The battle of Neighbourhoods: An Italian adventure in Toronto

Introduction

Toronto is the provincial capital of Ontario and the most populous city in Canada: according to World Population Review, it had an estimated population of just over 2.8 million in 2016, which makes it the 4th most populous city in North America[1].

Toronto is also one of the most multicultural and multiracial cities in the world, since 51.1% of the resident of the city proper belonged to a visible minority group[2]: *Figure 1* below provides a more detailed representations of minorities in the city[3]
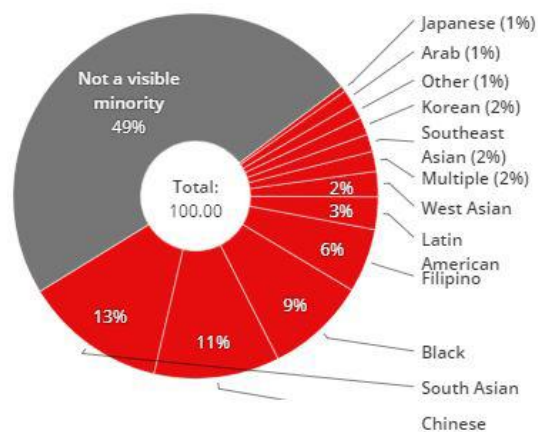

Figure 1: Minorities in Toronto

The heterogeneity of the population can be seen as an opportunity for foreign entrepreneurs wanting to open a restaurant in this city, given the high population and the potential high demand of ethnic food consumption. For this study, let's assume that Vincenzo, an Italian entrepreneur, tells us he is interested in opening an Italian restaurant in Toronto. Despite he is confident of his entrepreneurial ability, Vincenzo asks us to analyse the supply and demand in the restaurant industry of the city, and if we can suggest him which neighbourhoods are the best to open an Italian restaurant.

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[1] World population review, Toronto Population: http://worldpopulationreview.com/world-cities/toronto-population/

[2] CBC, Census 2016: More than half of Torontonians identify a visible minorities: https://www.cbc.ca/news/canada/toronto/census-visible-minorities-1.4371018

[3] Statistic Canada: https://www12.statcan.gc.ca/census-recensement/2016/dp-pd/prof/details/page.cfm?Lang=E&Geo1=CSD&Code1=3520005&Geo2=PR&Code2=35&Data=Count&SearchText=Toronto&SearchType=Begins&SearchPR=01&B1=Visible%20minority&TABID=1)

We need to provide him an overview of his main competitors, i.e. the other Italian restaurants opened in Toronto. According to CMA database[4] Italians represent 8.3% of the population in Toronto: a huge Italian community could represent a good customer base but this potentially implies an existing supply of Italian restaurants, meaning a though concurrency for our client.

Vincenzo wants to understand which boroughs (and more specifically which neighbourhoods) could be optimal for his entrepreneurial activity. He also wants a customer profiling for each location: this can help him to understand the purchasing power of his clients, and therefore his restaurant would be able to provide a fine-tuned customer experience.

Moreover, our Italian customer wants to analyse his concurrency by understanding what clients think about the best Italian restaurants in Toronto.

Data

For this study we firstly need to get information about the boroughs and neighbourhoods of Toronto; we will scrape this information from the Wikipedia Page: https://en.wikipedia.org/wiki/List_of_postal_codes_of_Canada:_M from which we will obtain the data of the boroughs of Toronto, its neighbourhoods and the respective postal codes.

We need the latitude and longitude for each neighbourhood of Toronto (Geospatial Data). This data is publicly available and contains the latitude and longitude coordinates of each postal code: http://cocl.us/Geospatial_data.

Once we will get these coordinates, we can provide our client a first idea of the location of the neighbourhoods by using the *Folium* Python Library and creating maps. We will use the Geospatial Data combined with the Foursquare API. The Foursquare API allows us to search for a specific venue category, the Italian restaurants in Toronto in our case. We will also use the Foursquare API to explore each neighbourhood of Toronto along with its most common venues. All the information collected with the Foursquare API will then be used to run a cluster analysis of each neighbourhood. Finally, we will take the list of the Best 10 Italian restaurants in Toronto according to *Il Gambero Rosso* website: https://www.gamberorosso.it/en/restaurants/itinerary/top-italian-restaurants-in-toronto/ and use the Foursquare API to collect each Venue's tips.

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[4] Demographics of Italians: https://en.wikipedia.org/wiki/Demographics_of_Toronto#Italians

Methodology

Data Scraping, Data Cleaning, and Borough Analysis

We scrape the data related to the boroughs and neighbourhoods of Toronto from the Wikipedia Page mentioned in the data section. To do that, we use the *BeautifulSoup* Python library, which allows to pull data out of HTML an XML files. After importing the data in a Dataframe, it's necessary to clean out data. As we can see from *Table 1*, there are some rows for which the Borough is not assigned.

Postal code	Borough	Neighbourhood
M1A	Not assigned	Not assigned
M2A	Not assigned	Not assigned
M3A	North York	Parkwoods

Table 1: Example of Not assigned Borough

We clean our dataset by excluding all the rows for which the borough is not assigned. To proceed in our data analysis, we also combine into one row the neighbourhoods separated with a comma. When the neighbourhood is not assigned, we make it equal to the borough. The data cleaning procedure gives us a dataset composed of 103 observations and 11 unique boroughs, reported in *Table 2*.

Borough
Scarborough
North York
East York
East Toronto
Downtown Toronto
West Toronto
Queen's Park
Mississauga
Etobicoke
Central Toronto

	York

We then associate each Postal code to its Geospatial Data, by creating one single table containing for each postal code: Borough, Neighbourhood, Latitude and Longitude. *Table 3* reports the first rows of this table:

Postal code	Borough	Neighbourhood	Latitude	Longitude
M1B	Scarborough	Rouge,Malvern	43.806.686	-79.194.353
M1C	Scarborough	Highland Creek,Rouge Hill,Port Union	43.784.535	-79.160.497
M1E	Scarborough	Guildwood,Morningside,West Hill	43.763.573	-79.188.711
M1G	Scarborough	Woburn	43.770.992	-79.216.917
M1H	Scarborough	Cedarbrae	43.773.136	-79.239.476
M1J	Scarborough	Scarborough Village	43.744.734	-79.239.476
M1K	Scarborough	East Birchmount Park,Ionview,Kennedy Park	43.727.929	-79.262.029

Table 3: Merged Data

The Geospatial Data allows us to have a first graphical representation of the neighbourhoods in Toronto. Using the *Geopy* Library, we are able to represent them in an interactive map, reported below in *Figure 2*:
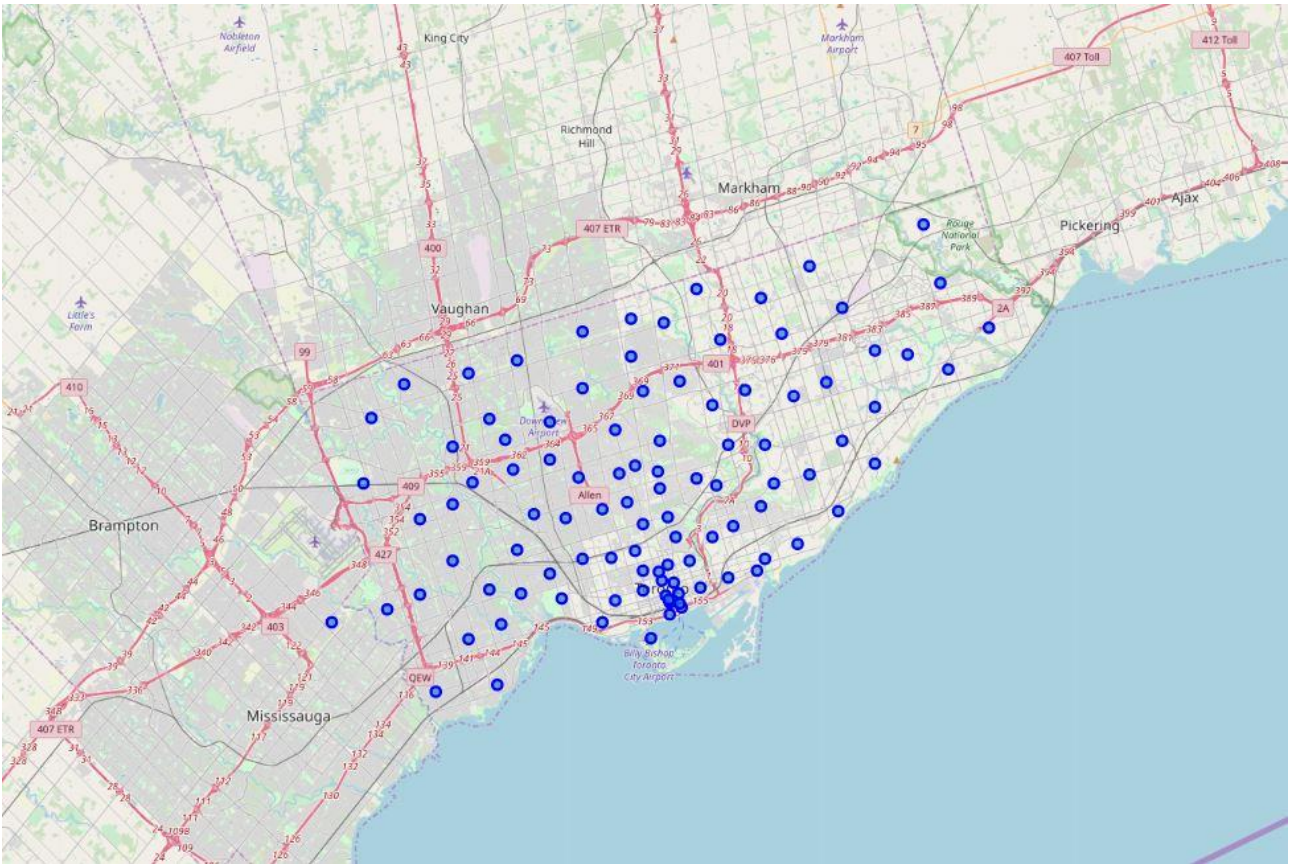
Figure 2: Neighbourhoods in Toronto

Once we obtained this data, we analyse each borough:

- We create a Dataframe for each borough;
- We use the Foursquare API to get the top venues for each neighbourhood of the borough;
- We report the top 5 most common venues of each neighbourhood, along with their frequency;
- We then consider only the neighbourhoods that have "Italian Restaurants" as one of the top 5 venues.

If the Borough analysed contains neighbourhoods with Italian Restaurant in its top 5 venues, we then apply a K-means clustering to the borough by creating 5 clusters for each of them, in order to profile the potential client of the restaurants.

Top 10 Restaurants in Toronto, according to *Il Gambero Rosso*

From *Il Gambero Rosso* webpage, we collect the name of the best Italian restaurants in Toronto.

Using the Foursquare API (Free Developer Plan), we report for each restaurant:

- The number of tips;
- The venue' tips.

Results

Neighbourhood Analysis

Table 4 below reports the results of the borough analysis. On a Total of 98 neighbourhoods analysed in the dataset, 9 of them (approximately 9.20%) have "Italian Restaurants" in the top 5 venues list.

Borough	Analysed Neighbourhoods	Neighbourhoods with Italian Restaurants in the top 5 Venues
Scarborough	15	1
North York	24	1
East York	5	0
East Toronto	5	0
Downtown Toronto	18	5
West Toronto	6	1
Queen's Park	1	1
Mississauga	0	0
Etobicoke	11	0
Central Toronto	9	0
York	4	0
Total	98	9

Table 4: Borough and Neighbourhood Analysis

The boroughs where Italian restaurants are more popular are: Scarborough, North York, Downtown Toronto, West Toronto, Queen's Park.

Let's explore more in details each of this borough, with a description of the neighbourhoods where Italian restaurants are in the top 5 venues: all the reported neighbourhoods below could be attractive places for Vincenzo to open his restaurant.

Scarborough

Table 5 below reports the analysed neighbourhoods for Scarborough:

Clarks Corners,Sullivan,Tam O'Shanter

Venue	Frequency
Pizza Place	0.18
Fast Food Restaurant	0.09
Chinese Restaurant	0.09
Italian Restaurant	0.09
Thai Restaurant	0.09

Table 5: Analysis for Scarborough

North York

Table 6 below reports the analysed neighbourhoods for North York:

Bedford Park,Lawrence Manor East

Venue	Frequency
Italian Restaurant	0.09
Coffee Shop	0.09
Greek Restaurant	0.04
Butcher	0.04
Grocery Store	0.04

Table 6: Analysis for North York

Downton Toronto

Table 7 below reports the analysed neighbourhoods for Downtown Toronto:

Cabbagetown,St. James Town

Venue	Frequency
Restaurant	0.07
Coffee Shop	0.07
Italian Restaurant	0.04
Market	0.04
Pub	0.04

Central Bay Street

Venue	Frequency
Coffee Shop	0.14
Italian Restaurant	0.06
Café	0.05
Ice Cream Shop	0.05
Burger Joint	0.04

Design Exchange,Toronto Dominion Centre

Venue	Frequency
Coffee Shop	0.14
Café	0.08
Hotel	0.06
Restaurant	0.04
Italian Restaurant	0.04

Harbourfront East,Toronto Islands,Union Station

Venue	Frequency
Coffee Shop	0.11
Aquarium	0.05
Hotel	0.05
Café	0.04
Italian Restaurant	0.04

St. James Town

Venue	Frequency
Coffee Shop	0.07
Restaurant	0.05
Café	0.05
Hotel	0.05
Italian Restaurant	0.04

Table 7: Analysis for Downton Toronto

West Toronto

Table 8 below reports the analysed neighbourhoods for West Toronto:

Runnymede,Swansea

Venue	Frequency
Pizza Place	0.09
Café	0.09
Sushi Restaurant	0.06
Coffee Shop	0.06
Italian Restaurant	0.06

Table 8: Analysis for West Toronto

Queen's Park

Table 9 below reports the analysed neighbourhoods for Queen's Park:

Queen's Park

Venue	Frequency
Coffee Shop	0.24
Park	0.05
Gym	0.05
Art Gallery	0.03
Italian Restaurant	0.03

Table 9: Analysis for Queen's Park

Cluster Analysis

Given the scarcity of the neighbourhoods with Italian Restaurants in the top 5 venues, the Cluster analysis has reported consistent results only for Downtown Toronto and Scarborough. *Figure 3* and *Figure 4* report the clusters containing Italian Restaurants for Downtown Toronto and Scarborough.

Cluster 0 in Downtown Toronto is the most relevant for our analysis. As we can see in *Figure 3*, Downtown Toronto is very attractive for the restaurant sector, since the most attractive venues are represented by cafés and ethnic restaurants. A typical customer of the borough has a very diversified taste in terms of restaurants. Vincenzo should be very aware of the tough concurrency.

	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	Downtown Toronto	0	Coffee Shop	Restaurant	Market	Pub	Italian Restaurant	Bakery	Pizza Place	Café	Breakfast Spot	Butcher
2	Downtown Toronto	0	Coffee Shop	Japanese Restaurant	Gay Bar	Sushi Restaurant	Restaurant	Café	Gastropub	Fast Food Restaurant	Hotel	Pub
3	Downtown Toronto	0	Coffee Shop	Park	Café	Pub	Bakery	Theater	Mexican Restaurant	Restaurant	Breakfast Spot	Gym / Fitness Center
4	Downtown Toronto	0	Coffee Shop	Clothing Store	Cosmetics Shop	Fast Food Restaurant	Café	Middle Eastern Restaurant	Restaurant	Diner	Ice Cream Shop	Italian Restaurant
5	Downtown Toronto	0	Coffee Shop	Hotel	Café	Restaurant	Italian Restaurant	Cocktail Bar	Cosmetics Shop	Breakfast Spot	Beer Bar	Gastropub
6	Downtown Toronto	0	Coffee Shop	Cocktail Bar	Cheese Shop	Bakery	Seafood Restaurant	Farmers Market	Beer Bar	Steakhouse	Café	Italian Restaurant
7	Downtown Toronto	0	Coffee Shop	Italian Restaurant	Ice Cream Shop	Café	Sandwich Place	Burger Joint	Chinese Restaurant	Indian Restaurant	Sushi Restaurant	Middle Eastern Restaurant
8	Downtown Toronto	0	Coffee Shop	Café	Steakhouse	Bar	Thai Restaurant	Burger Joint	Asian Restaurant	Cosmetics Shop	American Restaurant	Hotel
9	Downtown Toronto	0	Coffee Shop	Hotel	Aquarium	Café	Italian Restaurant	Sporting Goods Shop	Brewery	Pizza Place	Scenic Lookout	Bakery
10	Downtown Toronto	0	Coffee Shop	Café	Hotel	Restaurant	Italian Restaurant	Gastropub	Bar	Gym	Bakery	American Restaurant
11	Downtown Toronto	0	Coffee Shop	Hotel	Café	Restaurant	American Restaurant	Bakery	Deli / Bodega	Seafood Restaurant	Gastropub	Steakhouse
15	Downtown Toronto	0	Coffee Shop	Restaurant	Café	Beer Bar	Seafood Restaurant	Hotel	Cocktail Bar	Fast Food Restaurant	Art Gallery	Breakfast Spot
16	Downtown Toronto	0	Coffee Shop	Café	Hotel	Restaurant	Steakhouse	Asian Restaurant	Bar	Seafood Restaurant	Deli / Bodega	American Restaurant

Figure 3: Relevant Cluster of Downtown Toronto

The cluster analysis for Scarborough (*Figure 4*) shows us that the clients of this borough have more diversified interests w.r.t the ones of Downtown Toronto. On a comparative analysis, we see a lower number of restaurants in the top most common venues, meaning lower concurrency for Vincenzo.

	Borough	Cluster Labelstwo	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
2	Scarborough	1.0	Intersection	Breakfast Spot	Medical Center	Electronics Store	Pizza Place	Rental Car Location	Spa	Mexican Restaurant	Fried Chicken Joint	Fast Food Restaurant
3	Scarborough	1.0	Coffee Shop	Insurance Office	Korean Restaurant	History Museum	Hakka Restaurant	Grocery Store	General Entertainment	Furniture / Home Store	Fried Chicken Joint	Fast Food Restaurant
4	Scarborough	1.0	Thai Restaurant	Athletics & Sports	Bakery	Bank	Hakka Restaurant	Fried Chicken Joint	Caribbean Restaurant	Vietnamese Restaurant	Department Store	History Museum
6	Scarborough	1.0	Coffee Shop	Playground	Discount Store	Department Store	Vietnamese Restaurant	History Museum	Hakka Restaurant	Grocery Store	General Entertainment	Furniture / Home Store
7	Scarborough	1.0	Bus Line	Bakery	Intersection	Metro Station	Soccer Field	Park	Bus Station	Fast Food Restaurant	Discount Store	Electronics Store
9	Scarborough	1.0	Skating Rink	General Entertainment	Café	College Stadium	Vietnamese Restaurant	Coffee Shop	History Museum	Hakka Restaurant	Grocery Store	Furniture / Home Store
10	Scarborough	1.0	Indian Restaurant	Vietnamese Restaurant	Pet Store	Latin American Restaurant	Light Rail Station	Chinese Restaurant	Bar	Discount Store	Hakka Restaurant	Grocery Store
11	Scarborough	1.0	Middle Eastern Restaurant	Auto Garage	Bakery	Sandwich Place	Breakfast Spot	Vietnamese Restaurant	College Stadium	Hakka Restaurant	Grocery Store	General Entertainment
12	Scarborough	1.0	Skating Rink	Furniture / Home Store	Breakfast Spot	Lounge	Vietnamese Restaurant	Coffee Shop	Hakka Restaurant	Grocery Store	General Entertainment	Fried Chicken Joint
13	Scarborough	1.0	Pizza Place	Fast Food Restaurant	Thai Restaurant	Italian Restaurant	Shopping Mall	Bank	Fried Chicken Joint	Chinese Restaurant	Pharmacy	Noodle House
15	Scarborough	1.0	Fast Food Restaurant	Chinese Restaurant	Nail Salon	Pizza Place	Thrift / Vintage Store	Japanese Restaurant	Electronics Store	Coffee Shop	Pharmacy	Grocery Store

Figure 4: Relevant Cluster of Scarborough

Top 10 Restaurants in Toronto analysis

According to *Il Gambero Rosso* Website, the 10 best restaurants in Toronto are:

- Famiglia Baldassarre;
- Giulietta;
- Il Covo;
- Terroni Bar Centrale;
- Speducci Mercato;
- Pizzeria Defina;
- Pizza e Pazzi;
- La bettola di Terroni:
- Ardo Restaurant:
- L'Unità.

Table 10 below reports the number of tips and the comments for these restaurants. We are unable to collect all the tips for each restaurant, because we have a free plan subscription to Foursquare API. According to the table, customers love to have a good wine list, they search for a friendly service, top food presentation and Italian specialities like pasta, pizza and dishes with Italian Names.

Name	Number of Tips	Comments
Famiglia Baldassarre	1	In addition to selling fresh pasta for take home, Baldassarre also offers lunch Tuesday-Friday using their pasta and gelato.
Giulietta	4	So good! The service was impeccable, great spritz cocktail menu and the food is outstanding. Try the Fennel salade, tartare and truffle braised goat.
Il covo	2	Fresh, creative food & a brilliant wine program to match. Presentation top notch and the service perfection. Make a reso. Aim for 3-5 dishes per person. The beef in liquorice, clams with lemonquat...
Terroni Bar Centrale	34	love the vibe on the main floor. Great light streaming in. A very Italian feel. Must try the spicy tuna tartar and any and all pastas. To see more pics have a look at my instagram @Joannasable
Speducci Mercato	3	They have wild boar salami and a range of deli choices.
Pizzeria Defina	25	This place ticks all the right boxes, friendly staff, great food, good vibes and good atmosphere. Sure to go again soon and take friends with 😁
Pizza e Pazzi	31	Making Every Sunday Family Special !**Join us for Sunday Lunch 3 Course set menu !**Sundays are for relaxing, so let us do the cooking !
La bettola di Terroni	36	Consistently great food. The classic fungi salad is a must and always a pizza. The rest can change. Do go, a Toronto institution
Ardo Restaurant	8	Had the achiugge (grilled anchovies on crostini) and ARDO salsiccia (perfect tomatoes and amount of spice).Extremely attentive and friendly service. Owner/chef and waiters were exceptional.
L'unità	14	Amazing food and service. It has a really friendly atmosphere but can get loud with the hum of conversation. Great caesar salad and amazing pork loin with seasonal veggies. Nice wine list

Table 10: Top 10 Restaurants in Toronto

Discussion

Although we are able to provide a suggestion to Vincenzo where to open his restaurant and give him an idea of the taste of his potential customers, it's important to notice some limitations of the study.

The first issue of the study is related to data limitations. All the data of the venues come from the Foursquare API, therefore some important data on existing venues could be lost during the data collection, if not provided by this data provider. This missing data could have a strong impact on the definition of both the top 5 venues for each neighbourhood as well as in defining the clusters. Further studies could consider the same problem presented in this report and download data from more data provider, in order to have more reliable results.

It also should be interesting to have a full access of the tips for each analysed venue, in order to have a better idea of what makes unique the top restaurants in Toronto.

Conclusions

The study considered the request of a potential client, who wants to open an Italian Restaurant in Toronto. In order to provide him a potential location for his restaurant, we analysed the demand and supply of Italian Restaurants in the city, by considering the distribution of Italian restaurants across the boroughs of Toronto. The results in *Table 4* allow us to consider Scarborough, North York, Downtown Toronto, West Toronto, Queen's Park as the best boroughs to open his restaurant, while the results reported in *Tables 5-9* deeply analyse the outcome of our study by considering only the neighbourhoods where the Italian Restaurants are in the top 5 venues. All the reported neighbourhoods in Tables 5-9 could be attractive places for Vincenzo to open his restaurant, allowing us to restrict the potential location to 9 Neighbourhoods.

The cluster analysis gives us reliable results only for Downtown Toronto and Scarborough. Downtown Toronto is a popular borough for ethnic restaurants, meaning a high level of competition for Vincenzo, while customer in Scarborough have more diversified interests.

The analysis of the 10 best Italian restaurants in Toronto suggest that Vincenzo should offer a good wine list, a friendly service, top food presentation and Italian specialities like pasta, pizza and dishes with Italian names.