Italian Restaurant location recommendations for Toronto

Using FourSquare location data

Introduction

The purpose of this study is to decide which is the best neighborhood for a new Italian restaurant in Toronto. We are advising a chef from another part of Canada on where is the best place in Toronto to open a new restaurant.

1. The new Italian restaurant should not be in the same neighborhood as an existing Italian restaurant

2. The neighborhood chosen should have a lot in common with the neighborhoods that already have Italian restaurants.

These two criteria ensure that the new Italian restaurant will be in a location that is similar to the neighborhoods that already have Italian restaurants, but won't be too close to an existing Italian restaurant.

Data

Wikipedia, Python geocoder package, and FourSquare data were used

Geocoder- long/lat

FourSquare- local businesses

Wikipedia - Neighborhoods

	PostalCode	Borough	Neighbourhood
0	M1B	Scarborough	Malvern / Rouge
1	M1C	Scarborough	Rouge Hill / Port Union / Highland Creek
2	M1E	Scarborough	Guildwood / Morningside / West Hill
3	M1G	Scarborough	Woburn
4	M1H	Scarborough	Cedarbrae

	Postal Code	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

Coffee Shop	173
Café	101
Restaurant	73
Park	52
Italian Restaurant	51
Pizza Place	47
Hotel	42
Sandwich Place	40
Japanese Restaurant	39
Bakery	36

Name: Venue Category, dtype:

Methodology

1. Separate the dataset into neighborhoods with and without Italian restaurants.
2. Cosine similarity
   a. Each neighborhood will have a vector of about 200 different business types
   b. Vectors will sum to 1, as each value is the proportion of that business type (say, Cafe) in that neighborhood
   c. Each neighborhood without Italian restaurant will have a score with each neighborhood with an Italian restaurant
   d. Neighborhoods without Italian restaurants will have their cosine similarity scores summed to get a total score
   e. The top 10 scoring neighborhoods will be recommended to open a new Italian restaurant

Results - neighborhoods with and without Italian restaurants

- About two thirds of neighborhoods do not have an Italian restaurant yet
- Some of them have Pizza Places
- We will find out how many in the blue and green columns are recommended for a first-time Italian restaurant
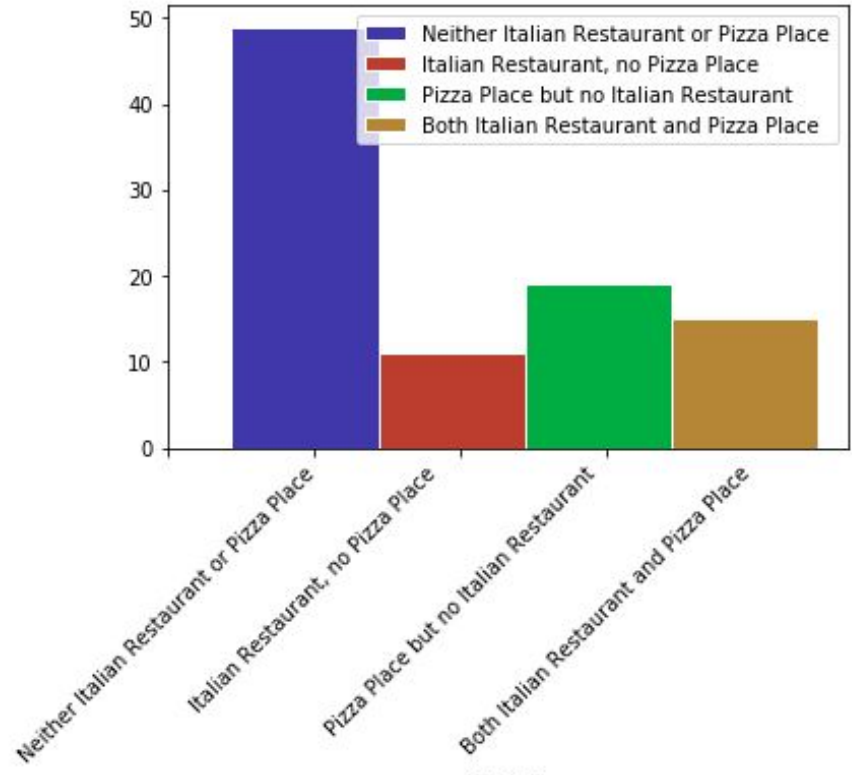
Results - Geographical locations

- Italians restaurants (red and orange) are usually found in the center city area, but a few are out towards the suburbs
- Which blue and green points should get an Italian restaurant next?
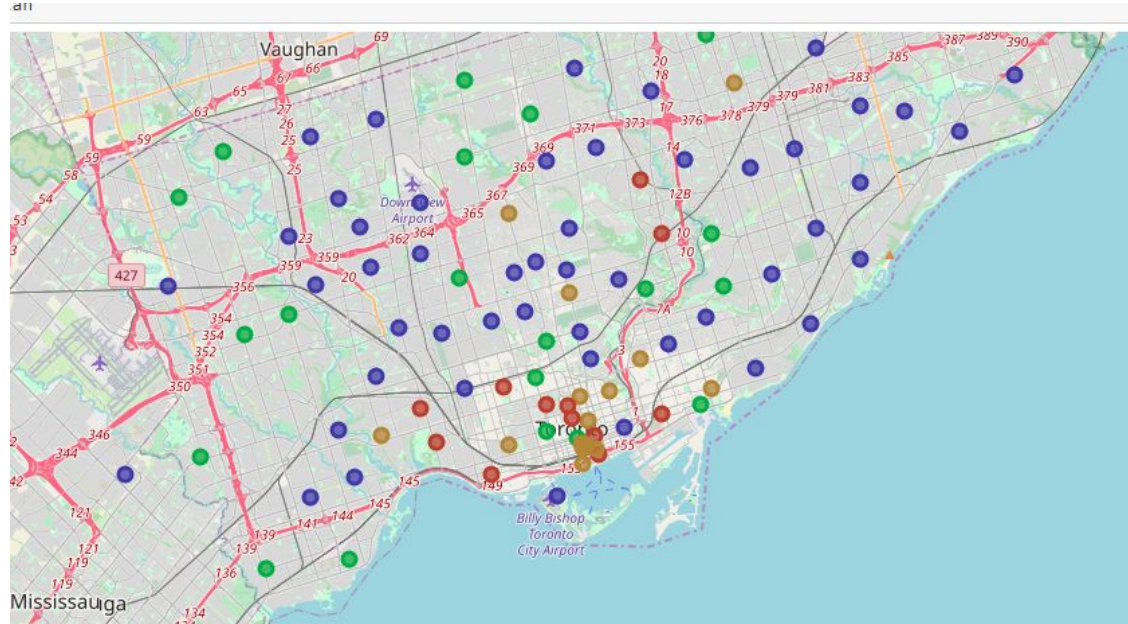
Results - Top 10 based on cosine similarity

- These are the top 10 neighborhoods with highest cosine similarity scores
- 7 of them already have pizza places
- These were determined to have the most similarity to neighborhoods that already have Italian restaurants

Neighborhood	Italian_Labels	Cosine_Sim_Scores
Richmond / Adelaide / King	Pizza Place but no Italian Restaurant	13.560804
Regent Park / Harbourfront	Neither Italian Restaurant or Pizza Place	11.731642
Willowdale	Pizza Place but no Italian Restaurant	10.539785
The Annex / North Midtown / Yorkville	Pizza Place but no Italian Restaurant	10.000838
Kensington Market / Chinatown / Grange Park	Pizza Place but no Italian Restaurant	9.924557
North Toronto West	Neither Italian Restaurant or Pizza Place	9.227167
New Toronto / Mimico South / Humber Bay Shores	Pizza Place but no Italian Restaurant	8.302159
Bathurst Manor / Wilson Heights / Downsview North	Pizza Place but no Italian Restaurant	8.239112
Woburn	Neither Italian Restaurant or Pizza Place	8.180041
Eringate / Bloordale Gardens / Old Burnhamthor...	Pizza Place but no Italian Restaurant	8.051736

Results - Top 10 recommendation locations

- Same map as before, but pink dots show our Top 10 recommendations

- Similarly to the places that already have Italian restaurants, these are mostly in the city center, but some are in suburbs
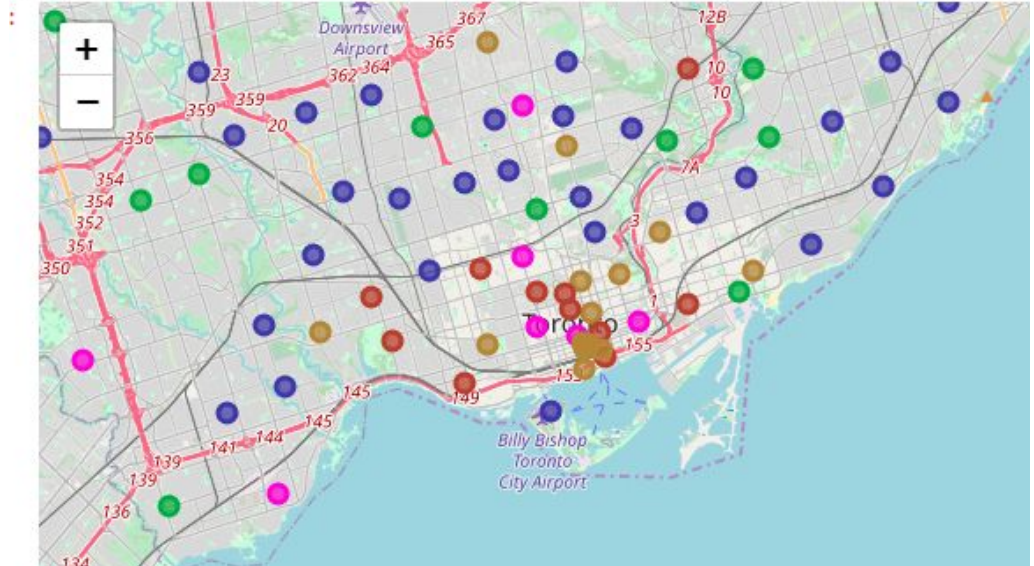
Results - local businesses in the top 10

- The top 10 are likely to have an average of 3.2 coffee shops per neighborhood, compared to 4.6 in neighborhoods that already have an Italian restaurant, and 0.38 in neighborhoods that don't
- The most common businesses in the top 10 are coffee shop, cafe, and restaurant, which is the same top 3 as neighborhoods that already have an Italian restaurant

Already has an Italian restaurant, n= 26	
Coffee Shop	4.576923
Café	2.923077
Restaurant	2.115385
Italian Restaurant	1.961538
Hotel	1.269231
Japanese Restaurant	1.192308
Bar	0.923077
Gym	0.884615
Park	0.884615
Pizza Place	0.846154

Recommended for a new Italian Restaurant, n= 10	
Coffee Shop	3.2
Café	2.1
Restaurant	1.1
Pizza Place	1.0
Park	0.7
Mexican Restaurant	0.6
Sandwich Place	0.6
Bakery	0.6
Cosmetics Shop	0.5
Pharmacy	0.5

Doesn't have an Italian restaurant, not in Top 10, n= 58	
Coffee Shop	0.379310
Park	0.379310
Pizza Place	0.258621
Bank	0.241379
Clothing Store	0.224138
Fast Food Restaurant	0.224138
Sandwich Place	0.224138
Grocery Store	0.189655
Bakery	0.189655
Pharmacy	0.155172

Discussion

- Location
  - The top 10 are distributed around Toronto, in both the city center and suburbs
  - Further studies might address the difference between a center city and more suburban location for Italian restaurants
- Characteristics
  - As expected, the neighborhoods in the top 10 have similar business profiles as those that already have Italian restaurants, with Cafe, Coffee Shop, and Restaurant as most common businesses
  - Further studies might address whether this pattern holds in other citie

Conclusion

- Our recommended top 10 Toronto neighborhoods for a new Italian restaurant satisfies the requirements of not already having an Italian restaurant, but being similar to neighborhoods that do
- This study also uncovered patterns in which types of businesses tend to be located in the same neighborhood as an Italian restaurant
- Further studies could be extended to other cities, or to use the cosine similarity method to provide neighborhood recommendations to other types of businesses.