

The background features a complex geometric pattern of concentric circles and arrows. The outermost circle has numerical markings from 140 to 260 in increments of 10. Several arrows point in various directions, some along the circle's circumference and others through the center. Smaller circles are scattered throughout the space.

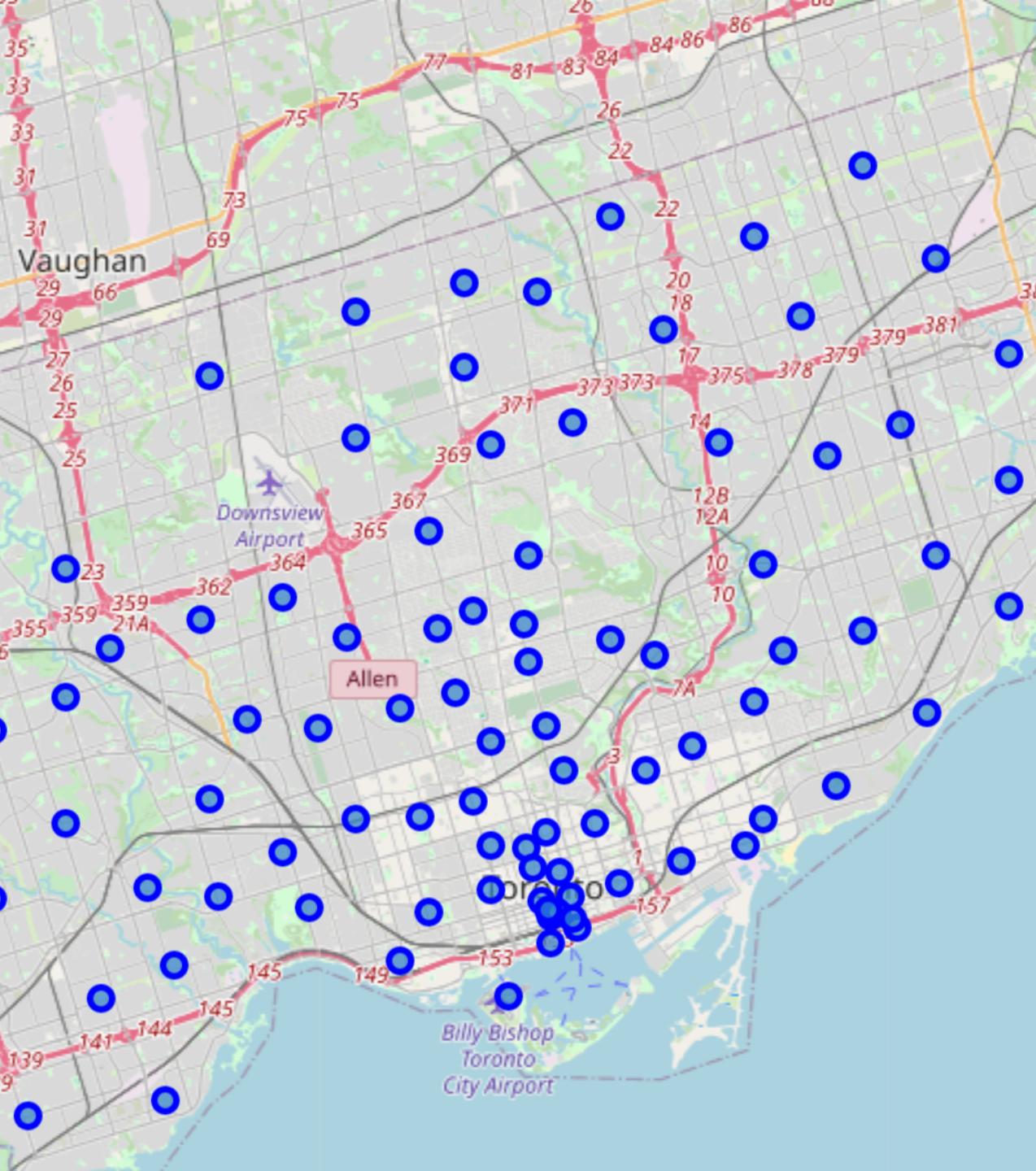
BEST LOCATION FOR NEW ITALIAN RESTAURANT IN TORONTO

MAIN ASPECTS FOR BEST LOCATION FOR NEW RESTAURANT IN TORONTO

- Floating population in Toronto
- Restaurants that could be competitors to his new restaurant
- Whether there are markets or farms near the location for affordable, quick and fresh ingredients
- Characteristics of each neighborhood

DATA ACQUISITION AND CLEANING

- Foursquare and Geopy will be used to retrieve geodata (latitude and longitude)
- Address and geodata for markets/farms will be achieved by Geopy and Nominatim
- BeautifulSoup will be utilized for retrieving data from URL (for floating population and avg income data)
- Use Folium for drawing map for Toronto and neighborhood
- Demographic data for neighborhoods is collected from
https://en.wikipedia.org/wiki/Demographics_of_Toronto_neighbourhoods
- Overall data for neighborhoods in Toronto is collected from
https://en.wikipedia.org/wiki/List_of_postal_codes_of_Canada:_M



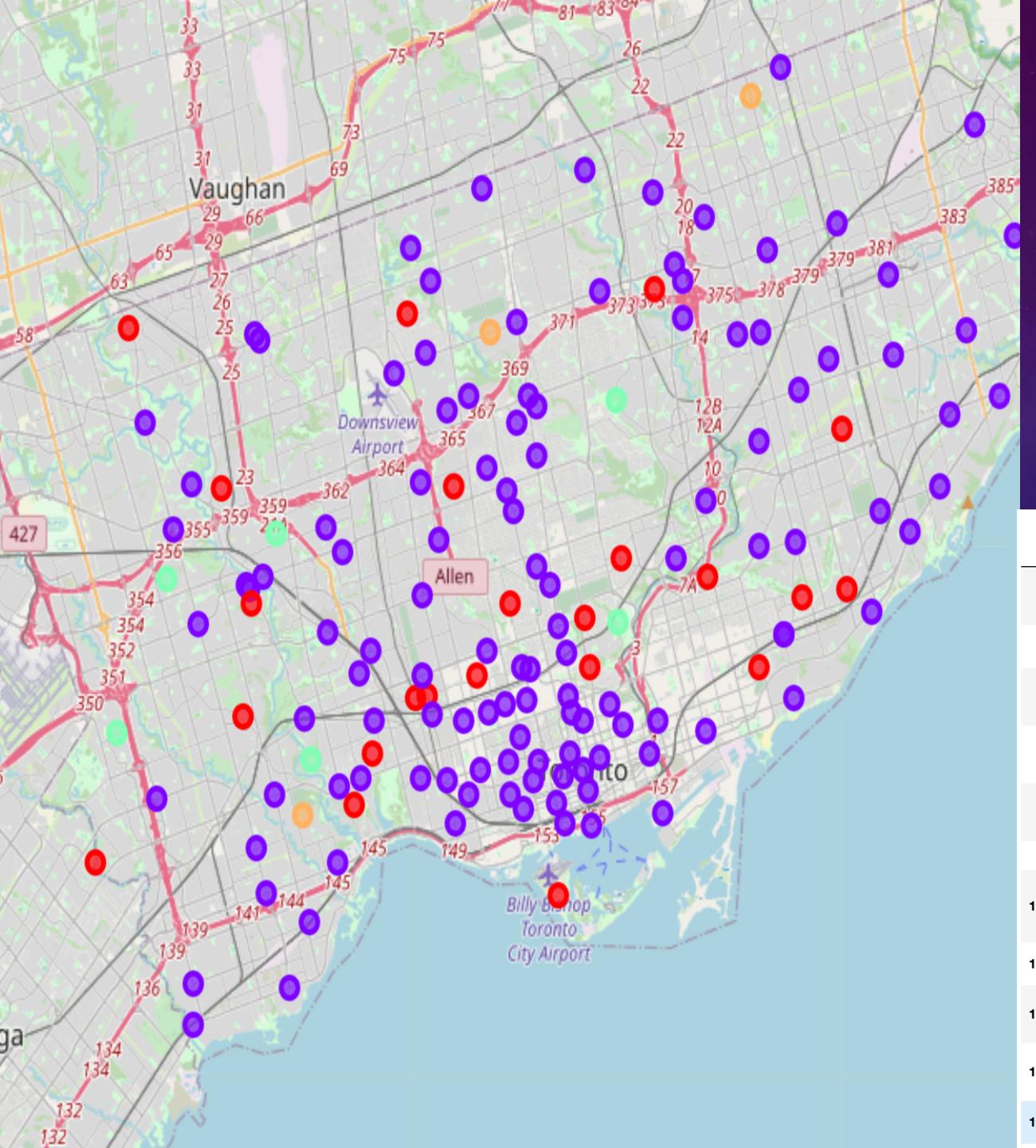
MAP OF NEIGHBORHOODS USING FOLIUM

PostalCode	Borough	Neighborhood	Latitude	Longitude	
0	M3A	Parkwoods	43.753259	-79.329656	
1	M4A	Victoria Village	43.725882	-79.315572	
2	M5A	Downtown Toronto	Regent Park, Harbourfront	43.654260	-79.360636
3	M6A	North York	Lawrence Manor, Lawrence Heights	43.718518	-79.464763
4	M7A	Downtown Toronto	Queen's Park, Ontario Provincial Government	43.662301	-79.389494
...	
98	M8X	Etobicoke	The Kingsway, Montgomery Road, Old Mill North	43.653654	-79.506944
99	M4Y	Downtown Toronto	Church and Wellesley	43.665860	-79.383160
100	M7Y	East Toronto	Business reply mail Processing Centre, South C...	43.662744	-79.321558
101	M8Y	Etobicoke	Old Mill South, King's Mill Park, Sunnylea, Hu...	43.636258	-79.498509
102	M8Z	Etobicoke	Mimico NW, The Queensway West, South of Bloor,...	43.628841	-79.520999

DEMOGRAPHIC DATA OF NEIGHBORHOODS IN TORONTO

	Neighborhood	Latitude	Longitude	Population	Density (people/km2)	PopulationChange %	AvgIncome
0	Agincourt	43.785353	-79.278549	44,577	3580	4.6	25,750
1	Alderwood	43.601717	-79.545232	11,656	2360	-4.0	35,239
2	Alexandra Park	43.650787	-79.404318	4,355	13,609	0.0	19,687
3	Allenby	43.711351	-79.553424	2,513	4333	-1.0	245,592
4	Amesbury	43.706162	-79.483492	17,318	4,934	1.1	27,546
...
159	Woburn	43.759824	-79.225291	48,507	3636	-1.5	26,190
160	Wychwood	43.682122	-79.423839	4,182	6150	-2.0	53,613
161	York Mills	43.744039	-79.406657	17,564	2409	2.0	92,099
162	York University Heights	43.758781	-79.519434	26,140	1979	-1.2	24,432
163	Yorkville	43.671386	-79.390168	6,045	10,795	62.6	105,239

VISUALIZATION OF K-MEAN CLUSTERING



index	Neighborhood	Latitude	Longitude	Population	Density (people/km ²)	PopulationChange %	AvgIncome	Cluster Labels	1st Most Common Venue	2nd Most Common Venue	3rd Most Common Venue
0	0	43.785353	-79.278549	44,577	3580	4.6	25,750	1.0	Chinese Restaurant	Hong Kong Restaurant	Train Station
1	1	43.601717	-79.545232	11,656	2360	-4.0	35,239	1.0	Pizza Place	Coffee Shop	Skating Rink
2	2	43.650787	-79.404318	4,355	13,609	0.0	19,687	1.0	Bar	Caribbean Restaurant	Furniture / Home Store
3	3	43.711351	-79.553424	2,513	4333	-1.0	245,592	1.0	Restaurant	Bookstore	Café
4	4	43.706162	-79.483492	17,318	4,934	1.1	27,546	1.0	Intersection	Bank	Athletics & Sports
...
153	159	43.759824	-79.225291	48,507	3636	-1.5	26,190	1.0	Fast Food Restaurant	Coffee Shop	Discount Store
154	160	43.682122	-79.423839	4,182	6150	-2.0	53,613	1.0	Italian Restaurant	Ice Cream Shop	Restaurant
155	161	43.744039	-79.406657	17,564	2409	2.0	92,099	1.0	Coffee Shop	Gym	Gym / Fitness Center
156	162	43.758781	-79.519434	26,140	1979	-1.2	24,432	1.0	Pizza Place	Grocery Store	Fast Food Restaurant
157	163	43.671386	-79.390168	6,045	10,795	62.6	105,239	1.0	Coffee Shop	Boutique	Italian Restaurant

	Neighborhood	Population	Density (people/km2)
0	St. James Town	14666	63765
1	Bay Street Corridor	4787	43518
2	North York City Centre	10427	37239
3	Church and Wellesley	13397	24358
4	Crescent Town	8157	20393
5	Garden District	8240	15846
6	Parkdale	28367	13974
7	Alexandra Park	4355	13609
8	Niagara	6524	11862
9	Wallace Emerson	10338	11748

- Data Frame sorted by the density of each neighborhoods
- Although St. James Town has the highest population density, we should notice that the town is mainly consisted of residents.
- A town mostly consisted of residents is not ideal for restaurant because there are limitation for residents in visiting luxurious restaurants like Ramsey's.

- One thing we should realize is that average income should not be the determinant for our decision.
- Average income data is mainly collected from residents, excluding travelers and foreigners.
- Luxurious restaurants such as Ramsey's should aim for the location where it has enough floating population of travelers.

	Neighborhood	Population	Density (people/km2)	PopulationChange %	AvgIncome
0	Allenby	2513	4333	-1.0	245592
1	Hoggs Hollow	3123	1132	2.0	222560
2	Lawrence Park	6653	1828	-5.1	214110
3	Rosedale	7672	2821	4.8	213941
4	Moore Park	4474	3959	-2.0	154825
5	Governor's Bridge/Bennington Heights	2112	1129	4.0	129904
6	Lytton Park	6494	5073	5.0	127356
7	South Hill	6218	4935	-3.8	120453
8	Armour Heights	4384	1914	2.0	116651
9	The Kingsway	8780	3403	7.9	110944

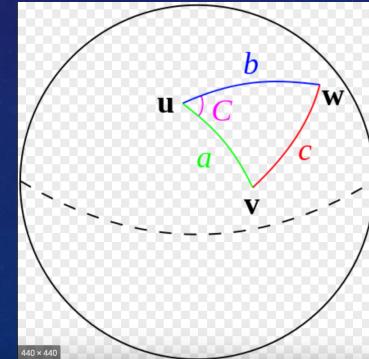
CHARACTERISTICS OF TOP 5 NEIGHBORHOODS WITH HIGH POPULATION DENSITY

- **St. James Town**
 - St. James Town is the largest high-rise community in Canada. It has been identified as one of 13 economically deprived neighbourhoods within the city. Due to its cultural and minority demographics, St. James Town is often thought as "the world within a block".
- **Bay Street Corridor**
 - "Bay Street" is frequently used as a metonym to refer to Toronto's Financial District and the Canadian financial sector as a whole, similar to Wall Street in the United States.
- **North York City Centre**
 - North York City Centre became the largest of four central business districts in the new city outside Downtown Toronto
- **Church and Wellesley**
 - It is an LGBT-oriented enclave with the core commercial strip located along Church Street from Wellesley south to Alexander.
- **Crescent Town**
 - It mainly consists of high-rise apartment complexes, built originally to take advantage of the opening of the adjacent Victoria Park subway station, which connects to the central quadrangle via a partially covered walkway.

- We can easily notice that Church and Wellesley and Crescent Town are not ideal for Ramsey's restaurant. Since it is LGBT-oriented neighborhood, Church and Wellesley is not efficient location for success of Ramsey's business. In addition, High-rise apartment complexes in Crescent Town would most likely limit the customers for Ramsey's restaurant.
- Therefore, we can claim that the possible candidates for Ramsey's new restaurant are St. James Town, Bay Street Corridor, and North York City Centre.

	Food Distributors	Address	Latitude	Longitude
0	Macgregors Meat & Seafood	265 Garyray Dr	43.768908	-79.539571
1	Atlantic Grocery Distributors	Bay Roberts	43.735988	-79.258963
2	Centennial	Richmond Hill	43.812589	-79.263370
3	Chicago58	Woodbridge	43.759586	-79.598073
4	FKK Wholesale Cash & Carey	North York	43.754326	-79.449117
5	Flanagan Foodservice	Kitchener	43.731949	-79.253564
6	GFS	Milton	43.695302	-79.332080
7	The Butcher Shoppe	Etobicoke	43.643556	-79.565633
8	Burton Meats	Mississauga	43.666855	-79.587956
9	Nossack Fine Meats	Red Deer	43.691766	-79.274040
10	Independent Fish	Winnipeg	43.669121	-79.371860
11	Mercury Wholesale	Hamilton	43.670618	-79.374682
12	Morton Wholesale	Windsor	43.664636	-79.378061
13	Northern Meat Services	Winnipeg	43.669121	-79.371860
14	Stewarts	Barrie	43.681135	-79.432282
15	Sysco	Peterborough	43.674714	-79.441812
16	Vending Products of Canada	Etobicoke	43.643556	-79.565633
17	Worldwide Specialty Foods	Calgary	43.669491	-79.374354

DISTANCES BETWEEN THE NEIGHBORHOODS AND FOOD DISTRIBUTORS USING Haversine Formula



Haversine Formula

$$d = 2r \arcsin \left(\sqrt{\sin^2 \left(\frac{\phi_2 - \phi_1}{2} \right) + \cos(\phi_1) \cos(\phi_2) \sin^2 \left(\frac{\lambda_2 - \lambda_1}{2} \right)} \right)$$

DISTANCE BETWEEN ST. JAMES AND FOOD DISTRIBUTORS

The head of data frame

	Food Distributors	Distance to St.James (km)
0	Macgregors Meat & Seafood	20.61
1	Atlantic Grocery Distributors	13.90
2	Centennial	24.17
3	Chicago58	23.00
4	FKK Wholesale Cash & Carey	14.70

Distance to St.James (km)	
count	18.000000
mean	10.308889
std	8.397219
min	0.080000
25%	1.927500
50%	11.205000
75%	16.040000
max	24.170000

DISTANCE BETWEEN BAY STREET AND FOOD DISTRIBUTORS

The head of data frame

	Food Distributors	Distance to Bay Street (km)
0	Macgregors Meat & Seafood	20.06
1	Atlantic Grocery Distributors	15.00
2	Centennial	24.95
3	Chicago58	22.23
4	FKK Wholesale Cash & Carey	14.52

	Distance to Bay Street (km)
count	18.000000
mean	10.449444
std	7.993305
min	0.940000
25%	2.055000
50%	12.245000
75%	14.965000
max	24.950000

DISTANCE BETWEEN NORTH YORK AND FOOD DISTRIBUTORS

The head of data frame

	Food Distributors	Distance to North York (km)
0	Macgregors Meat & Seafood	7.62
1	Atlantic Grocery Distributors	15.54
2	Centennial	17.50
3	Chicago58	11.99
4	FKK Wholesale Cash & Carey	0.00

Distance to North York (km)	
count	18.000000
mean	14.131667
std	4.614362
min	0.000000
25%	12.700000
50%	14.770000
75%	16.902500
max	19.780000

- Comparison of these three data gives insights that St. James Town and Bay Street Corridor are located closer to food distributors in Ontario than North York Centre. Therefore, I ruled out North York Centre.

MOST COMMON VENUES NEAR ST. JAMES AND BAY STREET

Cluster Labels	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
125	1 St. James Town	Coffee Shop	Pizza Place	Gym / Fitness Center	Grocery Store	Café	Hotel	Bar	Beer Store	Bistro	Breakfast Spot

Cluster Labels	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
8	1 Bay Street Corridor	Clothing Store	Coffee Shop	Sushi Restaurant	French Restaurant	Boutique	Italian Restaurant	Japanese Restaurant	Mediterranean Restaurant	Café	Smoke Shop

- The overall distribution of the most common venues near Bay Street Corridor suggests that Bay Street Corridor is the best location for Ramsey to open his new Italian restaurant in Toronto. Wide distribution of various restaurants and other venues indicates high floating population of various people, not just its residents.

	Venue	Venue Latitude	Venue Longitude	Venue Category
0	Trattoria Nervosa	43.671019	-79.391081	Italian Restaurant
2	Dal Moro's Fresh Pasta To Go	43.666641	-79.385400	Italian Restaurant
3	7 West Cafe	43.668665	-79.386830	Italian Restaurant
4	Blu Ristorante and Lounge	43.671685	-79.388614	Italian Restaurant
5	Dimmi	43.670062	-79.392680	Italian Restaurant
7	Vaticano Trattoria	43.670738	-79.391043	Italian Restaurant
8	Scaccia Restaurant	43.668794	-79.388296	Italian Restaurant
9	Sofia	43.670592	-79.391849	Italian Restaurant
10	Focaccia	43.669932	-79.386110	Italian Restaurant
11	Zaza paninoteca	43.670739	-79.391159	Italian Restaurant
12	Bacaro Italian Eatery	43.670824	-79.384675	Italian Restaurant

- Considering Ramsay's restaurants are luxurious (probably between 3 to 5-dollar signs), the possible competitors against his restaurant would be Blu Ristorante and Lounge, and Sofia.

CONCLUSION

- In conclusion, Bay Street Corridor is the best neighborhood for Ramsey's new Italian restaurant when we take account of floating population, characteristics of the neighborhood, and distance between the neighborhood and food distributors.
- Opening an Italian restaurant in Bay Street Corridor will not only expose the restaurant to many people but also maintain Ramsey's reputation for Michelin-star chef with quick distribution of fresh ingredients.