

Analyzing Public Catering Establishments in Toronto

IBM Capstone Project



Opening New Public Catering Establishment in Toronto

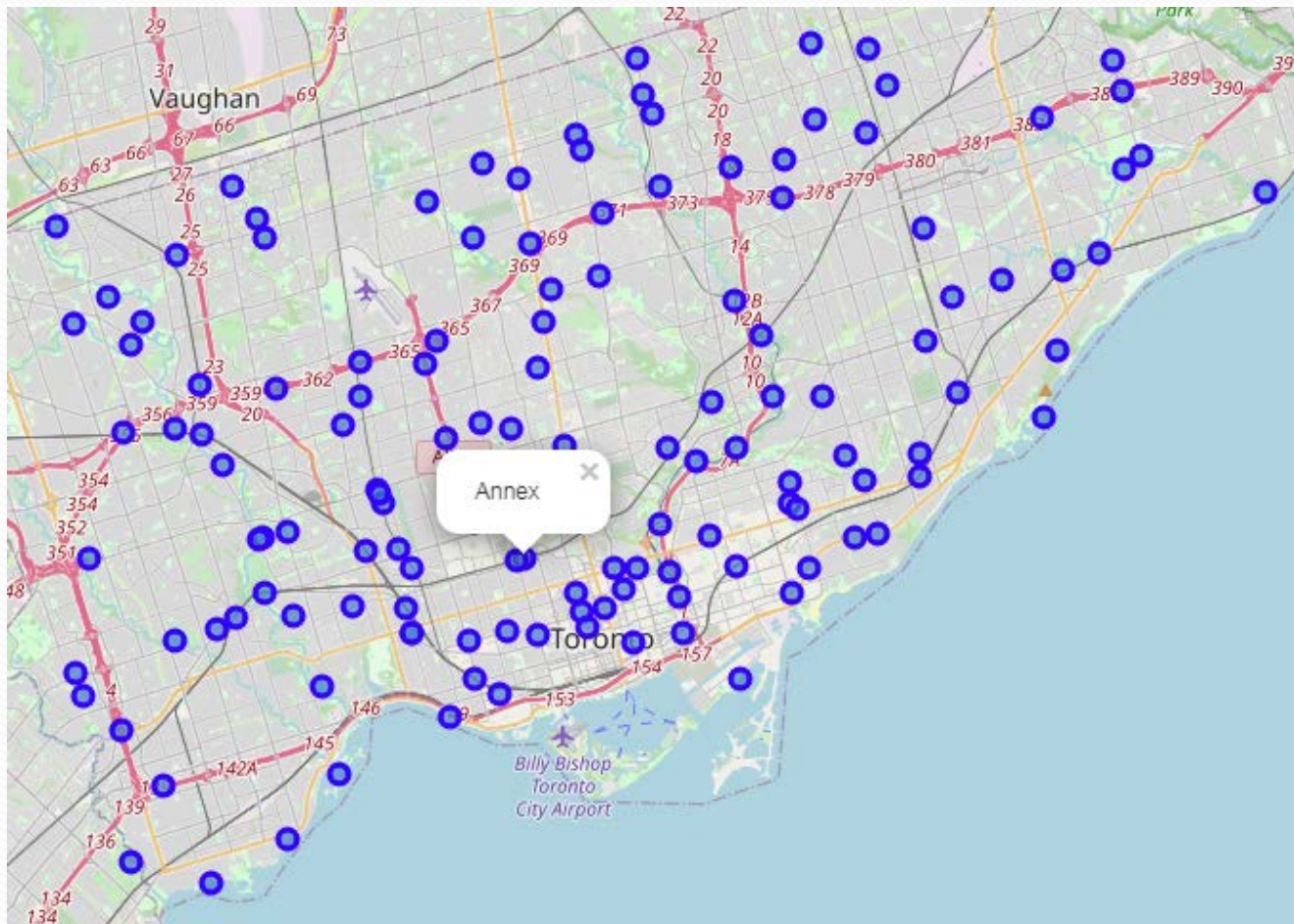
The following factors should be investigated:

- Number of existing public catering establishments in the neighborhoods
- Epidemiological situation in the neighbourhoods
- Crime rates in the neighbourhoods

Data Gaining and Preprocessing

- The total number of crimes per neighbourhood and the corresponding mean number of the crime rate over the past 7 years were obtained from [the dataset with neighbourhood crime rates](#) from the City of Toronto's Open Data Portal
- The total number of COVID-19 cases occurred since March 2021 were obtained from [the dataset with covid-19 cases in Toronto](#) from the City of Toronto's Open Data Portal
- The coordinates of the Toronto neighbourhoods were obtained from [the dataset with the coordinates of Toronto neighbourhoods](#)
- Neighbourhood names were fixed to make them the same in all data
- The total number of neighbourhoods in the cleaned data is 140

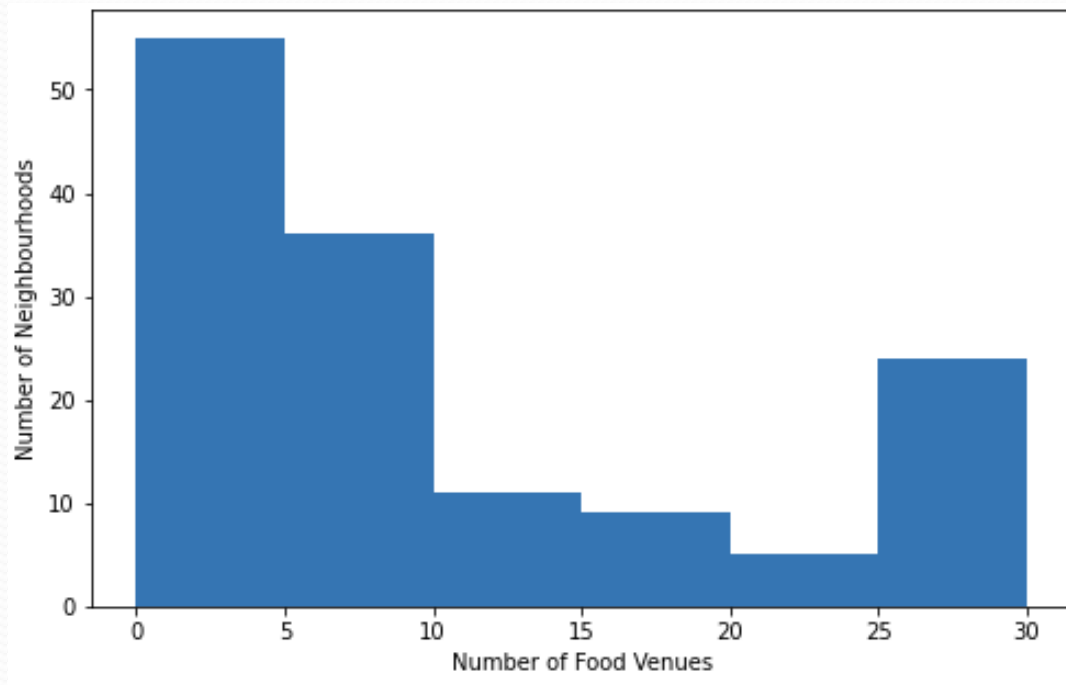
Visualized Toronto Neighbourhoods



Exploring Toronto Neighborhoods

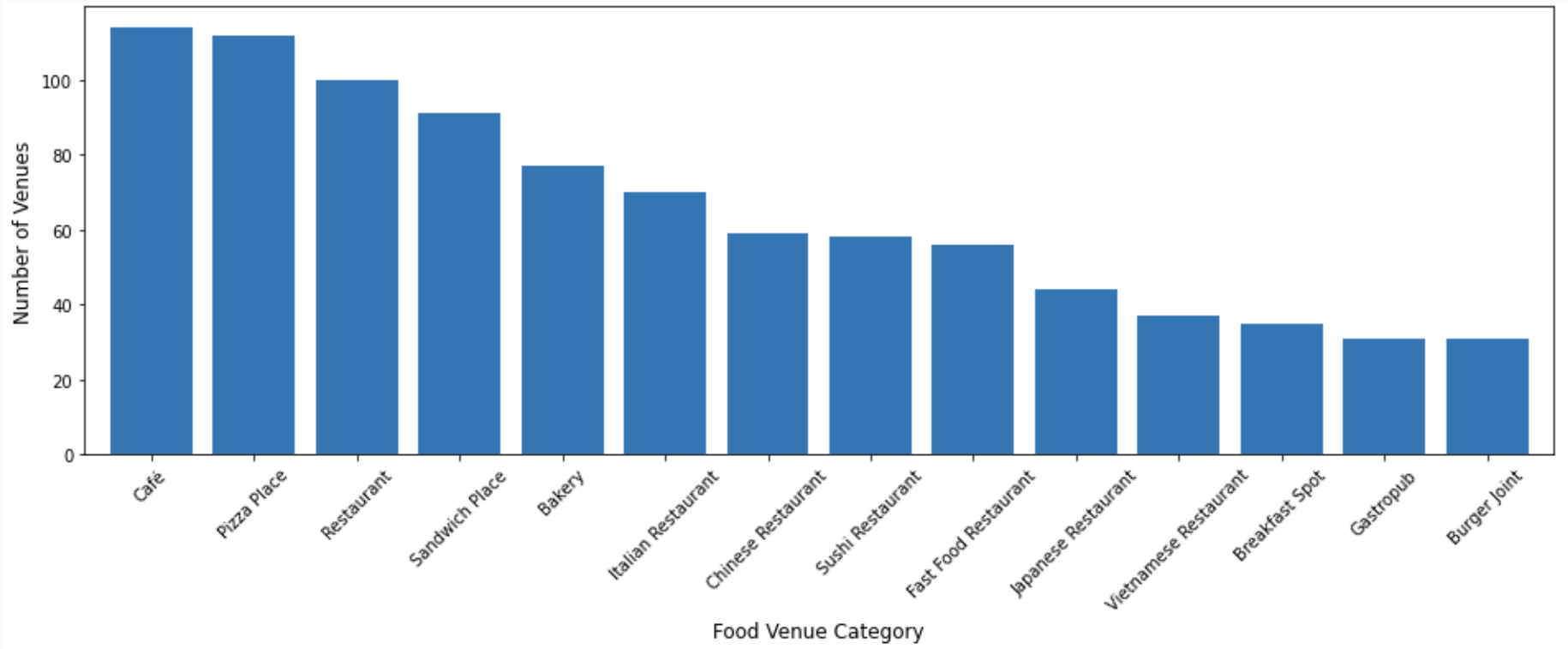
- Food venues in Toronto neighbourhoods were obtained with the use of the Foursquare API and within the area restricted by the radius of 600 meters relative to the neighbourhood coordinates.
- 1451 food venues are in 126 Toronto neighbourhoods
- 93 unique categories of food venues are in Toronto neighbourhoods
- 7 venues in Toronto are of an ambiguous category named 'Food'
 - Venues of this category were dropped
- 14 Toronto neighbourhoods are without any food venues

Assessing Total Number of Food Venues in Neighbourhoods

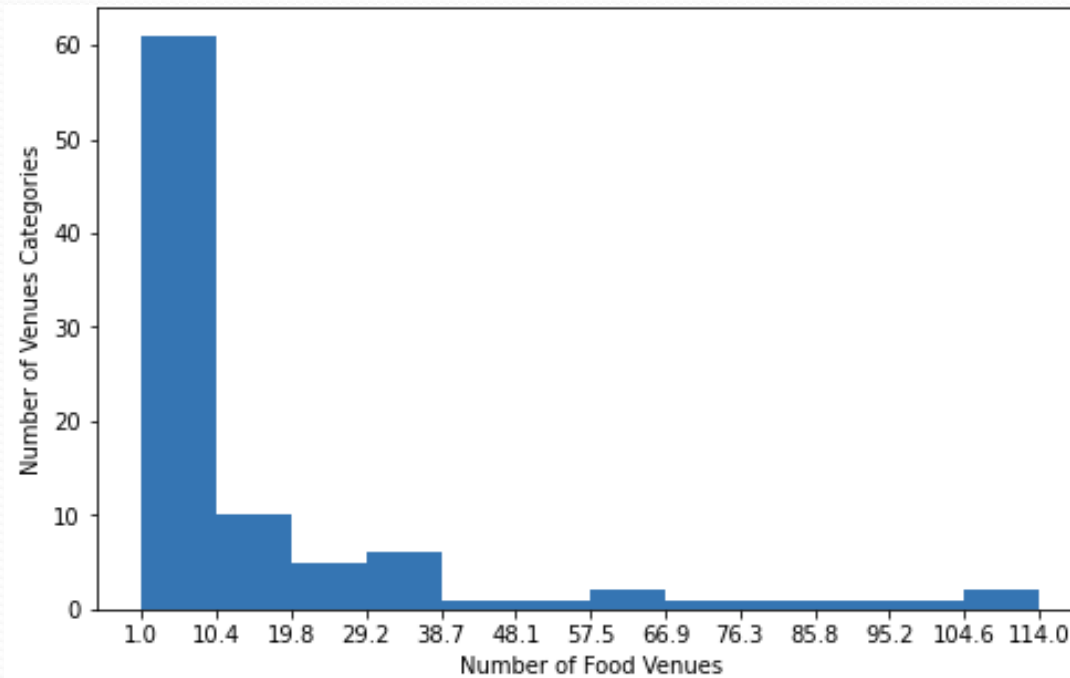


- There are 55 neighbourhoods with less than 5 food venues.
- There are 24 neighbourhoods with more than 25 food venues.

Assessing Total Number of Venues in Food Venue Categories



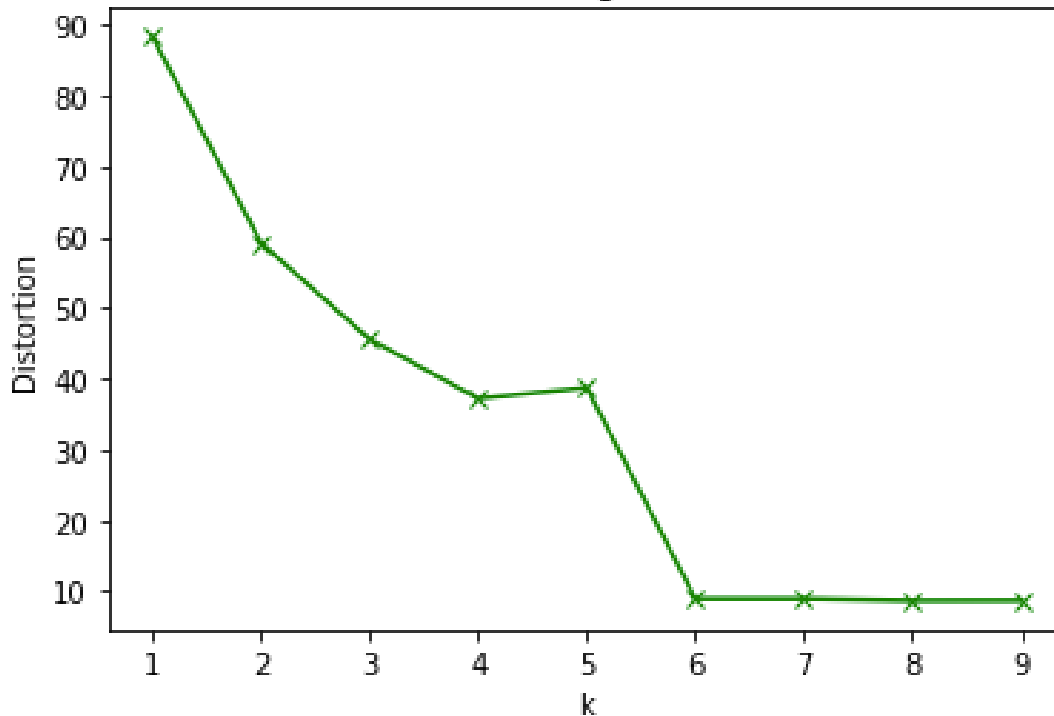
Assessing Total Number of Venues in Food Venue Categories



- No more than 10 venues exist for 61 food venue categories.

Clustering Neighbourhoods

The Elbow Method Using The Canberra Metric



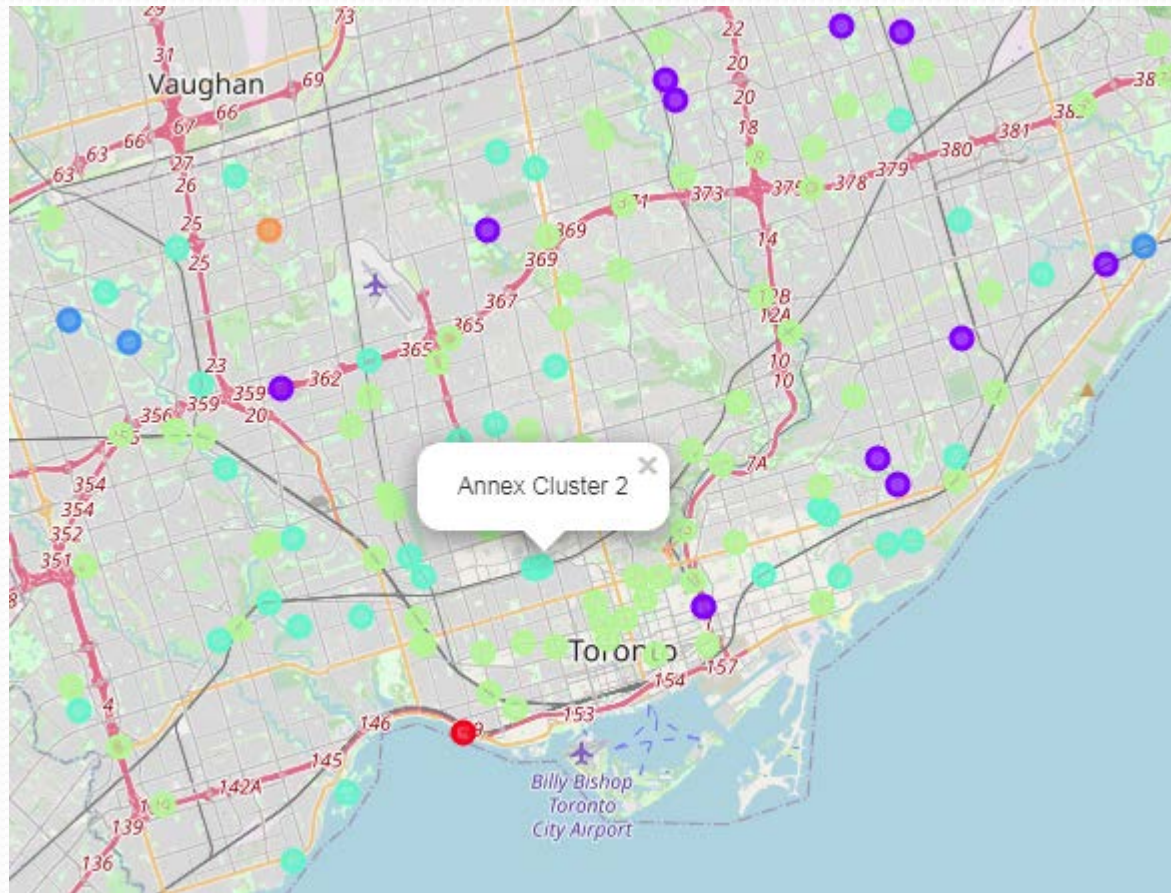
- Clustering neighbourhoods is based on the mean of the frequency of occurrence of each food category in them
- Neighbourhoods without food venues were not considered
- K-Means was run to cluster the neighbourhoods into 6 clusters.

Clustered Neighbourhoods

Cluster_Number		Neighbourhood	1st Most Common Venue	2nd Most Common Venue	3rd Most Common Venue	4th Most Common Venue	5th Most Common Venue
0	5	Agincourt North	Sandwich Place	Asian Restaurant	NoVenue	NoVenue	NoVenue
1	0	Agincourt South-Malvern West	Pizza Place	Chinese Restaurant	Korean Restaurant	Deli / Bodega	Sandwich Place
2	4	Annex	Café	Pizza Place	Sandwich Place	Indian Restaurant	Diner
3	2	Banbury-Don Mills	Wings Joint	Restaurant	Food Truck	Deli / Bodega	NoVenue
4	0	Bathurst Manor	Chinese Restaurant	Café	NoVenue	NoVenue	NoVenue

Since in some neighbourhoods the number of food venues is less than 5, then most common venues are identified as 'NoVenue'

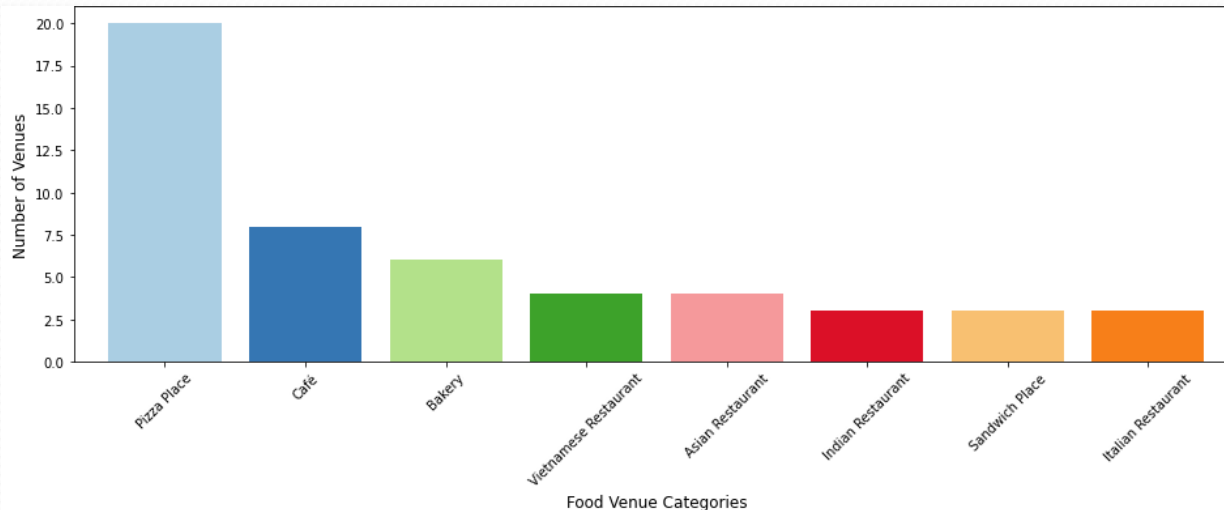
Visualized Clustered Toronto Neighbourhoods



Analyzing Clusters

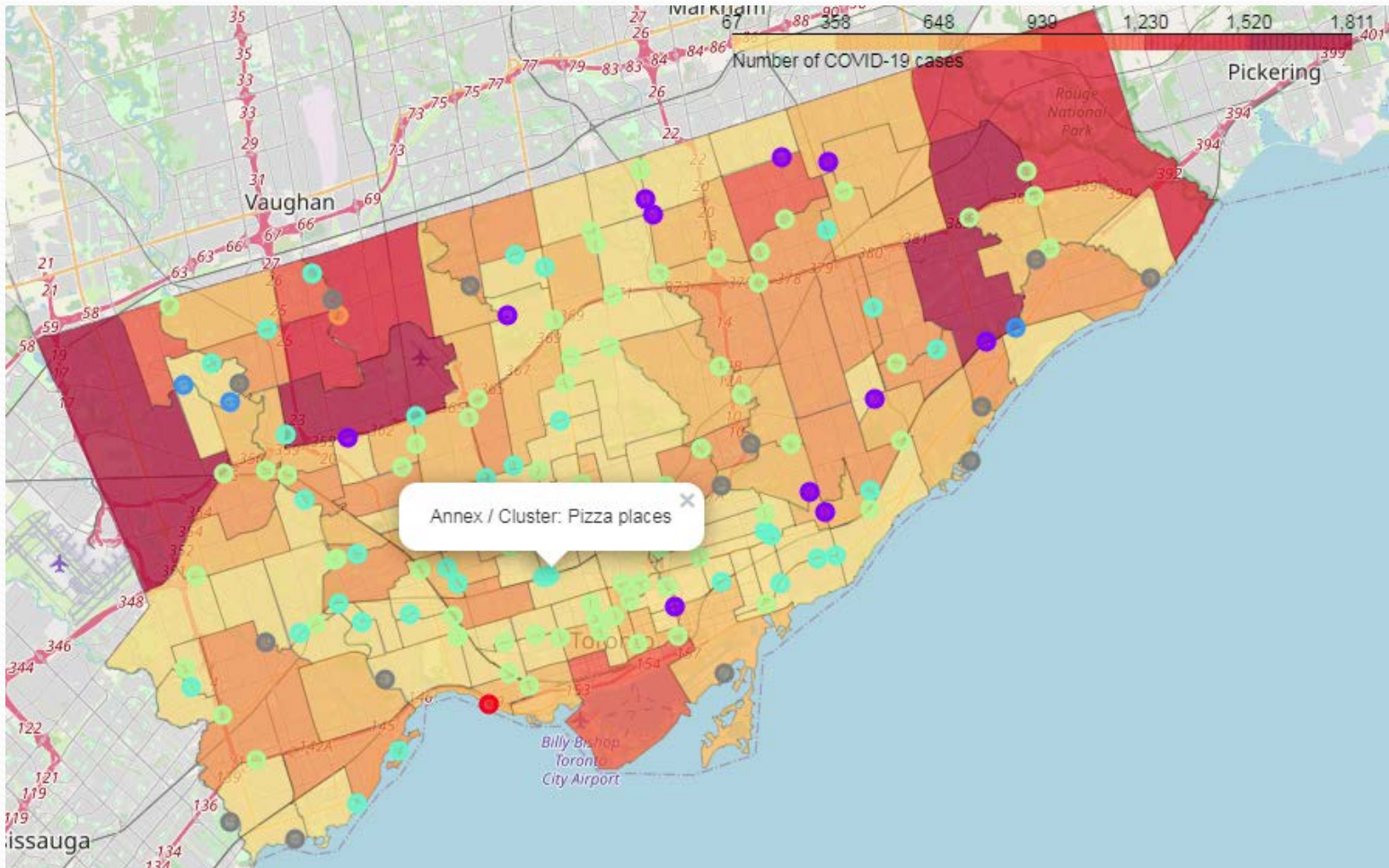
Cluster_Number	Cluster_Label
0	Chinese & Vietnamese Restaurants
1	Caribbean Restaurants
2	Pizza places
3	Various Restaurants and Fast Food Places
4	Middle Eastern Restaurant
5	American Restaurant

Clusters were labeled on the basis of the analysis of the first two most common venues in them



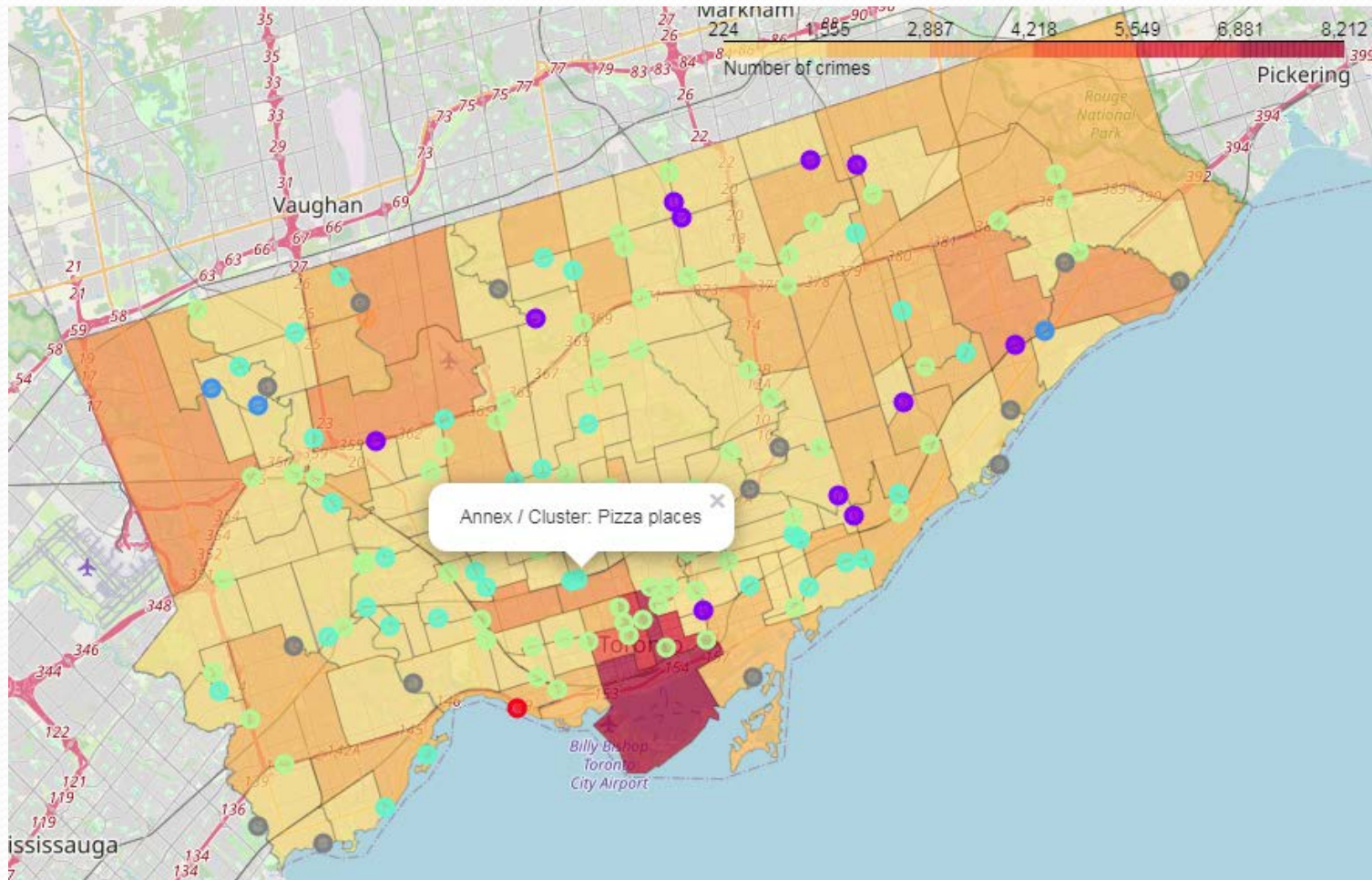
The total number of venues in topmost food venue categories in the cluster 2

Map of Toronto with Labeled Neighbourhoods Showing COVID-19 Rate



The non-clustered neighbourhoods are designated with grey colour

Map of Toronto with Labeled Neighbourhoods Showing Crime Rate



The non-clustered neighbourhoods are designated with grey colour

Discussion

- Our analysis shows that Toronto can offer a good opportunity to run a catering business.
- Venues of some categories are really in demand as for instance pizza and sandwich places, cafes and several types of restaurants, especially the Chinese, Italian, Sushi and fast food ones.
- In many neighbourhoods there are only a few food venues. Then only a few venues of less popular category may exist. So that the right decision will be to examine neighbourhoods which are not full of venues. After that it will be useful to analyze what venues may fit in such neighbourhoods.
- Toronto is a really safe city and only in a few neighbourhoods the number of crimes is larger comparatively with the other ones. The number of COVID-19 cases is quite small for such a big city. Thus most of neighbourhoods satisfy client's requirements on safety.

Conclusion

- Various data on Toronto neighbourhoods were gathered and explored in the analysis
- The cluster analysis was applied to extract significant insights
- The obtained results were assessed and visualized on the interactive maps
- Observations to determine where a new public catering establishment can be open and what kind of food venue it can be were clarified