



Finding a better location for food business

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Introduction

- ◇ Background
- ◇ Problem
 - ◇ Where should we open a food business in a city
- ◇ Audience
 - ◇ Food business owners
 - ◇ Investors

Data description

◇ Data Sources and cleaning

◇ Step 1: Get Borough, Neighborhood and Postal code of each city.

◇ Step 2: Get geographical coordinates of neighborhoods.

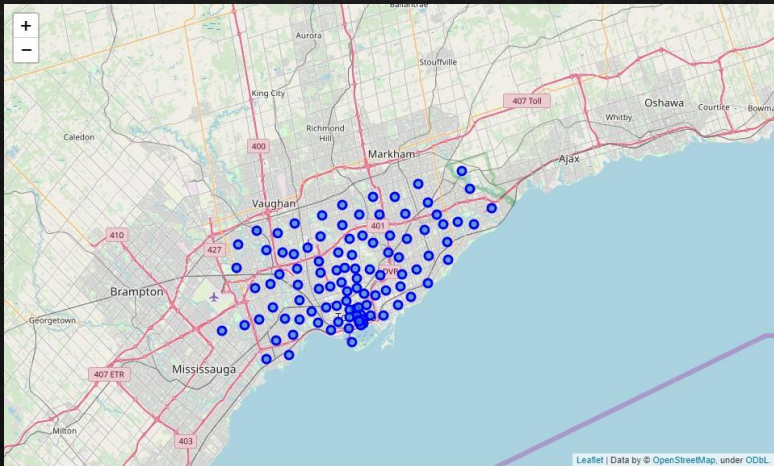
	Postcode	Borough	Neighborhood	Latitude	Longitude
0	SE2	Bexley, Greenwich	Abbey Wood	51.4869	0.107500
1	W3	Ealing, Hammersmith and Fulham	Acton	51.5114	-0.265717
2	EC3	City	Aldgate	51.5085	-0.125700
3	WC2	Westminster	Aldwych	51.5142	-0.123382
4	SE20	Bromley	Anerley	51.4154	-0.056950

◇ Step 3: Get nearby venue information for each geographical coordinate.

	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	Abbey Wood	Chinese Restaurant	Grocery Store	Indian Restaurant	Men's Store	Fish Market	Falafel Restaurant	Farmers Market	Fast Food Restaurant	Film Studio	Fish & Chips Shop
1	Acton	Pub	Park	Convenience Store	Mini Golf	Gas Station	Grocery Store	Bed & Breakfast	Train Station	Bakery	Japanese Restaurant
2	Aldgate	Theater	Hotel	French Restaurant	Pub	Plaza	Pizza Place	Wine Bar	Steakhouse	Café	Ice Cream Shop
3	Aldwych	Theater	Clothing Store	Coffee Shop	Bakery	Ice Cream Shop	Indian Restaurant	Dessert Shop	Cosmetics Shop	Museum	Wine Bar
4	Anerley	Fast Food Restaurant	Pub	Train Station	Coffee Shop	Pizza Place	Supermarket	Café	Hardware Store	Tunnel	Garden Center

Methodology

- ◆ Use folium library to visualize geographic details

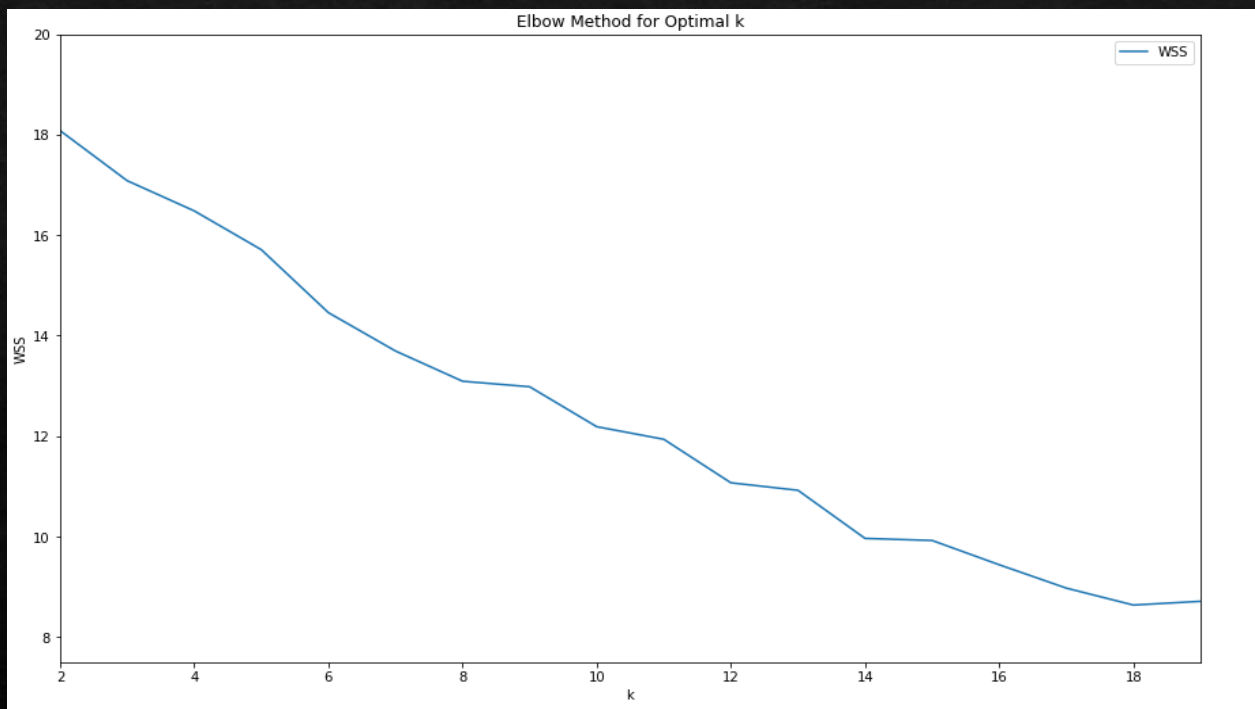


- ◆ Use the Foursquare API to explore the Neighborhoods.

	Neighborhood	Neighborhood Latitude	Neighborhood Longitude	Venue	Venue Latitude	Venue Longitude	Venue Category
0	Parkwoods	43.7545	-79.3300	Brookbanks Park	43.751976	-79.332140	Park
1	Parkwoods	43.7545	-79.3300	TTC stop - 44 Valley Woods	43.755402	-79.333741	Bus Stop
2	Parkwoods	43.7545	-79.3300	GreenWin pool	43.756232	-79.333842	Pool
3	Parkwoods	43.7545	-79.3300	Variety Store	43.751974	-79.333114	Food & Drink Shop
4	Victoria Village	43.7276	-79.3148	Victoria Village Arena	43.723481	-79.315635	Hockey Arena

Methodology

- ◆ Use K-means algorithm to cluster neighborhoods
- ◆ Select the K number using the Elbow Method

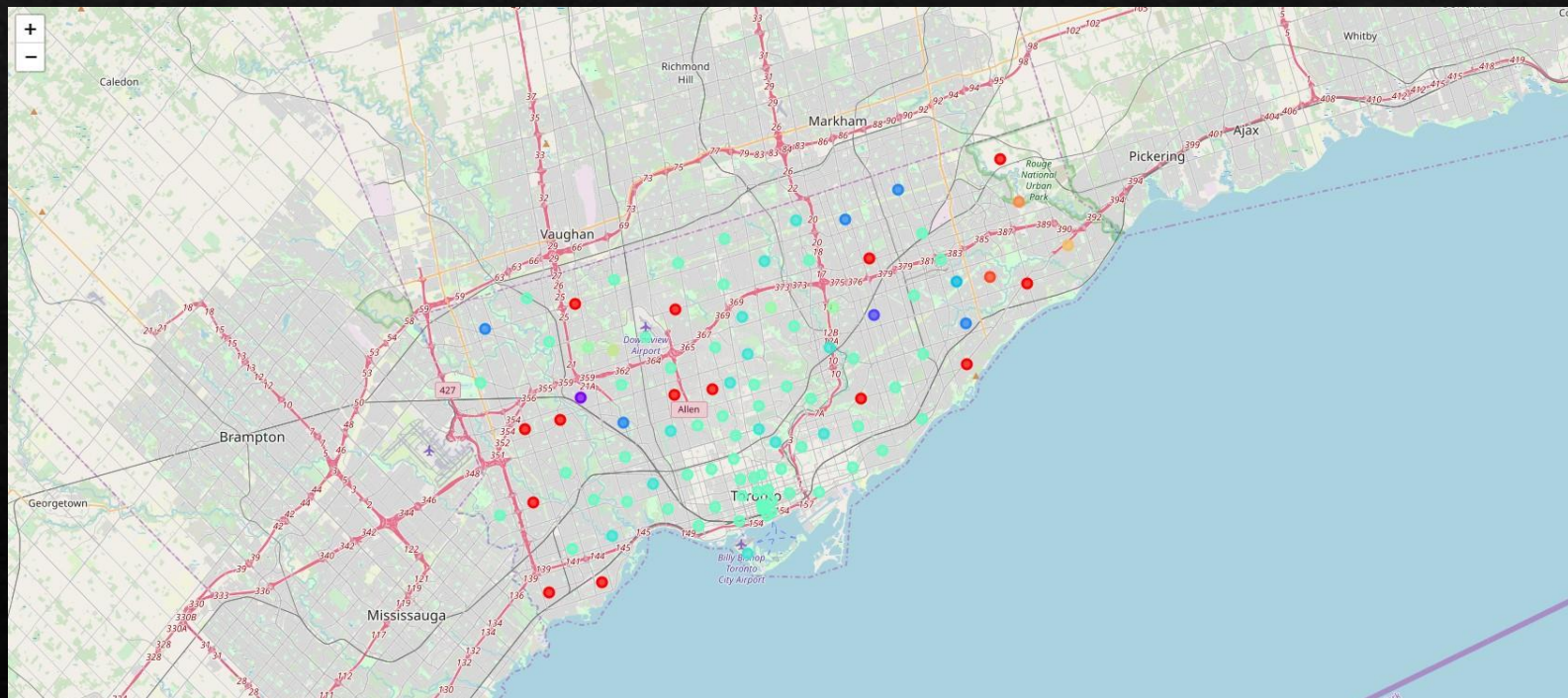


	WSS	WSS Diff
K		
2	18.079042	NaN
3	17.082677	-0.996365
4	16.481616	-0.601060
5	15.709200	-0.772416
6	14.456100	-1.253100
7	13.692914	-0.763186
8	13.090651	-0.602263
9	12.981026	-0.109625
10	12.185948	-0.795078
11	11.935022	-0.250926
12	11.069251	-0.865771
13	10.920317	-0.148933
14	9.962029	-0.958288
15	9.921269	-0.040761
16	9.438036	-0.483232
17	8.973160	-0.464877
18	8.635769	-0.337390
19	8.710062	0.074292

Methodology

- ◆ Use K-means algorithm to cluster neighborhoods
- ◆ Merged table with cluster labels for each neighborhood

Postcode	Borough	Neighborhood	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	M3A	North York	Parkwoods	43.7545	-79.3300	7	Bus Stop	Food & Drink Shop	Pool	Park	Falafel Restaurant	Dumpling Restaurant	Eastern European Restaurant	Electronics Store	Ethiopian Restaurant	Event Space
1	M4A	North York	Victoria Village	43.7276	-79.3148	6	Hockey Arena	Intersection	Park	Portuguese Restaurant	Coffee Shop	French Restaurant	Pizza Place	Harbor / Marina	Dim Sum Restaurant	Fast Food Restaurant
2	M5A	Downtown Toronto	Harbourfront	43.6555	-79.3626	6	Coffee Shop	Restaurant	Yoga Studio	Breakfast Spot	Electronics Store	Thai Restaurant	Bakery	Pub	Italian Restaurant	Event Space
3	M6A	North York	Lawrence Heights, Lawrence Manor	43.7223	-79.4504	6	Clothing Store	Coffee Shop	Cosmetics Shop	Electronics Store	Toy / Game Store	Men's Store	Sandwich Place	Jewelry Store	Food Court	Sushi Restaurant
4	M7A	Downtown Toronto	Queen's Park	43.6641	-79.3889	6	Gym	Pharmacy	Park	Burrito Place	Diner	College Cafeteria	Sushi Restaurant	Portuguese Restaurant	Coffee Shop	Ramen Restaurant



Methodology

◆ Use K-means algorithm to cluster neighborhoods

◆ Analysis for each meaningful cluster

Cluster Labels	Postcode	Borough	Neighborhood	Latitude	Longitude	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	14	14	14	14	14	11	11	11	11	11	11	11	11	11	11
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
3	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
4	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
5	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13
6	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60
7	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
8	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
9	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
10	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
11	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1

	Borough	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
8	East York	0	Pizza Place	Fast Food Restaurant	Gym / Fitness Center	Breakfast Spot	Gastropub	Bank	Intersection	Bus Line	Pharmacy	Curling Ice
10	North York	0	Pizza Place	Mediterranean Restaurant	Gas Station	Latin American Restaurant	Fast Food Restaurant	Ice Cream Shop	Japanese Restaurant	Grocery Store	Event Space	Eastern European Restaurant
11	Ettobicoke	0	Pizza Place	Construction & Landscaping	Tea Room	Sandwich Place	Coffee Shop	Chinese Restaurant	Wine Shop	Fast Food Restaurant	Farmers Market	Falafel Restaurant
18	Scarborough	0	Pizza Place	Electronics Store	Fast Food Restaurant	Coffee Shop	Liquor Store	Burger Joint	Sandwich Place	Food & Drink Shop	Breakfast Spot	Discount Store
28	North York	0	Pizza Place	Middle Eastern Restaurant	Coffee Shop	Fried Chicken Joint	Deli / Bodega	Mediterranean Restaurant	Fish & Chips Shop	Field	Fish Market	Fast Food Restaurant
51	Scarborough	0	Ice Cream Shop	Pizza Place	Bistro	Sandwich Place	Bank	Coffee Shop	Discount Store	Pharmacy	Cuban Restaurant	Cosmetics Shop
60	North York	0	Pizza Place	Grocery Store	Discount Store	Mobile Phone Shop	Liquor Store	Caribbean Restaurant	Gas Station	Fast Food Restaurant	Fried Chicken Joint	Sandwich Place
62	Central Toronto	0	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN
70	Ettobicoke	0	Pizza Place	Flea Market	Sandwich Place	Middle Eastern Restaurant	Ice Cream Shop	Supermarket	Chinese Restaurant	Coffee Shop	Yoga Studio	Electronics Store
76	Ettobicoke	0	Pharmacy	Supermarket	Bus Line	Chinese Restaurant	Beer Store	Bank	Sandwich Place	Gas Station	Shopping Mall	Pizza Place

Borough	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
13	North York	5	Gym	River	Park	Yoga Studio	Donut Shop	Dumping Restaurant	Eastern European Restaurant	Ethiopian Restaurant	Event Space
21	York	5	Park	Sporting Goods Shop	Mexican Restaurant	Bakery	Beer Store	Fast Food Restaurant	Gym	Market	Fish & Chips Shop
27	North York	5	Residential Building (Apartment / Condo)	Park	Yoga Studio	Event Space	Donut Shop	Dumping Restaurant	Eastern European Restaurant	Ethiopian Restaurant	Falafel Restaurant
35	East York	5	Park	Convenience Store	Rental Car Location	Greek Restaurant	Intersection	Donut Shop	Dumping Restaurant	Eastern European Restaurant	Electronics Store
36	Downtown Toronto	5	Music Venue	Cafe	Harbor / Marina	Park	Event Space	Donut Shop	Dumping Restaurant	Eastern European Restaurant	Ethiopian Restaurant
39	North York	5	Power Shop	Gas Station	Trail	Park	Ethiopian Restaurant	Donut Shop	Dumping Restaurant	Eastern European Restaurant	Electronics Store
61	Central Toronto	5	Photography Studio	Park	Lawyer	Yoga Studio	Falafel Restaurant	Dumping Restaurant	Eastern European Restaurant	Electronics Store	Ethiopian Restaurant
66	North York	5	Convenience Store	Bank	Park	Falafel Restaurant	Dumping Restaurant	Eastern European Restaurant	Electronics Store	Ethiopian Restaurant	Event Space
69	West Toronto	5	Bed & Breakfast	Park	Residential Building (Apartment / Condo)	Yoga Studio	Event Space	Dumping Restaurant	Eastern European Restaurant	Electronics Store	Ethiopian Restaurant
73	Central Toronto	5	Playground	Garden	Park	Gym Pool	Event Space	Donut Shop	Dumping Restaurant	Eastern European Restaurant	Electronics Store

Borough	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
32	Scarborough	3	Spa	Grocery Store	Yoga Studio	Falafel Restaurant	Dumping Restaurant	Eastern European Restaurant	Electronics Store	Ethiopian Restaurant	Event Space
56	York	3	Fast Food Restaurant	Playground	Coffee Shop	Event Space	Donut Shop	Dumping Restaurant	Eastern European Restaurant	Electronics Store	Falafel Restaurant
84	Scarborough	3	Sushi Restaurant	Pharmacy	Farmers Market	Dumping Restaurant	Eastern European Restaurant	Electronics Store	Ethiopian Restaurant	Event Space	Falafel Restaurant
88	Ettobicoke	3	Grocery Store	Liquor Store	Beer Store	Caribbean Restaurant	Coffee Shop	Fried Chicken Joint	Pizza Place	Hardware Store	Fast Food Restaurant
89	Scarborough	3	Fast Food Restaurant	Chinese Restaurant	Pizza Place	Other Great Outdoors	Coffee Shop	Grocery Store	Sandwich Place	Pharmacy	Event Space

	Borough	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
1	North York	6	Hockey Arena	Intersection	Park	Portuguese Restaurant	Coffee Shop	French Restaurant	Pizza Place	Harbor / Marina	Dim Sum Restaurant	Fast Food Restaurant
2	Downtown Toronto	6	Coffee Shop	Restaurant	Yoga Studio	Breakfast Spot	Electronics Store	Thai Restaurant	Bakery	Pub	Italian Restaurant	Event Space
3	North York	6	Clothing Store	Coffee Shop	Cosmetics Shop	Electronics Store	Toy / Game Store	Men's Store	Sandwich Place	Jewelry Store	Food Court	Sushi Restaurant
4	Downtown Toronto	6	Gym	Pharmacy	Park	Burrito Place	Diner	College Cafeteria	Sushi Restaurant	Portuguese Restaurant	Coffee Shop	Ramen Restaurant
5	Queen's Park	6	Gym	Pharmacy	Park	Burrito Place	Diner	College Cafeteria	Sushi Restaurant	Portuguese Restaurant	Coffee Shop	Ramen Restaurant
7	North York	6	Furniture / Home Store	Pool	Golf Driving Range	Park	Basketball Court	Yoga Studio	Donut Shop	Dumping Restaurant	Eastern European Restaurant	Electronics Store
9	Downtown Toronto	6	Coffee Shop	Clothing Store	Japanese Restaurant	Cafe	Cosmetics Shop	Bakery	Pizza Place	Lingerie Store	Theater	Plaza
14	East York	6	Convenience Store	Spa	Asian Restaurant	Video Store	Beer Store	Falafel Restaurant	Eastern European Restaurant	Electronics Store	Ethiopian Restaurant	Event Space
15	Downtown Toronto	6	Coffee Shop	Cafe	Restaurant	Bakery	Seafood Restaurant	Italian Restaurant	Breakfast Spot	Cosmetics Shop	Beer Bar	Hotel
16	York	6	Hockey Arena	Trail	Tennis Court	Playground	Field	Park	Deli / Bodega	Grocery Store	Donut Shop	Dumping Restaurant

Results

◆ Toronto

- ◆ Clusters 0 and 3 have better places for fast food restaurants. Cluster 5 has better places for bakery and breakfast restaurants. Cluster 6 welcomes all kinds of restaurants.

◆ NYC

- ◆ Cluster 0 has many restaurants, especially Chinese restaurants with supermarket and grocery stores. Cluster 1 has many fast food restaurants with other neighborhood retails. Cluster 5 has all kinds of restaurant, bar, retail stores and other shops.

◆ London

- ◆ Cluster 0 has many parks with some restaurants (mostly fast food) and pubs nearby. Cluster 1 has many fast food restaurants with pubs, coffee shops, farmers market and convenient stores. Cluster 3 has all kinds of restaurants, supermarkets and retail stores with lots of entertainments.

Discussion and Conclusion

- ◆ Discussion

- ◆ Limitation on target problem
- ◆ Limitation on model
- ◆ Limitation on data set

- ◆ Conclusion

- ◆ Help to give business owners and investors a quick guide to start searching location
- ◆ Finding some unique characteristics for each city

Q&A

THANK YOU!