

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.

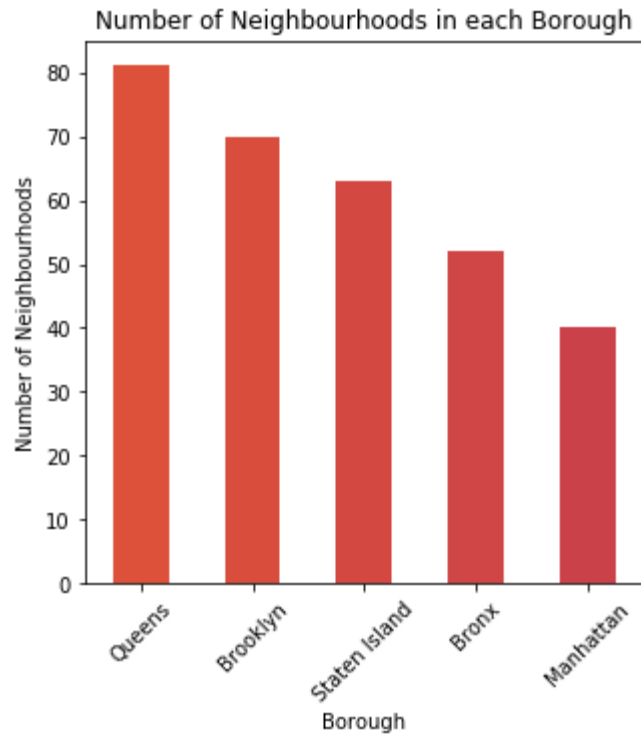
► Data Cleaning and Feature Selection:

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	Chinese Restaurant	Bus Station	Fast Food Restaurant	Martial Arts Dojo	Spanish Restaurant	Pharmacy	Food
1	Baychester	Electronics Store	Donut Shop	Bank	Baseball Field	Bus Station	Mattress Store	Mexican Restaurant	Pet Store	Spanish Restaurant	Fast Food Restaurant
2	Bedford Park	Diner	Chinese Restaurant	Deli / Bodega	Pizza Place	Mexican Restaurant	Spanish Restaurant	Sandwich Place	Supermarket	Fried Chicken Joint	Bus Station
3	Belmont	Italian Restaurant	Pizza Place	Deli / Bodega	Bakery	Donut Shop	Bank	Dessert Shop	Grocery Store	Bar	Mexican Restaurant
4	Bronxdale	Mexican Restaurant	Spanish Restaurant	Pizza Place	Performing Arts Venue	Breakfast Spot	Italian Restaurant	Gym	Paper / Office Supplies Store	Chinese Restaurant	Bank

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	Memorial Site	Gym	Wine Shop	Shopping Mall	Gourmet Shop	Plaza	Boat or Ferry
1	Carnegie Hill	Coffee Shop	Pizza Place	Café	Yoga Studio	Gym	Wine Shop	Bar	Bookstore	Japanese Restaurant	Grocery Store
2	Central Harlem	African Restaurant	Chinese Restaurant	French Restaurant	American Restaurant	Bar	Cosmetics Shop	Fried Chicken Joint	Seafood Restaurant	Food Truck	Market
3	Chelsea	Art Gallery	Coffee Shop	Café	Bakery	Ice Cream Shop	American Restaurant	Italian Restaurant	Theater	Seafood Restaurant	Hotel
4	Chinatown	Chinese Restaurant	Optical Shop	Bakery	Cocktail Bar	Bubble Tea Shop	Salon / Barbershop	Spa	Ice Cream Shop	American Restaurant	Coffee Shop

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	Chinese Restaurant	Sushi Restaurant	Pizza Place	Italian Restaurant	Bubble Tea Shop	Gas Station	Fast Food Restaurant	Ice Cream Shop	Sandwich Place
1	Bay Ridge	Spa	Italian Restaurant	Pizza Place	Greek Restaurant	American Restaurant	Bar	Thai Restaurant	Ice Cream Shop	Playground	Pharmacy
2	Bedford Stuyvesant	Bus Stop	Café	Pizza Place	Coffee Shop	Bar	Discount Store	Cocktail Bar	Thrift / Vintage Store	Gourmet Shop	Basketball Court
3	Bensonhurst	Chinese Restaurant	Ice Cream Shop	Sushi Restaurant	Italian Restaurant	Bakery	Donut Shop	Pizza Place	Noodle House	Cosmetics Shop	Butcher
4	Bergen Beach	Harbor / Marina	Donut Shop	Baseball Field	Playground	Athletics & Sports	Filipino Restaurant	Falafel Restaurant	Farm	Farmers Market	Fast Food Restaurant

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	Metro Station	Sandwich Place	Playground	Wine Shop	Bed & Breakfast	Pizza Place	Thai Restaurant	Bus Stop	Beach
1	Astoria	Middle Eastern Restaurant	Bar	Indian Restaurant	Hookah Bar	Mediterranean Restaurant	Greek Restaurant	Bakery	Deli / Bodega	Café	Seafood Restaurant
2	Astoria Heights	Burger Joint	Italian Restaurant	Bakery	Supermarket	Bus Station	Pizza Place	Bowling Alley	Hostel	Playground	Plaza
3	Auburndale	Mobile Phone Shop	Italian Restaurant	Supermarket	Korean Restaurant	Bar	Fast Food Restaurant	Furniture / Home Store	Toy / Game Store	Noodle House	Athletics & Sports
4	Bay Terrace	Clothing Store	Women's Store	Mobile Phone Shop	American Restaurant	Lingerie Store	Cosmetics Shop	Donut Shop	Kids Store	Shoe Store	Gift Shop

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	Pizza Place	Train Station	Sports Bar	Bakery	Liquor Store	Restaurant	Diner	Dance Studio	Pub	American Restaurant
1	Arden Heights	Pharmacy	Bus Stop	Lawyer	Coffee Shop	Pizza Place	Falafel Restaurant	Food & Drink Shop	Food	Flower Shop	Fish & Chips Shop
2	Arlington	Intersection	Grocery Store	Coffee Shop	Bus Stop	Boat or Ferry	Deli / Bodega	American Restaurant	Hotel	Falafel Restaurant	Food Truck
3	Arrochar	Bus Stop	Italian Restaurant	Deli / Bodega	Supermarket	Mediterranean Restaurant	Middle Eastern Restaurant	Food Truck	Outdoors & Recreation	Pizza Place	Polish Restaurant
4	Bay Terrace	Supermarket	Insurance Office	Train Station	Sushi Restaurant	Donut Shop	Salon / Barbershop	Shipping Store	Diner	Farmers Market	Food

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:

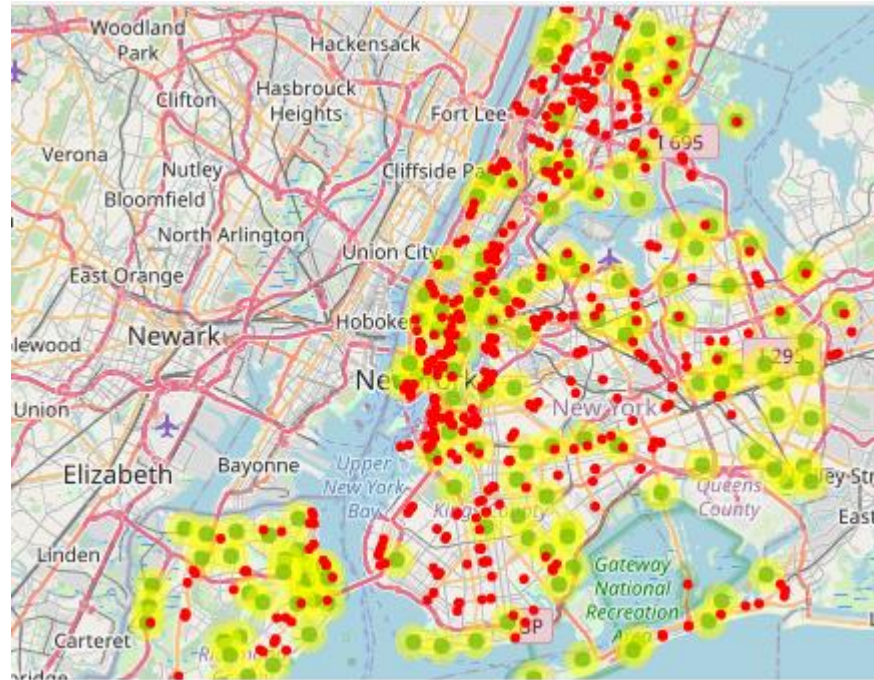
	Borough	Neighborhood	Latitude	Longitude
0	Bronx	Baychester	40.866858	-73.835798
1	Bronx	City Island	40.847247	-73.786488
2	Bronx	Clason Point	40.806551	-73.854144
3	Bronx	Co-op City	40.874294	-73.829939
4	Bronx	Concourse Village	40.824780	-73.915847

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 Foursqaure API again.

	Borough	Neighborhood	Latitude	Longitude
0	Bronx	City Island	40.847247	-73.786488
1	Bronx	Clason Point	40.806551	-73.854144
2	Bronx	Hunts Point	40.809730	-73.883315
3	Bronx	Soundview	40.821012	-73.865746
4	Bronx	Wakefield	40.894705	-73.847201

Best suggested neighbourhoods

Predictive Procedure (contd.)

	Borough	Neighborhood	Latitude	Longitude
0	Bronx	Baychester	40.866858	-73.835798
1	Bronx	Co-op City	40.874294	-73.829939
2	Bronx	Concourse Village	40.824780	-73.915847
3	Bronx	Country Club	40.844246	-73.824099
4	Bronx	Eastchester	40.887556	-73.827806

Moderate suggested neighbourhoods

Predictive Procedure (contd.)

	Borough	Neighborhood	Latitude	Longitude
0	Bronx	Fieldston	40.895437	-73.905643
1	Bronx	Mount Hope	40.848842	-73.908299
2	Bronx	Olinville	40.871371	-73.863324
3	Bronx	Unionport	40.829774	-73.850535
4	Bronx	Williamsbridge	40.881039	-73.857446

Worst suggested neighbourhoods

Predictive Procedure (contd.)



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

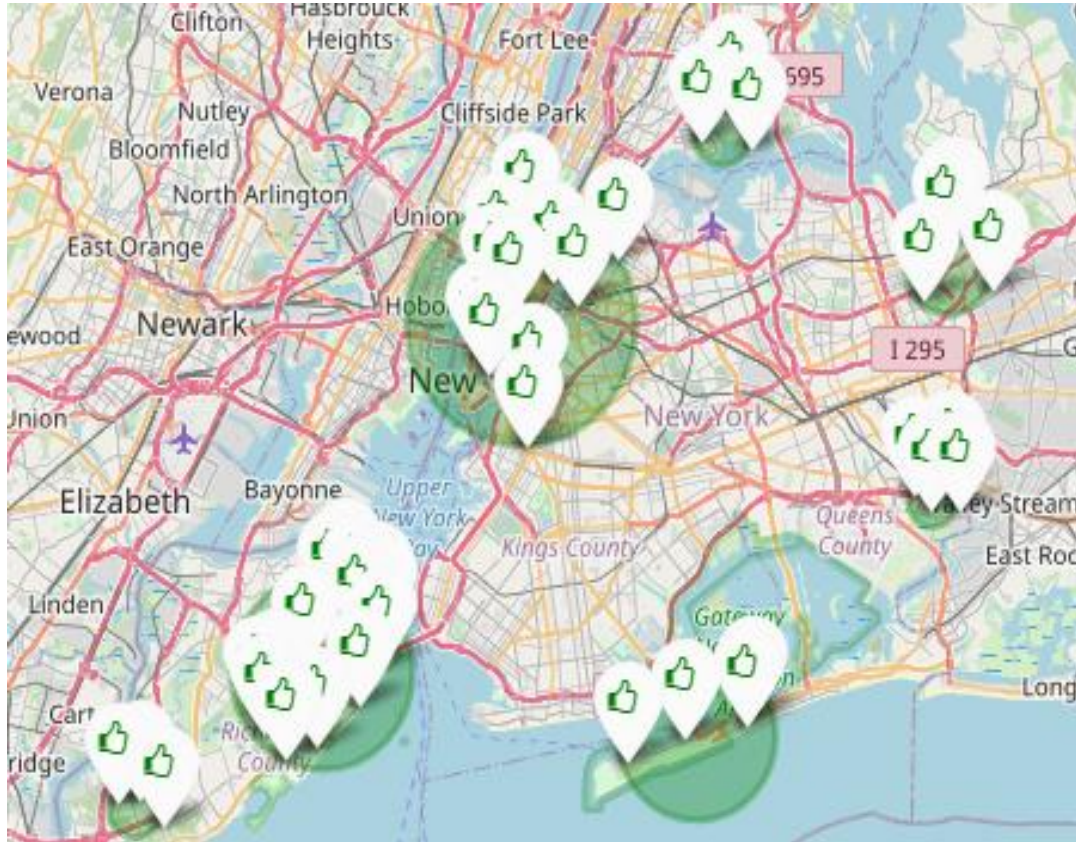
Predictive Procedure (contd.)

- 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	Staten Island	Arrochar	40.596313	-74.067124
1	Staten Island	Egbertville	40.579119	-74.127272
2	Staten Island	Fox Hills	40.617311	-74.081740
3	Staten Island	Grymes Hill	40.624185	-74.087248
4	Staten Island	Lighthouse Hill	40.576506	-74.137927
5	Staten Island	New Dorp Beach	40.564255	-74.104327
6	Staten Island	Oakwood	40.558462	-74.121566
7	Staten Island	Park Hill	40.609190	-74.080157
8	Staten Island	Richmond Town	40.569606	-74.134057
9	Staten Island	Rosebank	40.615305	-74.069805
10	Staten Island	Shore Acres	40.609719	-74.066678
11	Staten Island	Silver Lake	40.619193	-74.096290
12	Staten Island	South Beach	40.580247	-74.079553
13	Staten Island	Todt Hill	40.597069	-74.111329

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
Arrochar	Staten Island
Egbertville	Staten Island
Fox Hills	Staten Island
Grymes Hill	Staten Island
Lighthouse Hill	Staten Island
New Dorp Beach	Staten Island
Oakwood	Staten Island
Park Hill	Staten Island
Richmond Town	Staten Island
Rosebank	Staten Island
Shore Acres	Staten Island
Silver Lake	Staten Island
South Beach	Staten Island
Todt Hill	Staten Island

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
Hunts Point	Bronx
Soundview	Bronx
Wakefield	Bronx
Chelsea	Manhattan
Civic Center	Manhattan
Flatiron	Manhattan
Hudson Yards	Manhattan
Lincoln Square	Manhattan
Tribeca	Manhattan
Turtle Bay	Manhattan
Bergen Beach	Brooklyn
Boerum Hill	Brooklyn
Brighton Beach	Brooklyn
East Flatbush	Brooklyn
Sea Gate	Brooklyn
Vinegar Hill	Brooklyn
Bayswater	Queens
Belle Harbor	Queens
Breezy Point	Queens
Brookville	Queens
Douglaston	Queens
Glen Oaks	Queens
Hunters Point	Queens
Laurelton	Queens
Little Neck	Queens
Neponsit	Queens
Oakland Gardens	Queens
Queensboro Hill	Queens
Ravenswood	Queens
Rosedale	Queens
Roxbury	Queens
Somerville	Queens
Springfield Gardens	Queens
Arlington	Staten Island
Bloomfield	Staten Island
Butler Manor	Staten Island
Huguenot	Staten Island
Sandy Ground	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.