



# **EXPLORING THE RESTAURANTS IN TORONTO**

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# Background – Toronto City

- Canada's largest city, 4<sup>th</sup> largest city in North America
- Provincial capital of Ontario
- A very dynamic diverse metropolis
- Financial capital of Canada
- One of Canada's leading tourism cities



# Objectives

- Potential clients
  - People who are interested to invest a restaurant in Toronto
- Help clients to answer the questions:
  - ① Neighborhood has the most venues
  - ② Neighborhood has the most restaurants
  - ③ Relation between number of venues and number of restaurants
  - ④ The most popular cuisine in Toronto
  - ⑤ Investment recommendations

# Data Sources

## ➤ Foursquare API

- Location data of Toronto venues
- Details of Toronto restaurants

## ➤ Geographical coordinates

- Geocoder package
- Geospatial\_Coordinates.csv ([http://ocl.us/Geospatial\\_data](http://ocl.us/Geospatial_data))

## ➤ Toronto neighborhoods

- Wikipedia page ([https://en.wikipedia.org/wiki/List\\_of\\_postal\\_codes\\_of\\_Canada:\\_M](https://en.wikipedia.org/wiki/List_of_postal_codes_of_Canada:_M))

# Data Preparation

- DataFrame toronto\_df2 sample

	Postcode	Borough	Neighborhood	Latitude	Longitude
0	M5A	Downtown Toronto	Harbourfront	43.654260	-79.360636
1	M9A	Downtown Toronto	Queen's Park	43.667856	-79.532242
2	M5B	Downtown Toronto	Ryerson, Garden District	43.657162	-79.378937
3	M6C	Downtown Toronto	St. James Town	43.651494	-79.375418
4	M4E	East Toronto	The Beaches	43.676357	-79.293031
5	M5E	Downtown Toronto	Berczy Park	43.644771	-79.373306
6	M5G	Downtown	Central Bay Street	43.657952	-79.387383

- Data Frame toronto\_venues sample

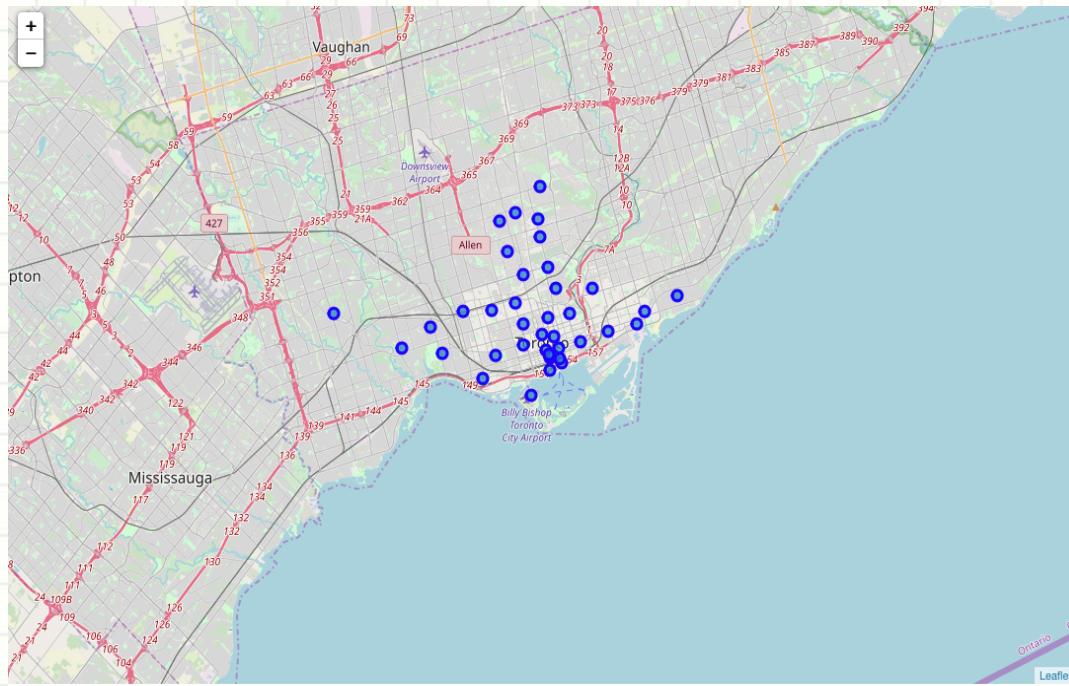
	Neighborhood	Neighborhood Latitude	Neighborhood Longitude	Venue	Venue ID	Venue Latitude	Venue Longitude	Venue Category
0	Harbourfront	43.65426	-79.360636	Roselle Desserts	54ea41ad498e9a11e9e13308	43.653447	-79.362017	Bakery
1	Harbourfront	43.65426	-79.360636	Tandem Coffee	53b8466a498e83df908c3f21	43.653559	-79.361809	Coffee Shop
2	Harbourfront	43.65426	-79.360636	Cooper Koo Family YMCA	574c229e498ebb5c6b257902	43.653191	-79.357947	Gym / Fitness Center
3	Harbourfront	43.65426	-79.360636	Body Blitz Spa East	50760559e4b0e8c7babe2497	43.654735	-79.359874	Spa
4	Harbourfront	43.65426	-79.360636	Morning Glory Cafe	4ae5b91ff964a520a6a121e3	43.653947	-79.361149	Breakfast Spot

# Methodology

- Descriptive statistic data analysis
- Data visualization
  - Maps with labels and markers
  - Scatter plot
  - Histogram
  - Word clouds
- Correlation matrix (Pearson)
- Linear regression model

# Results

- Neighborhoods from Wikipedia page
  - 210 neighborhoods & 103 unique postcodes
- 39 neighborhoods in Toronto



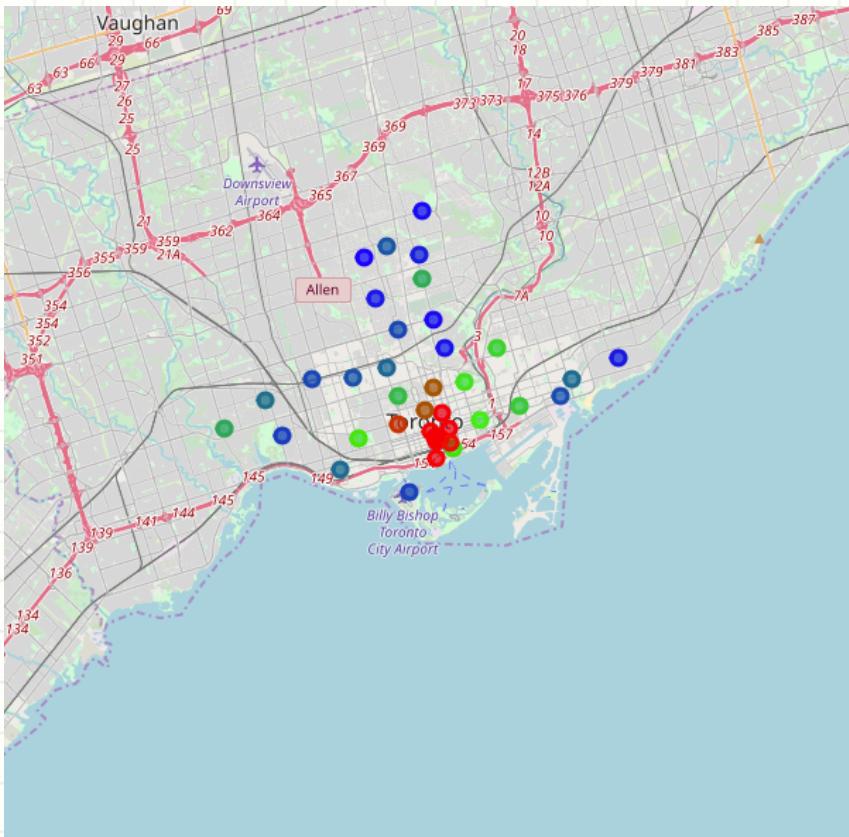
# Results

- Venues in Toronto
  - 1670 venues
  - 38 neighborhoods (M9A Queen's Park does not have any venues)
  - 232 unique venue categories
- DataFrame toronto\_venues sample

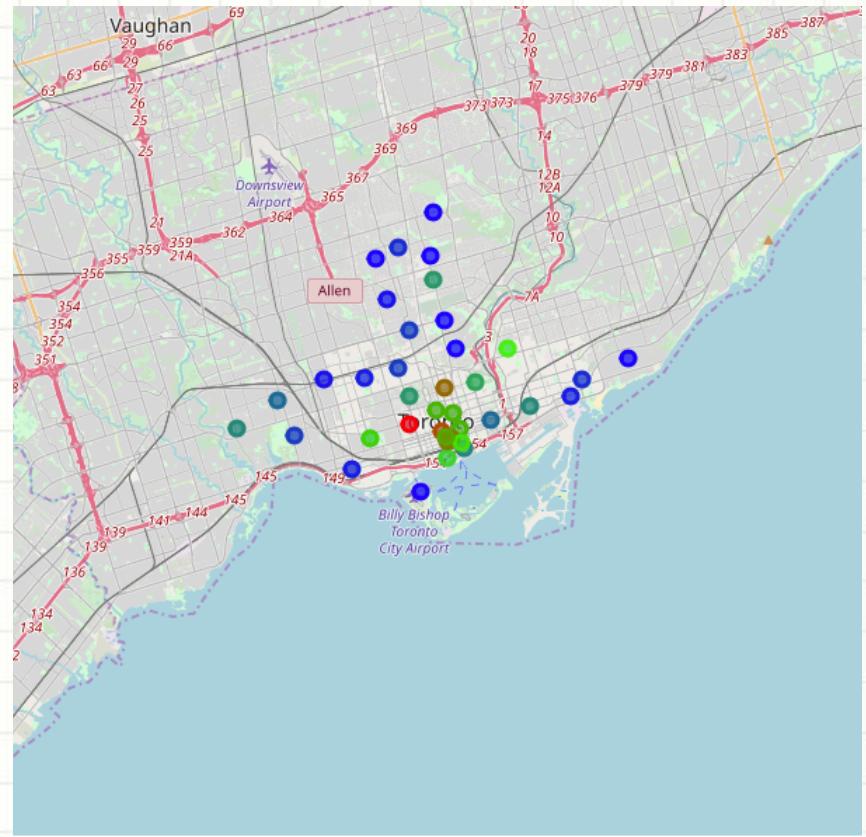
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# Results

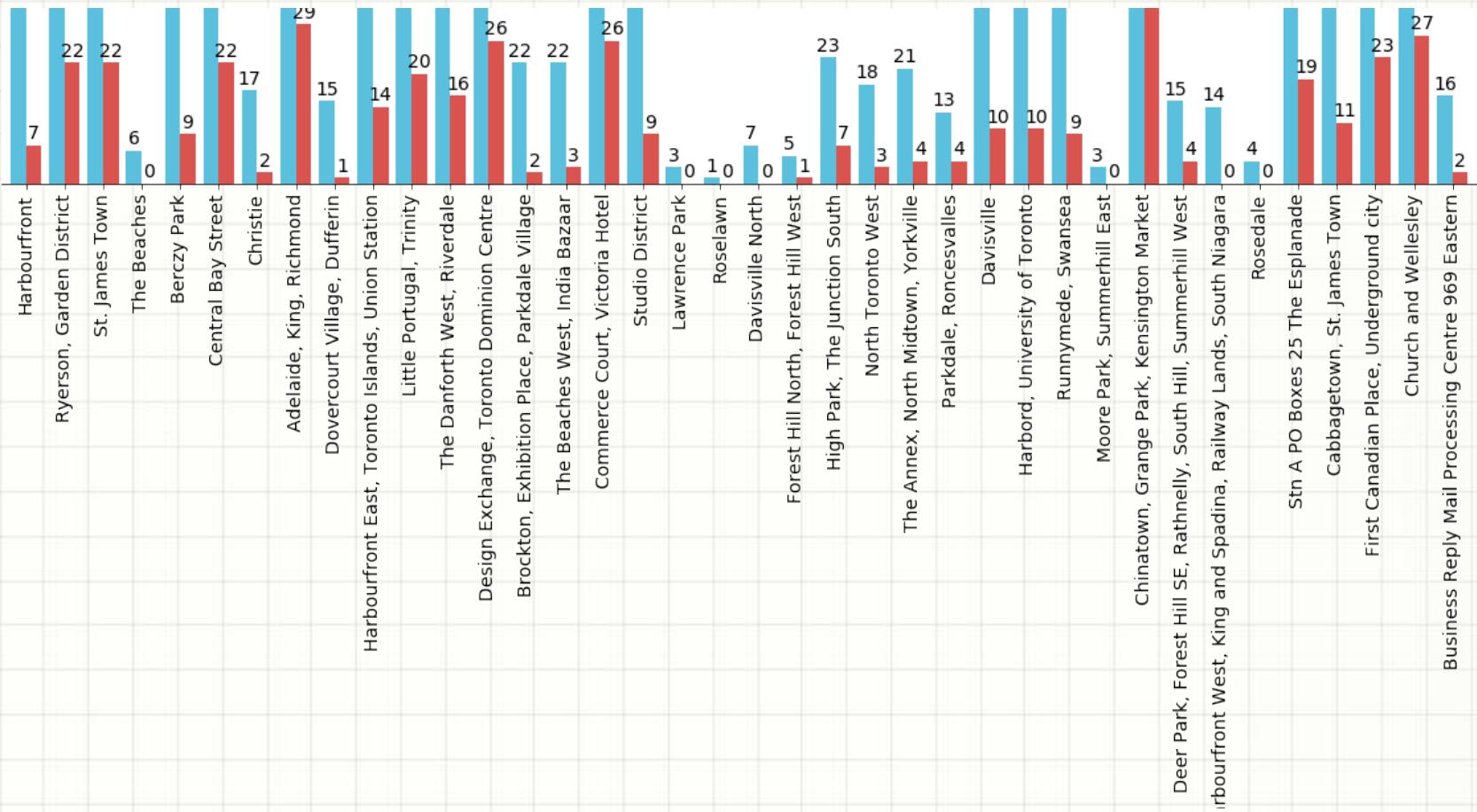
## Number of Venues



## Number of Restaurants



# Results



# Results

## Top 10 Neighborhood by Number of Venues

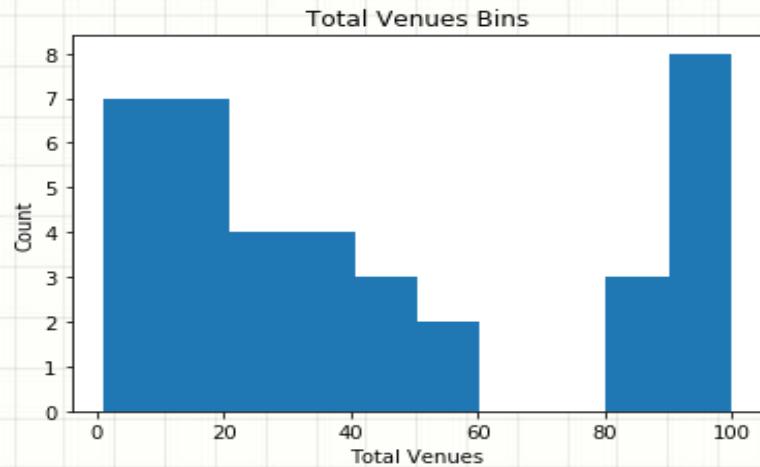
	Neighborhood	Total Venues
14	Design Exchange, Toronto Dominion Centre	100
31	St. James Town	100
30	Ryerson, Garden District	100
10	Commerce Court, Victoria Hotel	100
16	First Canadian Place, Underground city	100
0	Adelaide, King, Richmond	99
20	Harbourfront East, Toronto Islands, Union Station	99
32	Stn A PO Boxes 25 The Esplanade	97
7	Chinatown, Grange Park, Kensington Market	90
6	Central Bay Street	84

## Top 10 Neighborhoods by Number of Restaurants

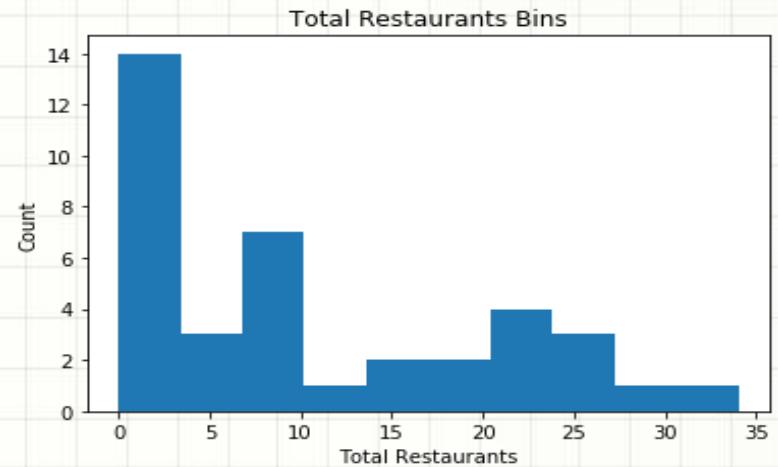
	Neighborhood	Total Restaurants
7	Chinatown, Grange Park, Kensington Market	34
0	Adelaide, King, Richmond	29
9	Church and Wellesley	27
14	Design Exchange, Toronto Dominion Centre	26
10	Commerce Court, Victoria Hotel	26
16	First Canadian Place, Underground city	23
31	St. James Town	22
30	Ryerson, Garden District	22
6	Central Bay Street	22
23	Little Portugal, Trinity	20

# Results

**Number of Venues**

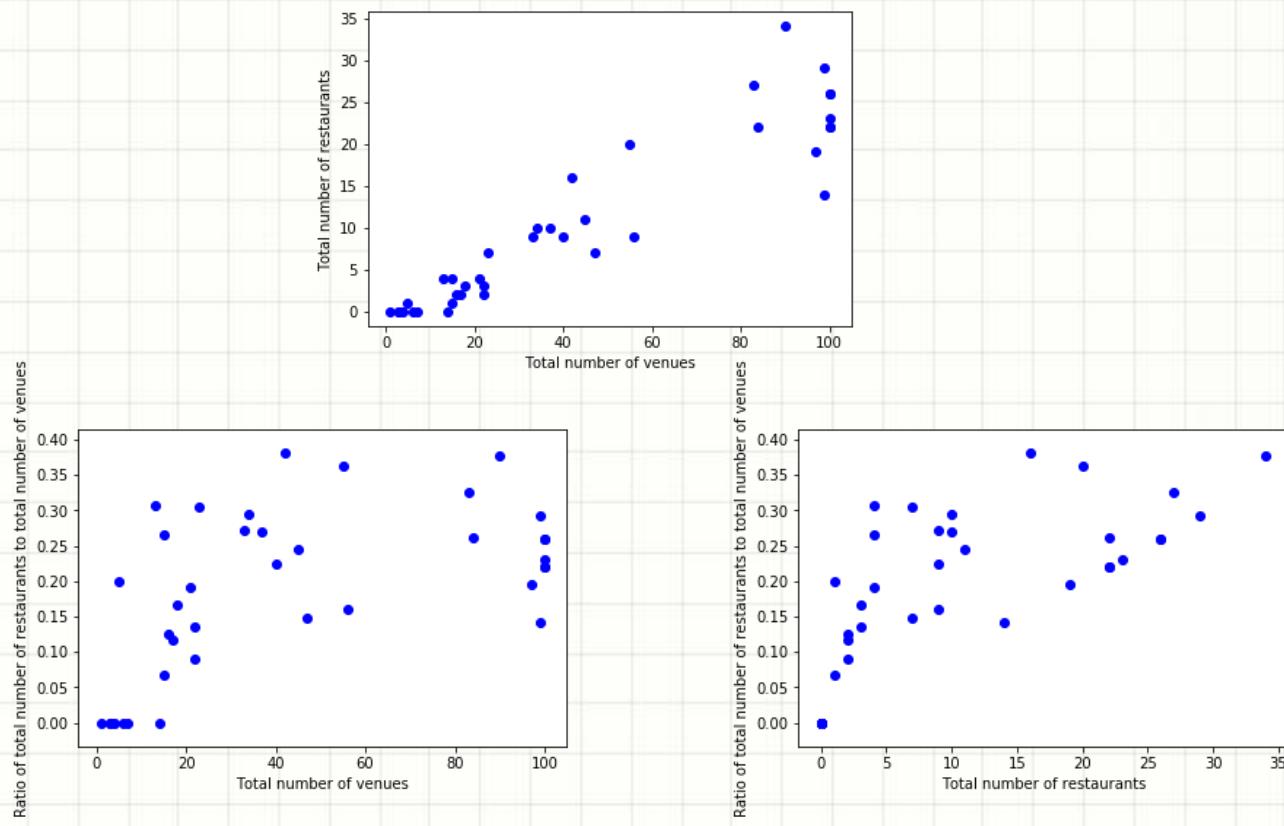


**Number of Restaurants**



# Results

- Relation between “Total Venues”, “Total Restaurants”, and “Percent Restaurant”



# Results

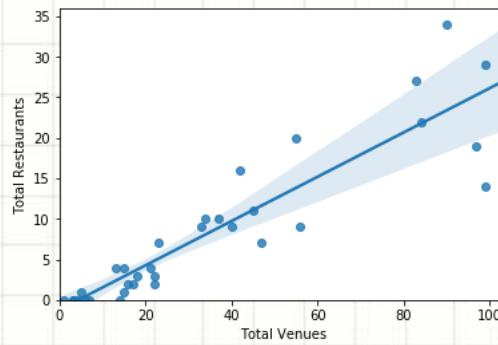
- Correlation Matrix

	Total Venues	Total Restaurants	Percent Restaurant
Total Venues	1.000000	0.907626	0.564633
Total Restaurants	0.907626	1.000000	0.733205
Percent Restaurant	0.564633	0.733205	1.000000

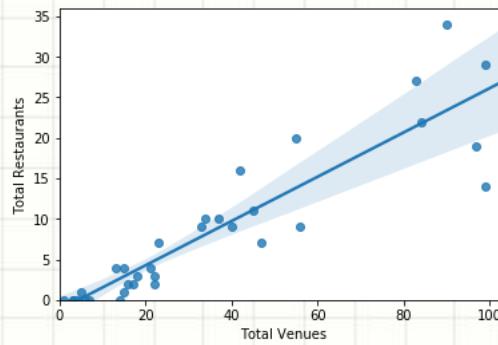
# Results

- Linear Regression Model

- Slope: 0.27
  - Intercept: -1.19
  - $R^2$ : 0.8238



- Residual Plot



# Results

- Frequency of Occurrence: venues



# Results

- 10 most common venues in the top 10 neighborhoods sorted by number of 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
14	Design Exchange, Toronto Dominion Centre	Coffee Shop	Hotel	Café	Italian Restaurant	Restaurant	American Restaurant	Bar	Bakery	Deli / Bodega	Gastropub
31	St. James Town	Café	Coffee Shop	Restaurant	Hotel	Breakfast Spot	Cocktail Bar	Beer Bar	Cosmetics Shop	Bakery	Diner
30	Ryerson, Garden District	Coffee Shop	Clothing Store	Café	Cosmetics Shop	Middle Eastern Restaurant	Pizza Place	Fast Food Restaurant	Plaza	Bookstore	Sporting Goods Shop
10	Commerce Court, Victoria Hotel	Coffee Shop	Café	Hotel	Restaurant	Italian Restaurant	American Restaurant	Steakhouse	Gym	Seafood Restaurant	Deli / Bodega
16	First Canadian Place, Underground city	Coffee Shop	Café	Hotel	Restaurant	Gym	Steakhouse	Burger Joint	Seafood Restaurant	Deli / Bodega	Asian Restaurant
0	Adelaide, King, Richmond	Coffee Shop	Café	Bar	Steakhouse	Burger Joint	Restaurant	Sushi Restaurant	Asian Restaurant	Thai Restaurant	Salad Place
20	Harbourfront East, Toronto Islands, Union Station	Coffee Shop	Aquarium	Hotel	Italian Restaurant	Café	Scenic Lookout	Brewery	Fried Chicken Joint	Restaurant	History Museum
32	Stn A PO Boxes 25 The Esplanade	Coffee Shop	Restaurant	Café	Japanese Restaurant	Seafood Restaurant	Hotel	Beer Bar	Cocktail Bar	Sandwich Place	Breakfast Spot
7	Chinatown, Grange Park, Kensington Market	Vietnamese Restaurant	Vegetarian / Vegan Restaurant	Café	Bar	Coffee Shop	Dumpling Restaurant	Chinese Restaurant	Bakery	Mexican Restaurant	Cocktail Bar
6	Central Bay Street	Coffee Shop	Italian Restaurant	Café	Sandwich Place	Ice Cream Shop	Burger Joint	Middle Eastern Restaurant	Juice Bar	Japanese Restaurant	Salad Place

# Results

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0	Adelaide, King, Richmond	Coffee Shop	Café	Bar	Steakhouse	Burger Joint	Restaurant	Sushi Restaurant	Asian Restaurant	Thai Restaurant	Salad Place
9	Church and Wellesley	Coffee Shop	Japanese Restaurant	Gay Bar	Sushi Restaurant	Restaurant	Mediterranean Restaurant	Gym	Hotel	Gastropub	Café
14	Design Exchange, Toronto Dominion Centre	Coffee Shop	Hotel	Café	Italian Restaurant	Restaurant	American Restaurant	Bar	Bakery	Deli / Bodega	Gastropub
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6	Central Bay Street	Coffee Shop	Italian Restaurant	Café	Sandwich Place	Ice Cream Shop	Burger Joint	Middle Eastern Restaurant	Juice Bar	Japanese Restaurant	Salad Place
23	Little Portugal, Trinity	Bar	Asian Restaurant	Restaurant	Pizza Place	Men's Store	New American Restaurant	Coffee Shop	Café	Vegetarian / Vegan Restaurant	Vietnamese Restaurant

# Results

- Frequency of Occurrence: restaurants



# Results

- Number of each restaurant category

Restaurant	53	Gluten-free Restaurant	4
Italian Restaurant	44	Modern European Restaurant	3
Japanese Restaurant	26	Falafel Restaurant	2
Seafood Restaurant	23	Ethiopian Restaurant	2
American Restaurant	21	Cuban Restaurant	2
Vegetarian / Vegan Restaurant	21	Brazilian Restaurant	2
Sushi Restaurant	20	Korean Restaurant	2
Thai Restaurant	18	Portuguese Restaurant	2
Greek Restaurant	15	Hotpot Restaurant	1
Asian Restaurant	14	Colombian Restaurant	1
Chinese Restaurant	12	Molecular Gastronomy Restaurant	1
Mexican Restaurant	11	Cajun / Creole Restaurant	1
French Restaurant	10	Malay Restaurant	1
Vietnamese Restaurant	10	Eastern European Restaurant	1
Middle Eastern Restaurant	9	Southern / Soul Food Restaurant	1
Fast Food Restaurant	9	Afghan Restaurant	1
New American Restaurant	8	Belgian Restaurant	1
Indian Restaurant	8	Theme Restaurant	1
Comfort Food Restaurant	7	Filipino Restaurant	1
Ramen Restaurant	6	German Restaurant	1
Latin American Restaurant	5	Doner Restaurant	1
Caribbean Restaurant	5	Taiwanese Restaurant	1
Dumpling Restaurant	4	Dim Sum Restaurant	1
Mediterranean Restaurant	4	Empanada Restaurant	1

# Results

- DataFrame toronto\_restaurants sample

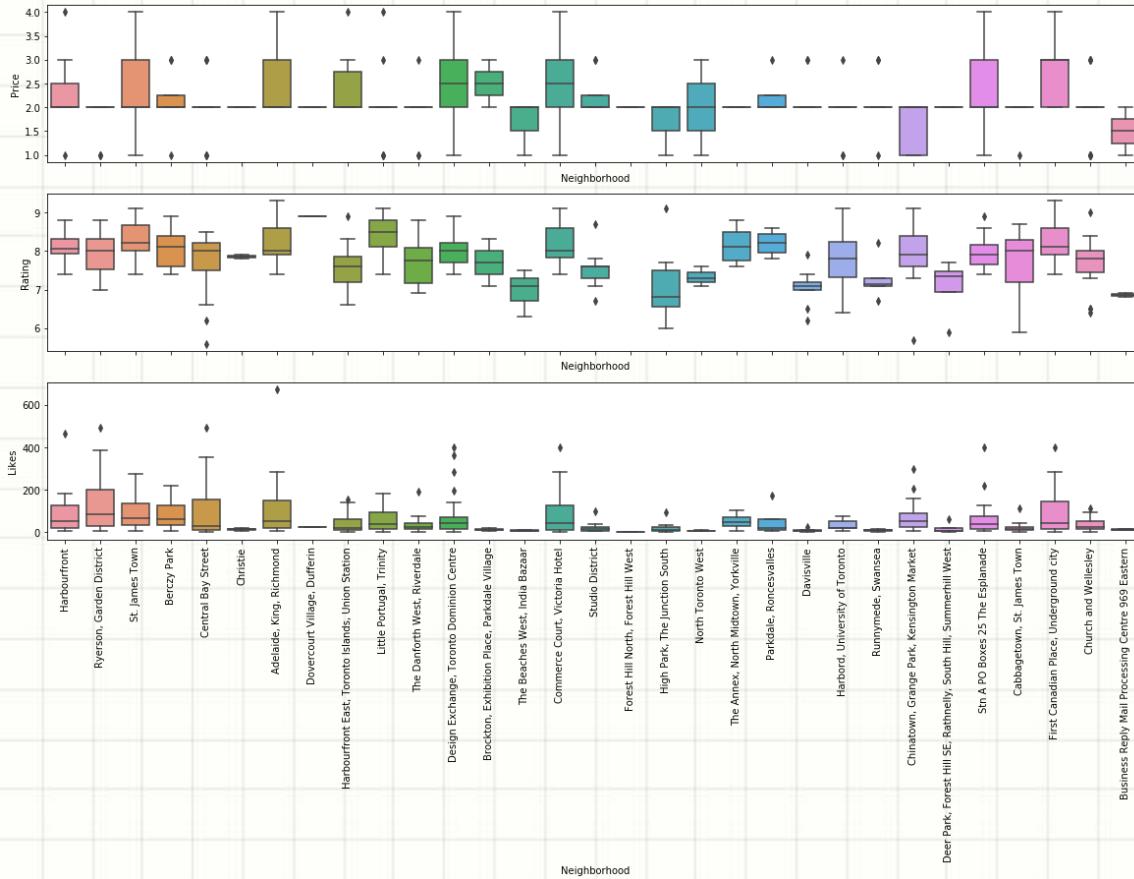
	Neighborhood	Neighborhood Latitude	Neighborhood Longitude	Venue	Venue ID	Venue Latitude	Venue Longitude	Venue Category	Price	Rating	Likes
0	Harbourfront	43.65426	-79.360636	Impact Kitchen	5612b1cc498e3dd742af0dc8	43.656369	-79.356980	Restaurant	2.0	8.8	51.0
1	Harbourfront	43.65426	-79.360636	Cluny Bistro & Boulangerie	53a22c92498ec91fda7ce133	43.650565	-79.357843	French Restaurant	4.0	8.4	183.0
2	Harbourfront	43.65426	-79.360636	El Catrin	51ddece498e1ff34185d2f	43.650601	-79.358920	Mexican Restaurant	3.0	8.1	465.0
3	Harbourfront	43.65426	-79.360636	Cocina Economica	5542ab36498e2f92a8c248f2	43.654959	-79.365657	Mexican Restaurant	1.0	7.9	67.0
4	Harbourfront	43.65426	-79.360636	Izumi	50e88fc6e4b007fcbb57aae8	43.649970	-79.360153	Asian Restaurant	2.0	8.0	18.0

- Descriptive statistic results

	Neighborhood	Latitude	Neighborhood	Longitude	Venue	Latitude	Venue	Longitude	Price	Rating	Likes
count		398.000000		398.000000	398.000000	398.000000	382.000000	392.000000	398.000000		
mean		43.656581		-79.387467	43.656885	-79.387648	2.185864	7.901786	69.309045		
std		0.013319		0.026194	0.013284	0.026088	0.690779	0.645402	93.510610		
min		43.636847		-79.484450	43.636951	-79.487067	1.000000	5.600000	0.000000		
25%		43.648198		-79.400049	43.648571	-79.394850	2.000000	7.575000	12.000000		
50%		43.651571		-79.382280	43.651813	-79.381784	2.000000	7.900000	32.000000		
75%		43.661608		-79.378937	43.662446	-79.378326	2.000000	8.300000	78.000000		
max		43.715383		-79.315572	43.716785	-79.315081	4.000000	9.300000	672.000000		

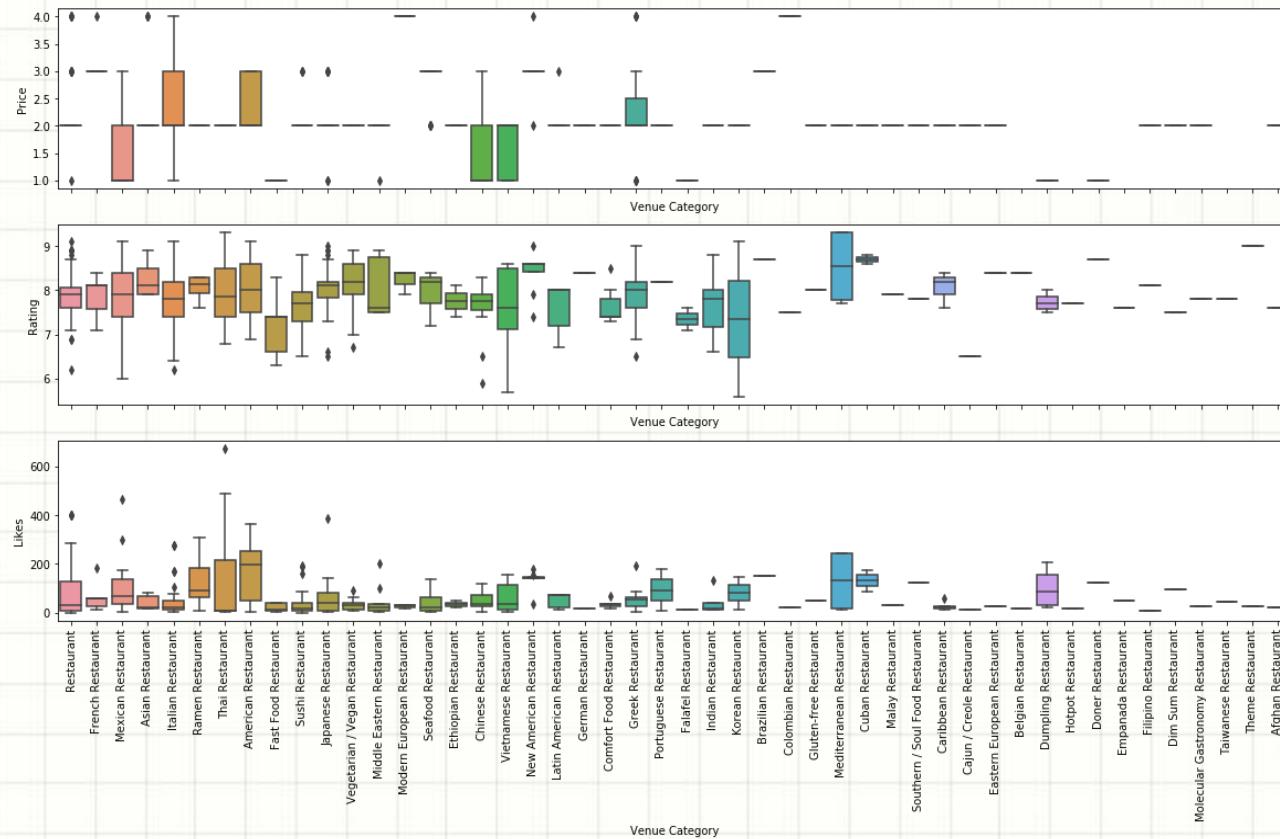
# Results

- Toronto restaurants by neighborhood



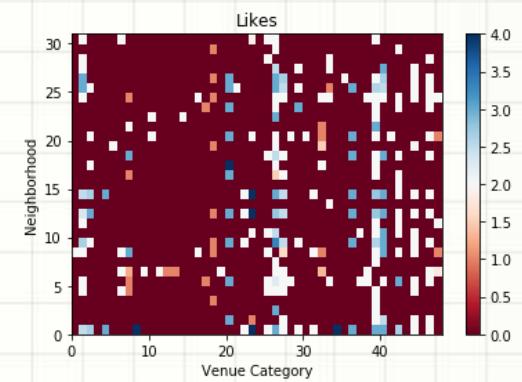
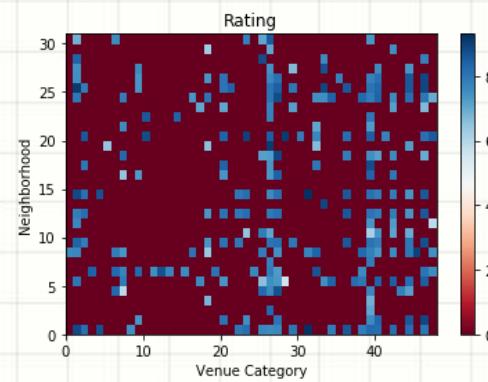
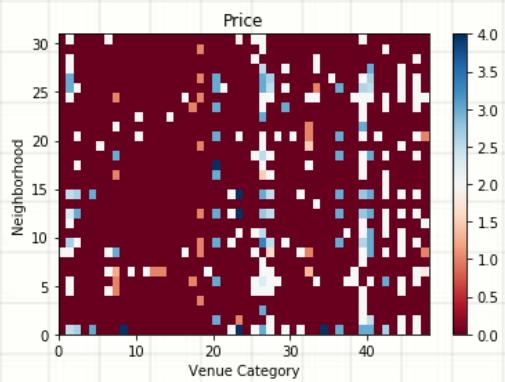
# Results

- Toronto restaurants by venue category



# Results

- Toronto restaurants grouped by neighborhood and venue category
  - Red: a value of 0 (missing value)
  - Sparse matrix



# Results

- Italian restaurants: most popular cuisine

	Neighborhood	Ave Price	Ave Likes	Ave Rating	Min Rating	Max Rating
21	The Beaches West, India Bazaar	2.000000	10.000000	7.100000	7.1	7.1
7	Davisville	2.500000	8.500000	7.100000	7.1	7.1
12	Harbourfront East, Toronto Islands, Union Station	2.500000	26.750000	7.250000	6.6	7.9
10	Harbord, University of Toronto	1.500000	38.000000	7.350000	6.4	8.3
11	Harbourfront	2.000000	20.000000	7.400000	7.4	7.4
20	Studio District	2.500000	23.000000	7.450000	7.1	7.8
3	Central Bay Street	2.250000	64.000000	7.550000	6.2	8.2
9	First Canadian Place, Underground city	3.000000	45.000000	7.600000	7.6	7.6
0	Adelaide, King, Richmond	3.000000	45.000000	7.600000	7.6	7.6
2	Cabbagetown, St. James Town	2.000000	24.500000	7.650000	7.1	8.2
19	Stn A PO Boxes 25 The Esplanade	3.000000	14.000000	7.650000	7.4	7.9
16	Runnymede, Swansea	2.000000	9.000000	7.750000	7.3	8.2
5	Christie	2.000000	6.000000	7.800000	7.8	7.8
15	Parkdale, Roncesvalles	3.000000	6.000000	7.800000	7.8	7.8
4	Chinatown, Grange Park, Kensington Market	2.000000	71.000000	7.900000	7.9	7.9
8	Design Exchange, Toronto Dominion Centre	2.750000	41.000000	7.975000	7.6	8.5
17	Ryerson, Garden District	2.000000	138.500000	8.050000	8.0	8.1
6	Commerce Court, Victoria Hotel	3.333333	114.000000	8.066667	7.6	8.7
18	St. James Town	3.000000	129.666667	8.100000	7.6	8.7
1	Brockton, Exhibition Place, Parkdale Village	3.000000	21.000000	8.300000	8.3	8.3
14	Little Portugal, Trinity	2.000000	20.000000	8.500000	8.5	8.5
22	The Danforth West, Riverdale	2.000000	24.000000	8.550000	8.3	8.8
13	High Park, The Junction South	2.000000	35.000000	9.100000	9.1	9.1

# Results

- 398 Toronto restaurants
  - Price tier 1: 43
  - Price tier 2: 244
  - Price tier 3: 76
  - Price tier 4: 19
  - No info: 16
- 44 Italian restaurants
  - Price tier 1: 1
  - Price tier 2: 26
  - Price tier 3: 13
  - Price tier 4: 4
  - No info: 0

# Results

- 26 price tier 2 Italian restaurants in 17 different neighborhoods

	Neighborhood	Ave Price	Ave Likes	Ave Rating	Min Rating	Max Rating	Number of P2 Italian	Total Venues	Total Restaurants	Percent Restaurant	Italian Restaurant	Percent P2 Italian Restaurant
0	Cabbagetown, St. James Town	2.0	24.5	7.650000	7.1	8.2	2	45	11	0.244444	2	0.044444
1	Central Bay Street	2.0	67.0	7.333333	6.2	8.1	3	84	22	0.261905	4	0.035714
2	Chinatown, Grange Park, Kensington Market	2.0	71.0	7.900000	7.9	7.9	1	90	34	0.377778	1	0.011111
3	Christie	2.0	6.0	7.800000	7.8	7.8	1	17	2	0.117647	1	0.058824
4	Davisville	2.0	10.0	7.100000	7.1	7.1	1	34	10	0.294118	2	0.029412
5	Design Exchange, Toronto Dominion Centre	2.0	42.0	7.900000	7.7	8.1	2	100	26	0.260000	4	0.020000
6	Harbord, University of Toronto	2.0	58.0	8.300000	8.3	8.3	1	37	10	0.270270	2	0.027027
7	Harbourfront	2.0	20.0	7.400000	7.4	7.4	1	47	7	0.148936	1	0.021277
8	Harbourfront East, Toronto Islands, Union Station	2.0	28.0	7.466667	6.8	7.9	3	99	14	0.141414	4	0.030303
9	High Park, The Junction South	2.0	35.0	9.100000	9.1	9.1	1	23	7	0.304348	1	0.043478
10	Little Portugal, Trinity	2.0	20.0	8.500000	8.5	8.5	1	55	20	0.363636	1	0.018182
11	Runnymede, Swansea	2.0	9.0	7.750000	7.3	8.2	2	33	9	0.272727	2	0.060606
12	Ryerson, Garden District	2.0	138.5	8.050000	8.0	8.1	2	100	22	0.220000	2	0.020000
13	Stn A PO Boxes 25 The Esplanade	2.0	6.0	7.400000	7.4	7.4	1	97	19	0.195876	2	0.010309
14	Studio District	2.0	37.0	7.100000	7.1	7.1	1	40	9	0.225000	2	0.025000
15	The Beaches West, India Bazaar	2.0	10.0	7.100000	7.1	7.1	1	22	3	0.136364	1	0.045455
16	The Danforth West, Riverdale	2.0	24.0	8.550000	8.3	8.8	2	42	16	0.380952	2	0.047619

# Discussion

All 5 questions in Objectives answered

- ① Most popular neighborhoods (most venues)
  - #10, #14, #16, #30, #31
  - 100 venues: max limit constraint by Foursquare
- ② Neighborhood with the largest number of restaurants: #7 (34 restaurants)
- ③ Positive correlation, linear regression:  
number of venues and number of restaurants
- ④ Most popular cuisine: Italian, Price tier 2

# Discussion

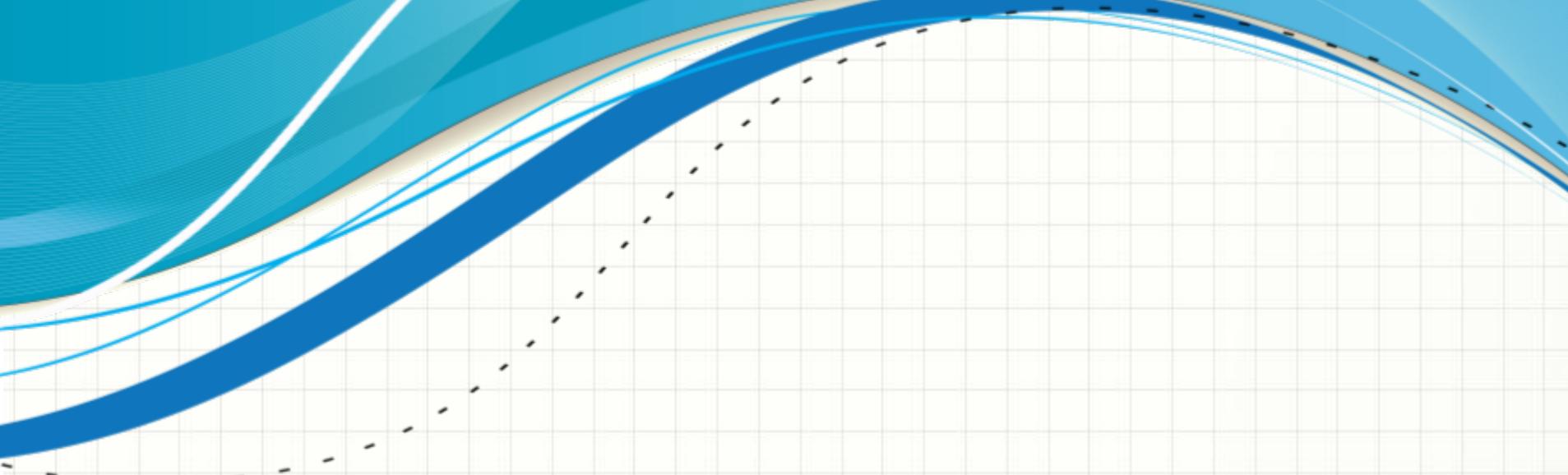
All 5 questions in Objectives answered (cont'd)

## ⑤ Investment recommendations:

- Considering price tier 2 Italian restaurants
- Considering neighborhoods with more venues and less percentage of restaurants
- Avoiding neighborhoods with similar restaurants that have high rating
- Be caution about the neighborhood without a similar restaurant

# Conclusion

- Toronto venues and restaurants were investigated
  - Linear regression: number of venues and number of restaurants
  - Price tier 2 Italian restaurants: most popular
  - Recommendations were made based on Table of 26 P2 Italian restaurants in Results
- Future work
  - Further information on restaurants, investors, available locations, and so forth should be take into consideration



**THANK YOU!**

**QUESTIONS?**