Capstone Project
The Battle of Neighborhoods

New York City versus Toronto as Headquarter

(Week 2)

Final Presentation

Content

- **1. Introduction / Business Problem**
  The "business problem" to be solved by this project

- **2. Data / Tools / Methodology**
  Describe Data requirements and Sources needed to solve the problem

- **3. Analysis / Results**
  Discussion of the results and finding of answer

- **4. Discussion / Conclusion**
  Chosen answer and Conclusions

1a) Introduction

"For most businesses, the issue of location choice now is driven by labor:

Will we be able to attract the white collar skills we need?"

– Peter Cappell

To get the best and most appropriate associates is one of the most important business factors for companies. They want a labor force that is young and educated = millennials.

Millennials want everything:

- a city with all the cultural amenities – theaters, museums, fairs, concerts, live music, all forms of entertainment.

- do not like suburbs or exurbs.

- a lot of bars and restaurants for having fun in addition to work.

1b) Business Problem

- A new and emerging company needs to decide on the location of its future headquarter:

Toronto (Canada) or New York City (US)

- Therefore, differences of neighborhoods between the two Cities are explored in this project.

- What and how many venues are there in the different neighborhoods and how are they clustered.

2a) Data

Data used for the project are as following:

- New York City dataset:
  https://geo.nyu.edu/catalog/nyu_2451_34572

- New York City latitude and longitude:
  Geolibrary

- Toronto Dataset (Toronto's zip codes, boroughs and neighborhood names):
  https://en.wikipedia.org/wiki/List_of_postal_codes_of_Canada:_M.

- Toronto latitude and longitude information:
  http://cocl.us/Geospatial_data

- **Explore neighborhoods in Toronto and New York City:**
  Foursquare API¶
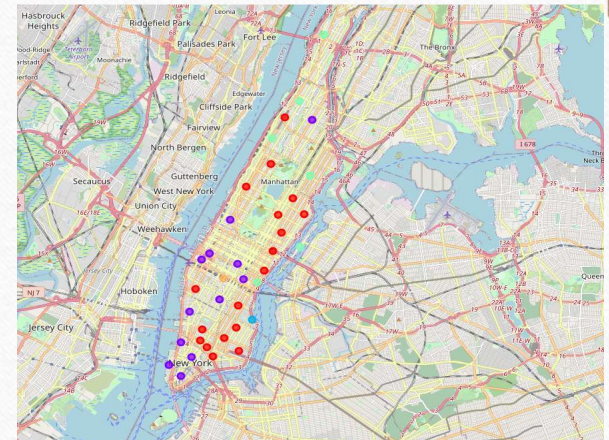
2b) Tools

- Pandas: Data Analysis
- NumPy: Data handling (vectors)
- JSON: Handling of JSON files
- Geopy: Retrieving location data
- Matplotlib: Data Visualization/Plotting
- Sklearn: Machine Learning; k-Mean calculation
- Folium: Map Rendering

2c) Methodology

- Data Download

- Data Transformation

- Adding latitude/longitude

- Segmentation and Explore specific Neighborhoods

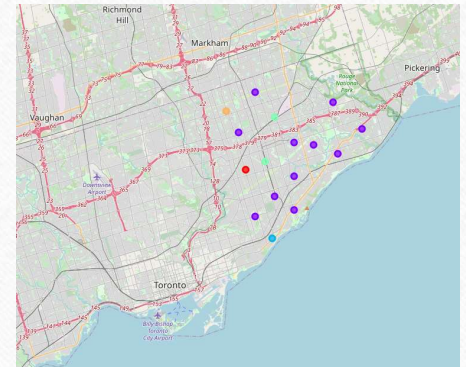- Data Analyzing

- Clustering using k-means

3a) Analysis New York City

- New York City has 5 boroughs and 306 Neighborhoods.
  With focus on Manhattan:

- Manhattan has 40 different Neighborhoods There are 3197 individual venues in those neighborhoods

- Those venues can be grouped in 334 unique categories

- Neighborhoods could be clustered in 5 groups
  (represented by different colors in the map)
  (see list in back-up)

3b) Analysis Toronto

- Toronto has 103 different postal codes with several neighborhoods each.

- With focus on Scarborough:
  - Scarborough has 17 different Neighborhoods
  - there are 39 different categories of venues

- Neighborhoods could be clustered in 5 groups
  (represented by different colors in the map)

- List of top 10 venues per Neighborhood in the back-up

3c) Results

- New York City/Manhattan has a much higher variety of venues, like different kind of restaurants, bars, sport venues per Neighborhood than Toronto/Scarborough (334 versus 39).

- The absolute number of venues in Manhattan is with 3197 higher than in Scarborough.

- Clustering of the neighborhoods was done and visualized (see pitcutres on the previeous slides)

4) Discussion / Conclusion

- Higher number of venues and more different categories of venues per neighborhood are more attractive for millenniums.

- The company will choose New York City, US as location for its headquarter and not Toronto, Canada

- As a next step a further analyses are proposed to check office prices in the two Cities as well as availability of apartments to be considered for the final decision of the location of a future headquarter.

Back up – example of first NYC Cluster with top 10 venues

	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	Bakery	Chinese Restaurant	Cocktail Bar	Spa	Ice Cream Shop	American Restaurant	Optical Shop	Vietnamese Restaurant	Salon / Barbershop	Dessert Shop
5	Manhattanville	Coffee Shop	Italian Restaurant	Mexican Restaurant	Chinese Restaurant	Seafood Restaurant	Cuban Restaurant	Boutique	Supermarket	Burger Joint	Spanish Restaurant
8	Upper East Side	Italian Restaurant	Exhibit	Coffee Shop	Bakery	American Restaurant	Gym / Fitness Center	Spa	French Restaurant	Hotel	Juice Bar
9	Yorkville	Italian Restaurant	Gym	Coffee Shop	Bar	Deli / Bodega	Wine Shop	Diner	Sushi Restaurant	Japanese Restaurant	Bagel Shop
10	Lenox Hill	Sushi Restaurant	Italian Restaurant	Pizza Place	Coffee Shop	Cocktail Bar	Café	Gym / Fitness Center	Gym	Burger Joint	Mexican Restaurant
12	Upper West Side	Italian Restaurant	Bar	Wine Bar	Bakery	Indian Restaurant	Café	Coffee Shop	Dessert Shop	French Restaurant	Gym / Fitness Center
17	Chelsea	Coffee Shop	Art Gallery	Bakery	French Restaurant	American Restaurant	Wine Shop	Ice Cream Shop	Café	Park	Market
18	Greenwich Village	Italian Restaurant	Sushi Restaurant	Café	Clothing Store	American Restaurant	Dessert Shop	Boutique	Gym	Gourmet Shop	French Restaurant
19	East Village	Bar	Mexican Restaurant	Pizza Place	Vietnamese Restaurant	Korean Restaurant	Coffee Shop	Vegetarian / Vegan Restaurant	Salon / Barbershop	Cocktail Bar	Wine Bar
20	Lower East Side	Chinese Restaurant	Art Gallery	Café	Bakery	Park	Coffee Shop	Japanese Restaurant	Yoga Studio	Cocktail Bar	Bubble Tea Shop
22	Little Italy	Café	Bakery	Italian Restaurant	Cocktail Bar	Chinese Restaurant	Coffee Shop	Clothing Store	Bubble Tea Shop	Mediterranean Restaurant	Salon / Barbershop
23	Soho	Clothing Store	Italian Restaurant	Coffee Shop	Boutique	Salon / Barbershop	Sporting Goods Shop	Women's Store	Bakery	Mediterranean Restaurant	Furniture / Home Store
25	Manhattan Valley	Coffee Shop	Bar	Yoga Studio	Mexican Restaurant	Thai Restaurant	Indian Restaurant	French Restaurant	Pizza Place	Clothing Store	Hill
27	Gramercy	Bar	Bagel Shop	Pizza Place	American Restaurant	Coffee Shop	Cocktail Bar	Mexican Restaurant	Italian Restaurant	Playground	Wine Shop
30	Carnegie Hill	Coffee Shop	Café	Yoga Studio	French Restaurant	Pizza Place	Cosmetics Shop	Bookstore	Bar	Wine Shop	Gym / Fitness Center
31	Noho	Italian Restaurant	Coffee Shop	Pizza Place	Cocktail Bar	Bookstore	French Restaurant	Grocery Store	Mexican Restaurant	Yoga Studio	Wine Bar
34	Sutton Place	Italian Restaurant	Pizza Place	Gym / Fitness Center	Park	Coffee Shop	Bagel Shop	Gym	Furniture / Home Store	Burger Joint	Bakery
35	Turtle Bay	Italian Restaurant	Coffee Shop	Sushi Restaurant	Park	Deli / Bodega	Seafood Restaurant	Japanese Restaurant	Ramen Restaurant	Pharmacy	Turkish Restaurant

Back up – top 10 venues of Scarborough per Neighborhood

	Borough	Neighbourhood	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	Scarborough	Malvern, Rouge	43.806686	-79.194353	1	Fast Food Restaurant	Vietnamese Restaurant	Coffee Shop	Hobby Shop	Hakka Restaurant	General Entertainment	Gas Station	Furniture / Home Store	Fried Chicken Joint	Electronics Store
1	Scarborough	Rouge Hill, Port Union, Highland Creek	43.784535	-79.160497	1	Bar	Vietnamese Restaurant	Coffee Shop	Hobby Shop	Hakka Restaurant	General Entertainment	Gas Station	Furniture / Home Store	Fried Chicken Joint	Fast Food Restaurant
2	Scarborough	Guildwood, Morningside, West Hill	43.763573	-79.188711	1	Rental Car Location	Restaurant	Medical Center	Electronics Store	Breakfast Spot	Mexican Restaurant	Bank	Intersection	Fried Chicken Joint	College Stadium
3	Scarborough	Woburn	43.770992	-79.216917	1	Coffee Shop	Korean BBQ Restaurant	Vietnamese Restaurant	Hakka Restaurant	General Entertainment	Gas Station	Furniture / Home Store	Fried Chicken Joint	Fast Food Restaurant	Electronics Store
4	Scarborough	Cedarbrae	43.773136	-79.239476	1	Gas Station	Thai Restaurant	Athletics & Sports	Hakka Restaurant	Bakery	Bank	Caribbean Restaurant	Fried Chicken Joint	Electronics Store	Department Store
5	Scarborough	Scarborough Village	43.744734	-79.239476	1	Jewelry Store	Playground	Vietnamese Restaurant	Coffee Shop	Hakka Restaurant	General Entertainment	Gas Station	Furniture / Home Store	Fried Chicken Joint	Fast Food Restaurant
6	Scarborough	Kennedy Park, Ionview, East Birchmount Park	43.727929	-79.262029	1	Discount Store	Coffee Shop	Hobby Shop	Bus Station	Department Store	Vietnamese Restaurant	Hakka Restaurant	General Entertainment	Gas Station	Furniture / Home Store
7	Scarborough	Golden Mile, Clairlea, Oakridge	43.711112	-79.284577	1	Bakery	Ice Cream Shop	Bus Line	Metro Station	Soccer Field	Intersection	Park	Department Store	Discount Store	Electronics Store
8	Scarborough	Cliffside, Cliffcrest, Scarborough Village West	43.716316	-79.239476	1	American Restaurant	Motel	Movie Theater	Ice Cream Shop	Hakka Restaurant	General Entertainment	Gas Station	Furniture / Home Store	Fried Chicken Joint	Fast Food Restaurant
9	Scarborough	Birch Cliff, Cliffside West	43.692657	-79.264848	2	General Entertainment	Skating Rink	Café	College Stadium	Vietnamese Restaurant	Coffee Shop	Hakka Restaurant	Gas Station	Furniture / Home Store	Fried Chicken Joint
10	Scarborough	Dorset Park, Wexford Heights, Scarborough Town...	43.757410	-79.273304	3	Indian Restaurant	Pet Store	Brewery	Chinese Restaurant	Furniture / Home Store	Light Rail Station	Vietnamese Restaurant	Restaurant	Soccer Field	Smoke Shop
11	Scarborough	Wexford, Maryvale	43.750072	-79.295849	0	Middle Eastern Restaurant	Auto Garage	Smoke Shop	Bakery	Sandwich Place	Electronics Store	College Stadium	Cosmetics Shop	Department Store	Discount Store
12	Scarborough	Agincourt	43.794200	-79.262029	3	Clothing Store	Skating Rink	Latin American Restaurant	Breakfast Spot	Lounge	Coffee Shop	General Entertainment	Gas Station	Furniture / Home Store	Fried Chicken Joint
13	Scarborough	Clarks Corners, Tam O'Shanter, Sullivan	43.781638	-79.304302	1	Pizza Place	Fast Food Restaurant	Noodle House	Thai Restaurant	Gas Station	Chinese Restaurant	Intersection	Bank	Italian Restaurant	Fried Chicken Joint
14	Scarborough	Milliken, Agincourt North, Steeles East, L'Amo...	43.815252	-79.284577	1	Intersection	Playground	Park	Vietnamese Restaurant	Clothing Store	General Entertainment	Gas Station	Furniture / Home Store	Fried Chicken Joint	Fast Food Restaurant
15	Scarborough	Steeles West, L'Amoreaux West	43.799525	-79.318389	4	Fast Food Restaurant	Coffee Shop	Indian Restaurant	Pizza Place	Thrift / Vintage Store	Furniture / Home Store	Discount Store	Cosmetics Shop	Chinese Restaurant	Pharmacy