

Data Science – Capstone Project

BATTLE OF NEIGHBORHOODS OF TORONTO

Several white lines of varying lengths and slopes are positioned in the bottom right corner of the slide, creating a modern, abstract graphic element.



INTRODUCTION

- Data analysis of two boroughs – Scarborough and North York in Toronto, Canada.
- Objective is to explore the best neighborhood in Toronto and search for trending venues around a neighborhood using Data Science Tools
- Both boroughs are segmented into neighborhoods to discover the top trending venues.

DATA

- List of postal codes of Canada: M from Wikipedia

https://en.wikipedia.org/wiki/List_of_postal_codes_of_Canada:_M

- Latitude and Longitude values are provided from a cvs file

https://cf-courses-data.s3.us.cloud-object-storage.appdomain.cloud/IBMDeveloperSkillsNetwork-DS0701EN-SkillsNetwork/labs_v1/Geospatial_Coordinates.csv

- Foursquare API: Foursquare location data

https://api.foursquare.com/v2/venues/search?client_id={}&client_secret={}&ll={},{}&oauth_token={}&v={}&query={}&radius={}&limit=

- Toronto Information

<https://en.wikipedia.org/wiki/Toronto>

METHODOLOGY

Download and explore data set

Web scrapping: scraping the Wikipedia page using BeautifulSoup

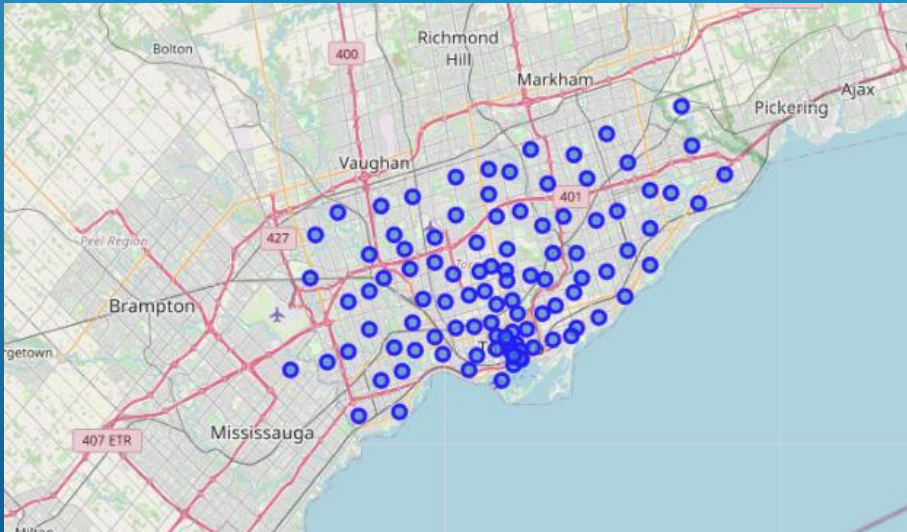
Download csv file using wget command

Clean and wrangle data in a structural formatted data frame figure 1

Get coordinates using geopy library

Segment boroughs into neighborhoods figure 2

Map Toronto using folium



	PostalCode	Latitude	Longitude
0	M1B	43.806686	-79.194353
1	M1C	43.784535	-79.160497
2	M1E	43.763573	-79.188711
3	M1G	43.770992	-79.216917
4	M1H	43.773136	-79.239476

Figure 1

	PostalCode	Borough	Neighborhood	Latitude	Longitude
0	M1B	Scarborough	Malvern / Rouge	43.806686	-79.194353
1	M1C	Scarborough	Rouge Hill / Port Union / Highland Creek	43.784535	-79.160497
2	M1E	Scarborough	Guildwood / Morningside / West Hill	43.763573	-79.188711
3	M1G	Scarborough	Woburn	43.770992	-79.216917
4	M1H	Scarborough	Cedarbrae	43.773136	-79.239476
5	M1J	Scarborough	Scarborough Village	43.744734	-79.239476
6	M1K	Scarborough	Kennedy Park / Ionview / East Birchmount Park	43.727929	-79.262029
7	M1L	Scarborough	Golden Mile / Clairlea / Oakridge	43.711112	-79.284577
8	M1M	Scarborough	Cliffside / Cliffcrest / Scarborough Village West	43.716316	-79.239476
9	M1N	Scarborough	Birch Cliff / Cliffside West	43.692657	-79.264848

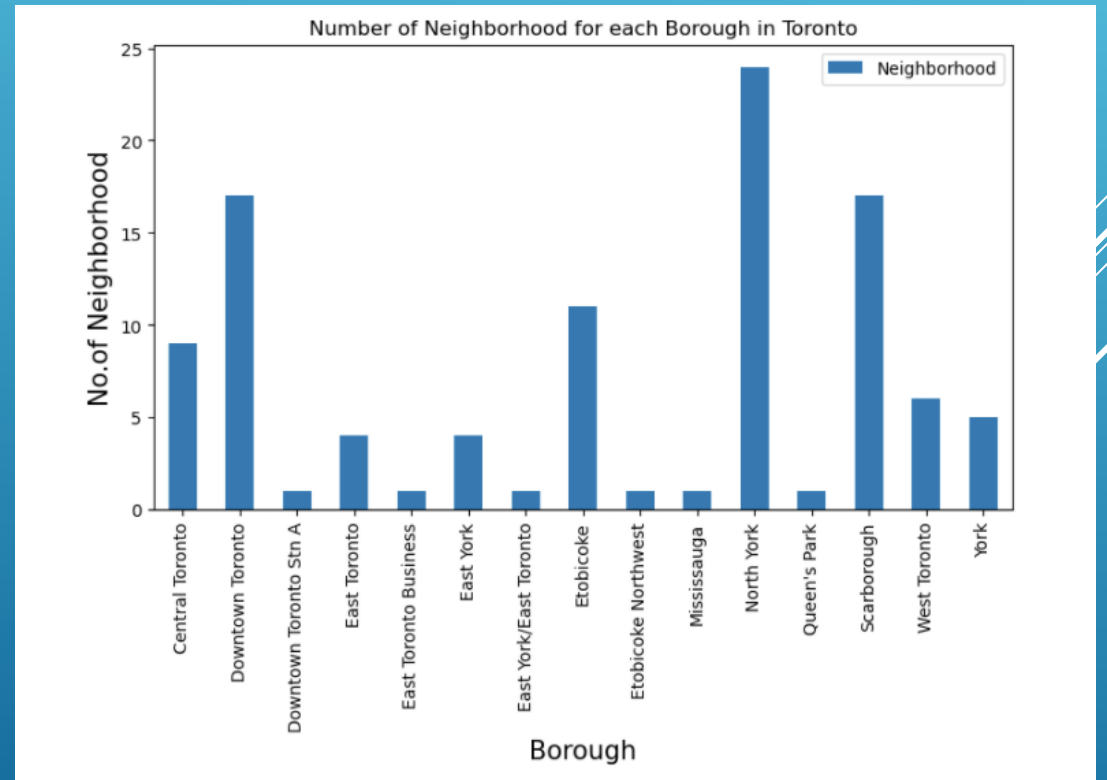
Figure 2

METHODOLOGY

Using matplotlib library to plot the boroughs with its neighborhoods on a bar graph.

- North York: 23 neighborhoods
- Scarborough: 17 neighborhoods
- Downtown Toronto: 17 neighborhoods

Pick the top 3 boroughs – North York, Downtown Toronto, and Scarborough - according to their neighborhoods' count - to segment



METHODOLOGY

Define 2 functions

`get_category_type()`: extracts the category of the venues

`getNearbyVenues()`: extracts the nearby venues

Define Foursquare Credentials and Version

Utilize Foursquare data location for different purposes: make calls to Foursquare API to send a request to the API to explore a geographical location, to search for nearby venues, to explore a particular venue with its rating, and to get trending venues around a location.

`LIMIT = 100` # limit of number of venues returned by Foursquare API

`radius = 500` # define radius

Several white lines of varying lengths and slopes are positioned in the bottom right corner of the slide, creating a modern, abstract design element.

METHODOLOGY – EXPLORING SCARBOROUGH

Create a new data frame of the
Scarborough data.

Get the latitude and longitude coordinates
of Scarborough using geopy library

Map Scarborough with 17 neighborhoods

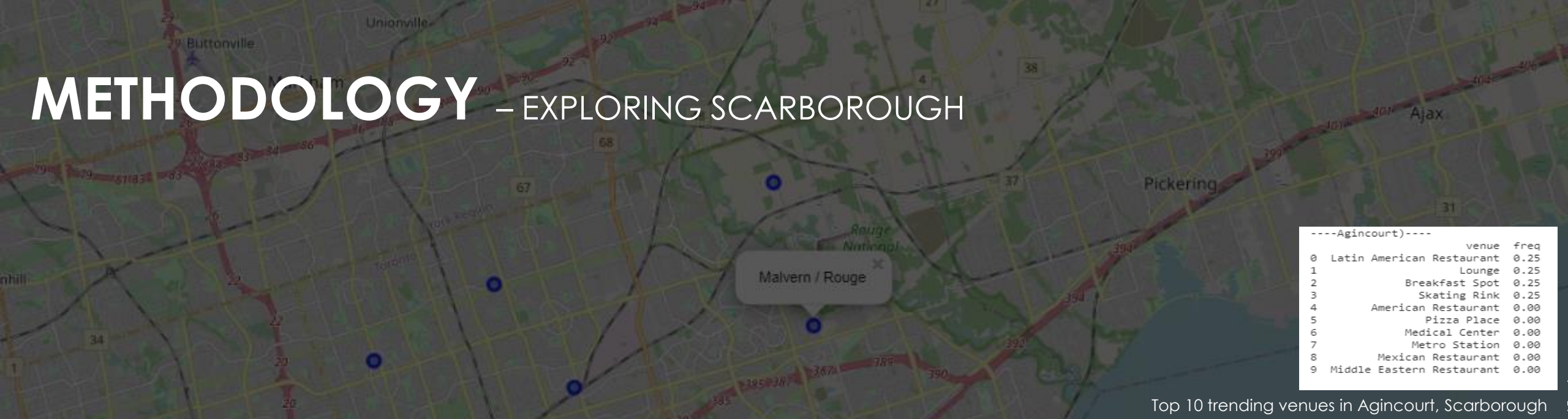
Using `get_category_type()` and `getNearbyVenues()` to
get venues and their categories

Filter and group venues into a list of unique venues returned
by Foursquare

Analyze the neighborhoods to get the top common 10 venues using a
machine learning algorithm called One hot coding

Explore the first neighborhood in Scarborough – Malvern/Rouge

METHODOLOGY – EXPLORING SCARBOROUGH



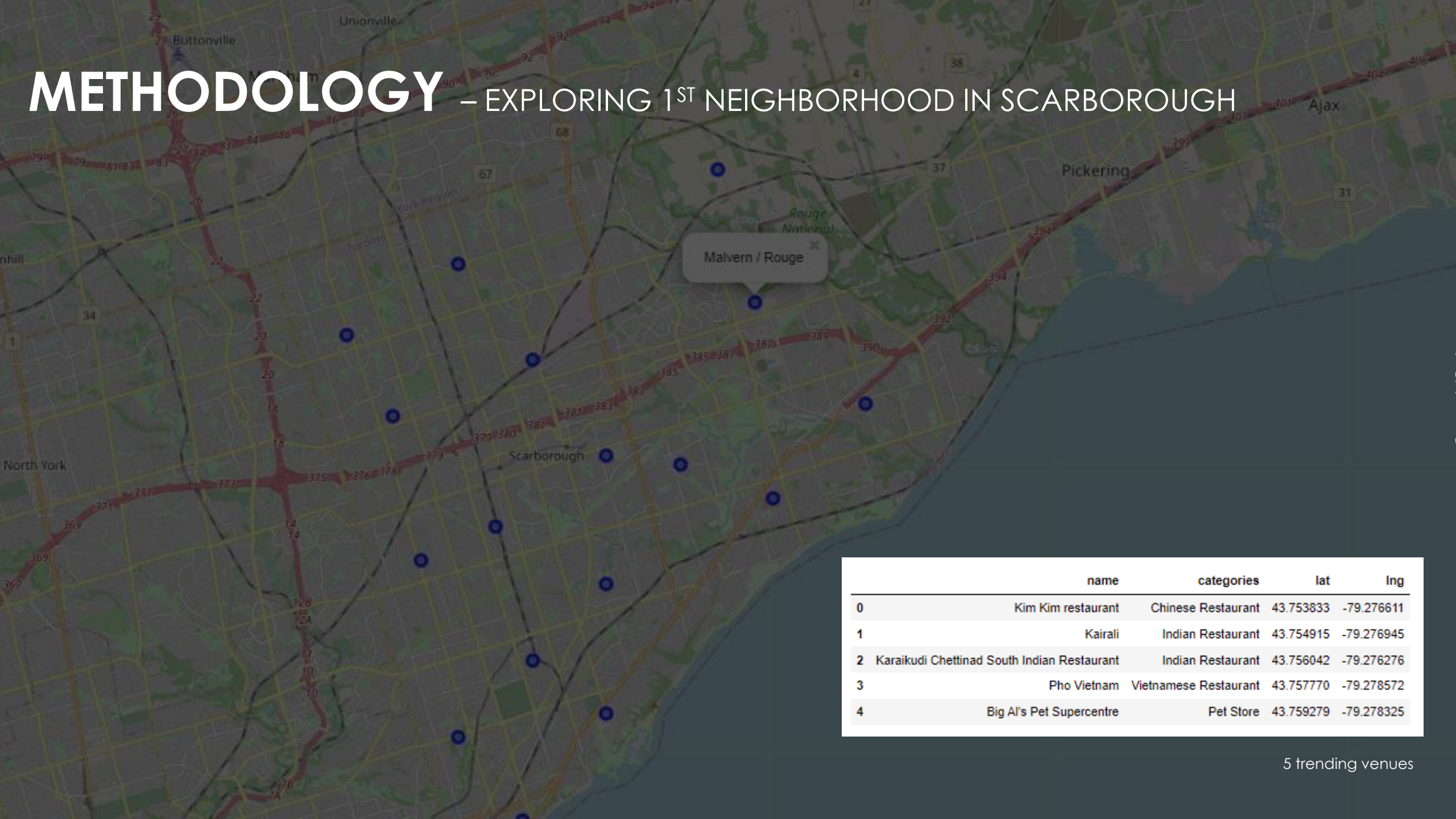
----Agincourt)----			venue	freq
0	Latin American Restaurant	0.25		
1	Lounge	0.25		
2	Breakfast Spot	0.25		
3	Skating Rink	0.25		
4	American Restaurant	0.00		
5	Pizza Place	0.00		
6	Medical Center	0.00		
7	Metro Station	0.00		
8	Mexican Restaurant	0.00		
9	Middle Eastern Restaurant	0.00		

Top 10 trending venues in Agincourt, Scarborough

	Neighborhood	Neighborhood Latitude	Neighborhood Longitude	Venue	Venue ID	Venue Latitude	Venue Longitude	Venue Category
0	Malvern / Rouge	43.806686	-79.194353	Wendy's	4bb6b9446edc76b0d771311c	43.807448	-79.199056	Fast Food Restaurant
1	Malvern / Rouge	43.806686	-79.194353	Interprovincial Group	5539e7d2498edaf4b02673ca	43.805630	-79.200378	Print Shop
2	Rouge Hill / Port Union / Highland Creek	43.784535	-79.160497	Great Shine Window Cleaning	5b19cb3bacc5f5002c693e5c	43.783145	-79.157431	Home Service
3	Rouge Hill / Port Union / Highland Creek	43.784535	-79.160497	Royal Canadian Legion	4c23d3aaf7ced13a5ed7216d	43.782533	-79.163085	Bar
4	Rouge Hill / Port Union / Highland Creek	43.784535	-79.160497	SEBS Engineering Inc. (Sustainable Energy and ...	5e7116458a090d000896267f	43.782371	-79.156820	Construction & Landscaping
...
84	Steeles West / L'Amoreaux West	43.799525	-79.318389	Eggsmart	4cd6985967adf04d66d93391	43.796375	-79.318681	Breakfast Spot
85	Steeles West / L'Amoreaux West	43.799525	-79.318389	Fit4Less	578e8b7a498ebcc03535c433	43.798394	-79.318453	Gym
86	Steeles West / L'Amoreaux West	43.799525	-79.318389	Rogers Plus	4ba415b0f964a520c97f38e3	43.798911	-79.318277	Electronics Store
87	Steeles West / L'Amoreaux West	43.799525	-79.318389	Nantha's Bakery	4efccc9bb8f701ff611ce191	43.796430	-79.319151	Indian Restaurant
88	Steeles West / L'Amoreaux West	43.799525	-79.318389	Ocean Nails Spa	4db5dfd96e8179a91398afed	43.795290	-79.320101	Nail Salon
89 rows × 8 columns								

89 venues with 56 unique categories


METHODOLOGY – EXPLORING 1ST NEIGHBORHOOD IN SCARBOROUGH



	name	categories	lat	lng
0	Kim Kim restaurant	Chinese Restaurant	43.753833	-79.276611
1	Kairali	Indian Restaurant	43.754915	-79.276945
2	Karaikudi Chettinad South Indian Restaurant	Indian Restaurant	43.756042	-79.276276
3	Pho Vietnam	Vietnamese Restaurant	43.757770	-79.278572
4	Big Al's Pet Supercentre	Pet Store	43.759279	-79.278325

5 trending venues

METHODOLOGY – EXPLORING NORTH YORK



Create a new dataframe of the North York data.
Get the latitude and longitude coordinates using geopy library
Map North York with 24 neighborhoods
Using `get_category_type()` and `getNearbyVenues()` to get venues and their categories
Filter and group venues into a list of unique venues returned by Foursquare
Analyze the neighborhoods to get the top common 10 venues using a machine learning algorithm called One hot coding
Explore the first neighborhood in North York – Fairview / Henry Farm / Oriole

METHODOLOGY – EXPLORING NORTH YORK

----Bathurst Manor / Wilson Heights / Downsview North-

	venue	freq
0	Coffee Shop	0.11
1	Bank	0.11
2	Sushi Restaurant	0.06
3	Diner	0.06
4	Sandwich Place	0.06
5	Bridal Shop	0.06
6	Pizza Place	0.06
7	Shopping Mall	0.06
8	Frozen Yogurt Shop	0.06
9	Pharmacy	0.06

Top 10 trending venues

	Neighborhood	Neighborhood Latitude	Neighborhood Longitude	Venue	Venue ID	Venue Latitude	Venue Longitude	Venue Category
0	Hillcrest Village	43.803762	-79.363452	New York Fries	4d8771f6651041bd5e499b30	43.803664	-79.363905	Fast Food Restaurant
1	Hillcrest Village	43.803762	-79.363452	Eagle's Nest Golf Club	4ad9dce6f964a520651b21e3	43.805455	-79.364186	Golf Course
2	Hillcrest Village	43.803762	-79.363452	AY Jackson Pool	4e1fad69fa761d67106a9989	43.804515	-79.366138	Pool
3	Hillcrest Village	43.803762	-79.363452	Villa Madina	5331a799498e3bfbae4a5a04	43.801685	-79.363938	Mediterranean Restaurant
4	Hillcrest Village	43.803762	-79.363452	Duncan Creek Park	4c64ca1b772bef3bfadbc2aa	43.805539	-79.360695	Dog Run
...
239	North Park / Maple Leaf Park / Upwood Park	43.713756	-79.490074	Queen's GreenBelt Park	4f8ba717121d29fd94277ce8	43.712355	-79.484754	Trail
240	North Park / Maple Leaf Park / Upwood Park	43.713756	-79.490074	Mika's Trim	590bdb6bbe70781ade1dab8a	43.714068	-79.496113	Construction & Landscaping
241	Humber Summit	43.756303	-79.565963	HNS ARARAT	54fb21be498e513a0a853128	43.757519	-79.563653	Furniture / Home Store
242	Humber Summit	43.756303	-79.565963	Paul Davis Canada of York Region	57b20e5e498e2f95667c4fd6	43.755852	-79.560256	Home Service
243	Humberlea / Emery	43.724766	-79.532242	Strathburn Park	4e38862f1f6ecc2de159fb4d	43.721765	-79.532854	Baseball Field

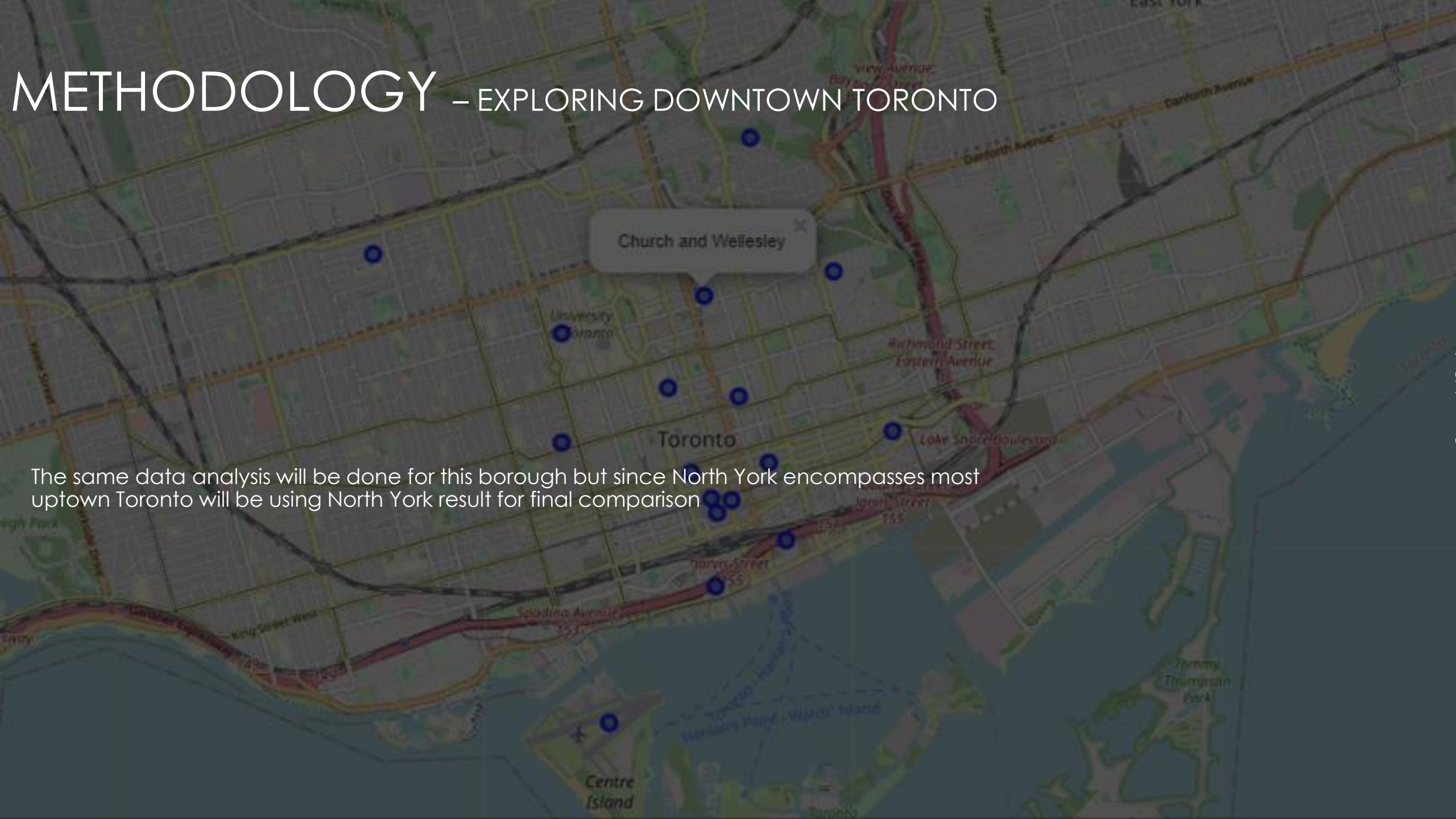
244 venues group into 101 unique categories

METHODOLOGY – EXPLORING 2ND NEIGHBORHOOD IN NORTH YORK

	name	categories	lat	lng
0	De Berardini's	Salon / Barbershop	43.778069	-79.342642
1	Moxie's Classic Grill	American Restaurant	43.777779	-79.343185
2	RBC Royal Bank	Bank	43.777304	-79.344653
3	TD Canada Trust	Bank	43.777763	-79.345974
4	New York Fries - Fairview Mall	Restaurant	43.778605	-79.343577
...
62	Don Mills Subway Station Passenger Pickup	Bus Station	43.775796	-79.345007
63	Fit For Life	Fast Food Restaurant	43.779352	-79.350568
64	Circle K	Convenience Store	43.775442	-79.347839
65	Don Mills & Sheppard	Intersection	43.775323	-79.346998
66	Oriole Park	Baseball Field	43.780817	-79.351327

67 venues

METHODOLOGY – EXPLORING DOWNTOWN TORONTO



The same data analysis will be done for this borough but since North York encompasses most uptown Toronto will be using North York result for final comparison

RESULTS AND CONCLUSION

North York has more and better selections in term of venues

	Scarborough	North York	Downtown Toronto
Neighborhoods	17	24	17
Total Venues	89	244	1102
Unique Categories	56	101	202