Below table suggests the same:

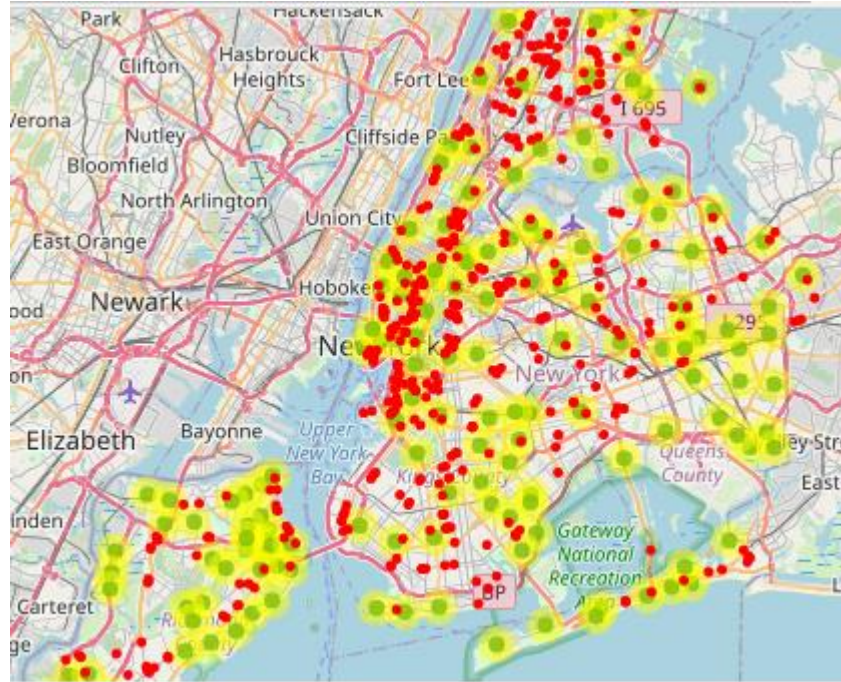
	Borough	Neighborhood	Latitude	Longitude
0	Bronx	Baychester	40.866858	-73.835798
1	Bronx	Bronxdale	40.852723	-73.861726
2	Bronx	City Island	40.847247	-73.786488
3	Bronx	Clason Point	40.806551	-73.854144
4	Bronx	Country Club	40.844246	-73.824099

Predictive Procedure (contd.)



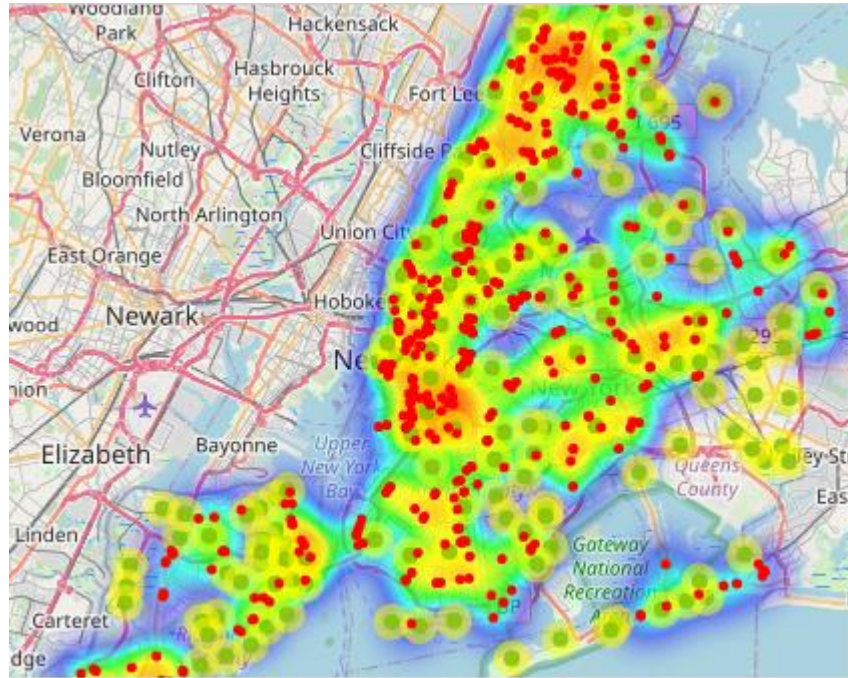
Map of all suggested Neighbourhoods

Predictive Procedure (contd.)



Map of all suggested Neighbourhoods with all Pizza Places

Predictive Procedure (contd.)



HeatMap of all suggested Neighbourhoods with all Pizza Places

Predictive Procedure (contd.)

- Now we will narrow down the list of suggested places further by finding all the competitors of our client within 1Km radius using Foursquare API again.

	Borough	Neighborhood	Latitude	Longitude
0	Bronx	City Island	40.847247	-73.786488
1	Bronx	Clason Point	40.806551	-73.854144
2	Bronx	Soundview	40.821012	-73.865746
3	Bronx	Wakefield	40.894705	-73.847201
4	Manhattan	Chelsea	40.744035	-74.003116

Best suggested neighbourhoods

Predictive Procedure (contd.)

	Borough	Neighborhood	Latitude	Longitude
0	Bronx	Baychester	40.866858	-73.835798
1	Bronx	Country Club	40.844246	-73.824099
2	Bronx	Eastchester	40.887556	-73.827806
3	Bronx	Edenwald	40.884561	-73.848083
4	Bronx	Fieldston	40.895437	-73.905643

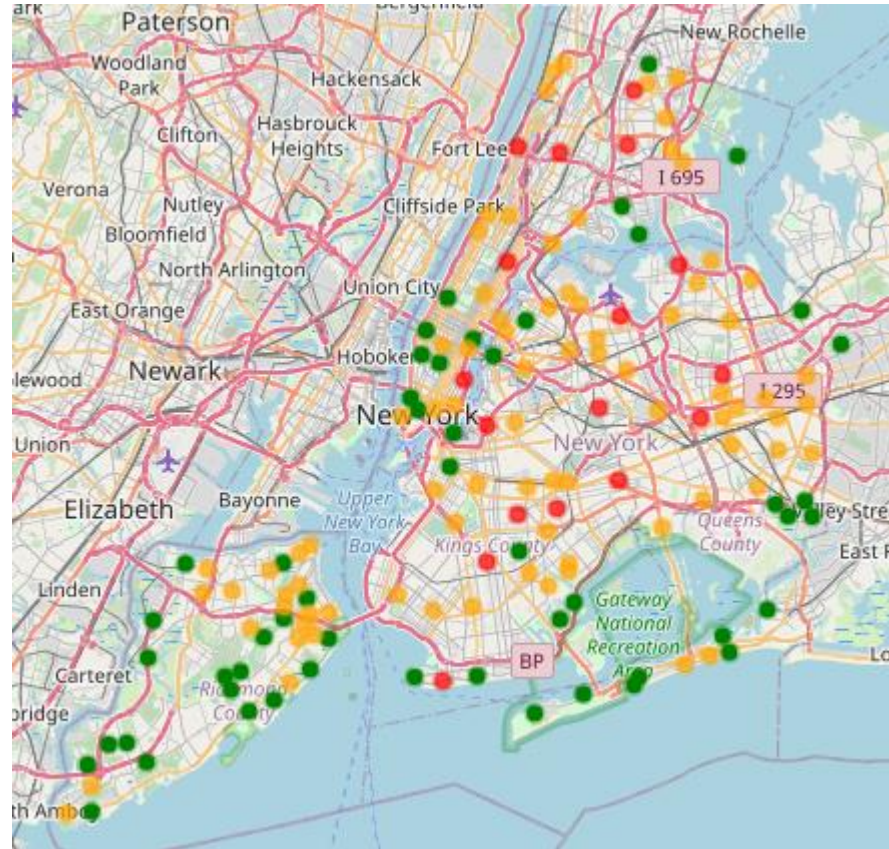
Moderate suggested neighbourhoods

Predictive Procedure (contd.)

	Borough	Neighborhood	Latitude	Longitude
0	Bronx	Bronxdale	40.852723	-73.861726
1	Bronx	Mount Hope	40.848842	-73.908299
2	Bronx	Williamsbridge	40.881039	-73.857446
3	Manhattan	East Harlem	40.792249	-73.944182
4	Manhattan	Stuyvesant Town	40.731000	-73.974052

Worst suggested neighbourhoods

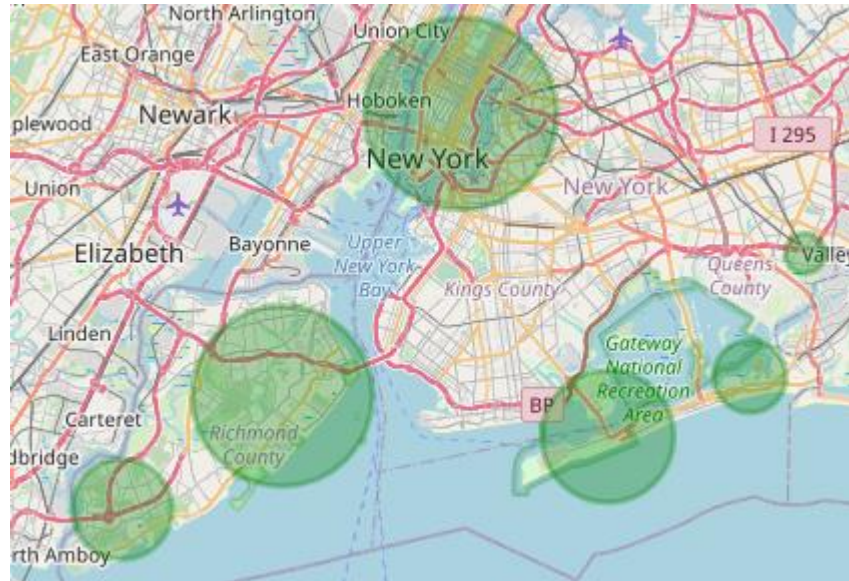
Predictive Procedure (contd.)



Best (in green), Moderate (in orange) and Worst (in red)
suggested neighbourhoods

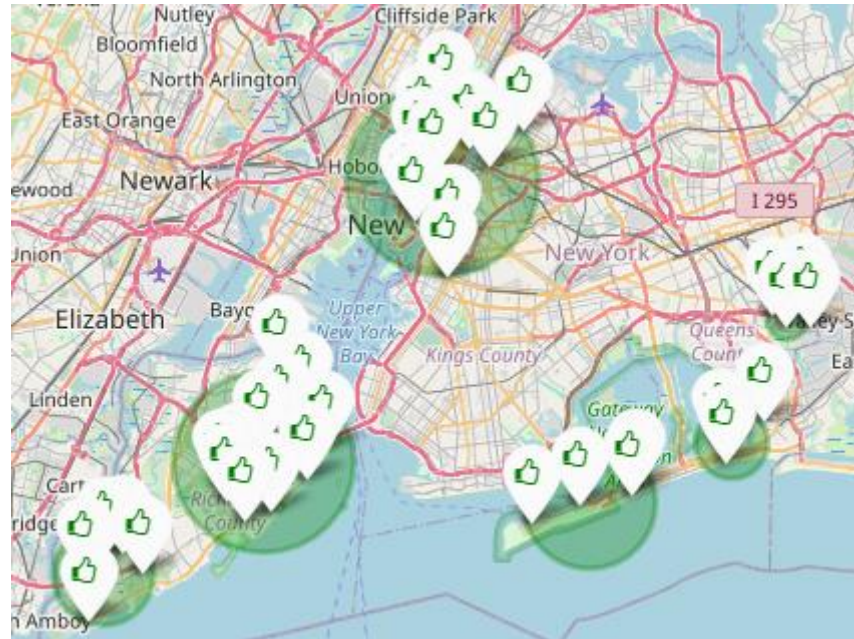
Predictive Procedure (contd.)

- Now we use DBSCAN clustering algorithm to cluster the Best Suggested Neighbourhoods with at least 3 neighbourhoods per cluster with epsilon value of 0.005. Upon using the algorithm, we find the centres and radii of each cluster and plot them on the map as given below:



Clusters of best suggested neighbourhoods

Predictive Procedure (contd.)



Clusters of best suggested neighbourhoods along with their locations

Predictive Procedure (contd.)

- The biggest cluster among all these clusters suggests that there are a large number of neighbourhoods in close proximity where there are very few “Pizza Places” compared to other neighbourhoods and thus will be best suitable for our client to open a new branch/outlet, thus increasing their chances of success by a great factor.

	Borough	Neighborhood	Latitude	Longitude
0	Manhattan	Chelsea	40.744035	-74.003116
1	Manhattan	Civic Center	40.715229	-74.005415
2	Manhattan	Flatiron	40.739673	-73.990947
3	Manhattan	Hudson Yards	40.756658	-74.000111
4	Manhattan	Lincoln Square	40.773529	-73.985338
5	Manhattan	Tribeca	40.721522	-74.010683
6	Manhattan	Turtle Bay	40.752042	-73.967708
7	Brooklyn	Boerum Hill	40.685683	-73.983748
8	Brooklyn	Vinegar Hill	40.703321	-73.981116
9	Queens	Hunters Point	40.743414	-73.953868
10	Queens	Ravenswood	40.761705	-73.931575

Neighbourhoods which come under the biggest cluster of “Best” suggested Neighbourhoods

Conclusions

- From all the above data processing and analysis, we can come to a final conclusion that following neighbourhoods are the best for our client to carry out further research on the likings and average money spent on eating out, by the residents, to further narrow down their new outlet location:

Neighborhood	Borough
Chelsea	Manhattan
Civic Center	Manhattan
Flatiron	Manhattan
Hudson Yards	Manhattan
Lincoln Square	Manhattan
Tribeca	Manhattan
Turtle Bay	Manhattan
Boerum Hill	Brooklyn
Vinegar Hill	Brooklyn
Hunters Point	Queens
Ravenswood	Queens

Conclusions (contd.)

- Client may also want to look into following neighbourhoods, although they do not make a huge cluster and thus may not be as beneficial for our client to invest their resources on:

Neighborhood	Borough
City Island	Bronx
Clason Point	Bronx
Soundview	Bronx
Wakefield	Bronx
Bergen Beach	Brooklyn
Brighton Beach	Brooklyn
East Flatbush	Brooklyn
Mill Island	Brooklyn
Sea Gate	Brooklyn
Arverne	Queens
Bayswater	Queens
Belle Harbor	Queens
Breezy Point	Queens
Brookville	Queens
Douglaston	Queens
Glen Oaks	Queens
Laurelton	Queens
Neponsit	Queens
Rosedale	Queens
Roxbury	Queens
Somerville	Queens
Springfield Gardens	Queens
Arlington	Staten Island
Arrochar	Staten Island
Bloomfield	Staten Island
Butler Manor	Staten Island
Charleston	Staten Island
Egbertville	Staten Island
Emerson Hill	Staten Island
Fox Hills	Staten Island
Huguenot	Staten Island
Lighthouse Hill	Staten Island
New Dorp Beach	Staten Island
Oakwood	Staten Island
Randall Manor	Staten Island
Richmond Town	Staten Island
Sandy Ground	Staten Island
South Beach	Staten Island
Todt Hill	Staten Island
Travis	Staten Island
Woodrow	Staten Island

Future Directions

- ▶ Based on our current research and methodology, we were only able to suggest our client a possible neighbourhood based on location.
- ▶ Later on for further improvements, we may also want to look into the average salaries and average spending of people living in our target neighbourhoods so as to better analyse and further narrow down the list of suggested neighbourhoods.
- ▶ We may also consider the general likes and dislikes of people as they also play an important factor in deciding whether any business will be successful in the region or not.