

**THE BATTLE OF THE
NEIGHBORHOODS:
PROVIDING FOOD TO
NEIGHBORHOOD**



Introduction

Root Cause:

COVID-19

Problem:

Restriction of patrons to dine in restaurants has resulted in a dramatic loss of income for restaurant owners

Current imperfect solution:

Cost of food delivery and duration of delivery affecting the quality of the food drove the revenue down once again.

Proposed solution:

To move the business closer to homes, where they may scale down their business and focus on takeaway orders.

Problem Description

Which neighborhood should the food venues shift into ?

Factors to consider

1. The distribution of food venues in Toronto
2. Analyzing density of food venues in each neighbourhood
3. Identifying neighborhood with the least number of food venues

Data Acquisition

1. Location – Geocoordinates of neighborhoods in Toronto city. Source: (https://en.wikipedia.org/wiki/List_of_postal_codes_of_Canada:_M) / (https://cocl.us/Geospatial_data)
2. Venues – Geocoordinates of venues in the neighbourhood. Source: (Foursquare API)

Approach

1. Get the geocoordinates of neighborhood in Toronto
2. Use the geocoordinates to call for venues from Foursquare API
3. Use a restriction list to define what are food venues and create a filter list
4. Use statistic description and Kclustering model to group neighbourhood based on the number of food venues
5. Visualized the density of food venues on folium heat map
6. Pin the neighbourhood with least number of food venues on the folium map

Data

Figure 1. Showing the number of food venues and the first 5 rows of dataframe showing neighbourhood with their respective venue count (refer to methodology 3.3).

```
In [19]: 1 FoodDF.shape
```

```
Out[19]: (1457, 7)
```

```
Out[20]:
```

	Neighborhood	Neighborhood Latitude	Neighborhood Longitude	Venue Count
44	Humberlea, Emery	43.724766	-79.532242	1
47	Islington Avenue	43.667856	-79.532242	1
52	Lawrence Park	43.728020	-79.388790	1
14	Clairville, Humberwood, Woodbine Downs, West H...	43.706748	-79.594054	1
72	Rouge Hill, Port Union, Highland Creek	43.784535	-79.160497	2

Data

Figure 2. Heat map imposed on a folium map of Toronto showing the food venues distribution

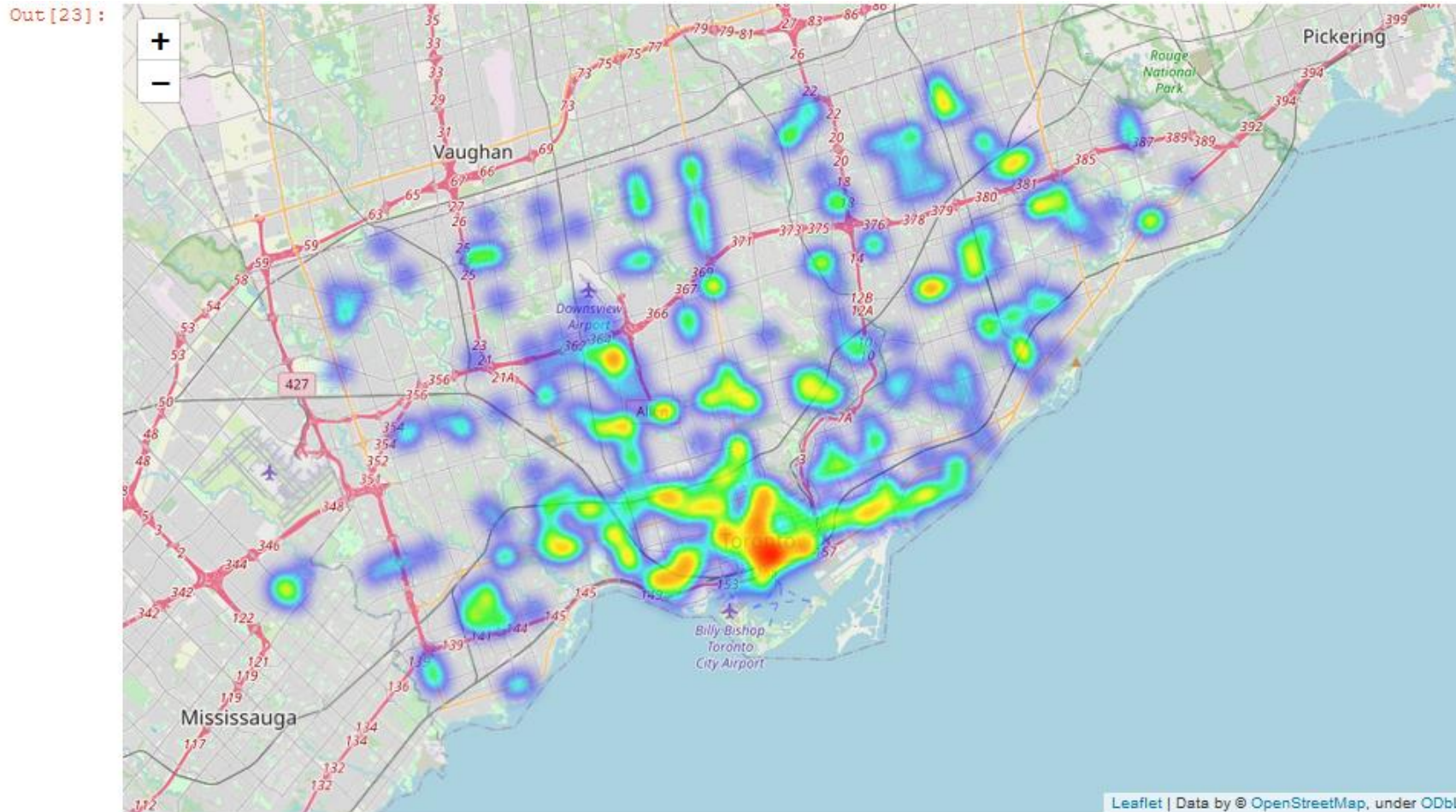
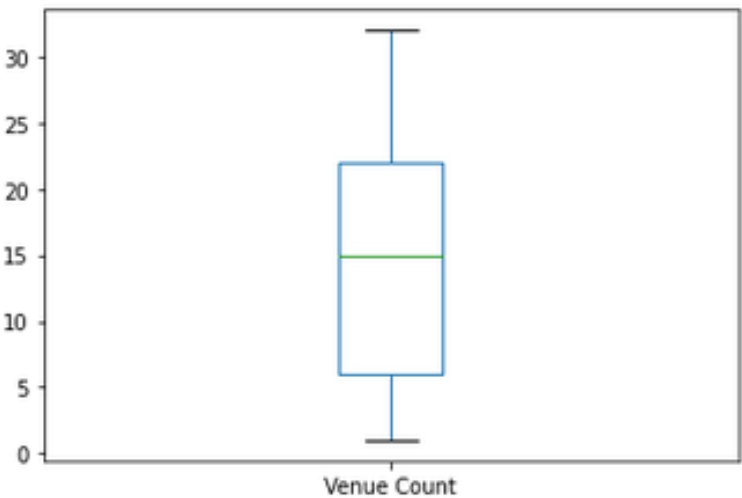


Figure 3. Boxplot of venue count per neighbourhood and their statistical describing.

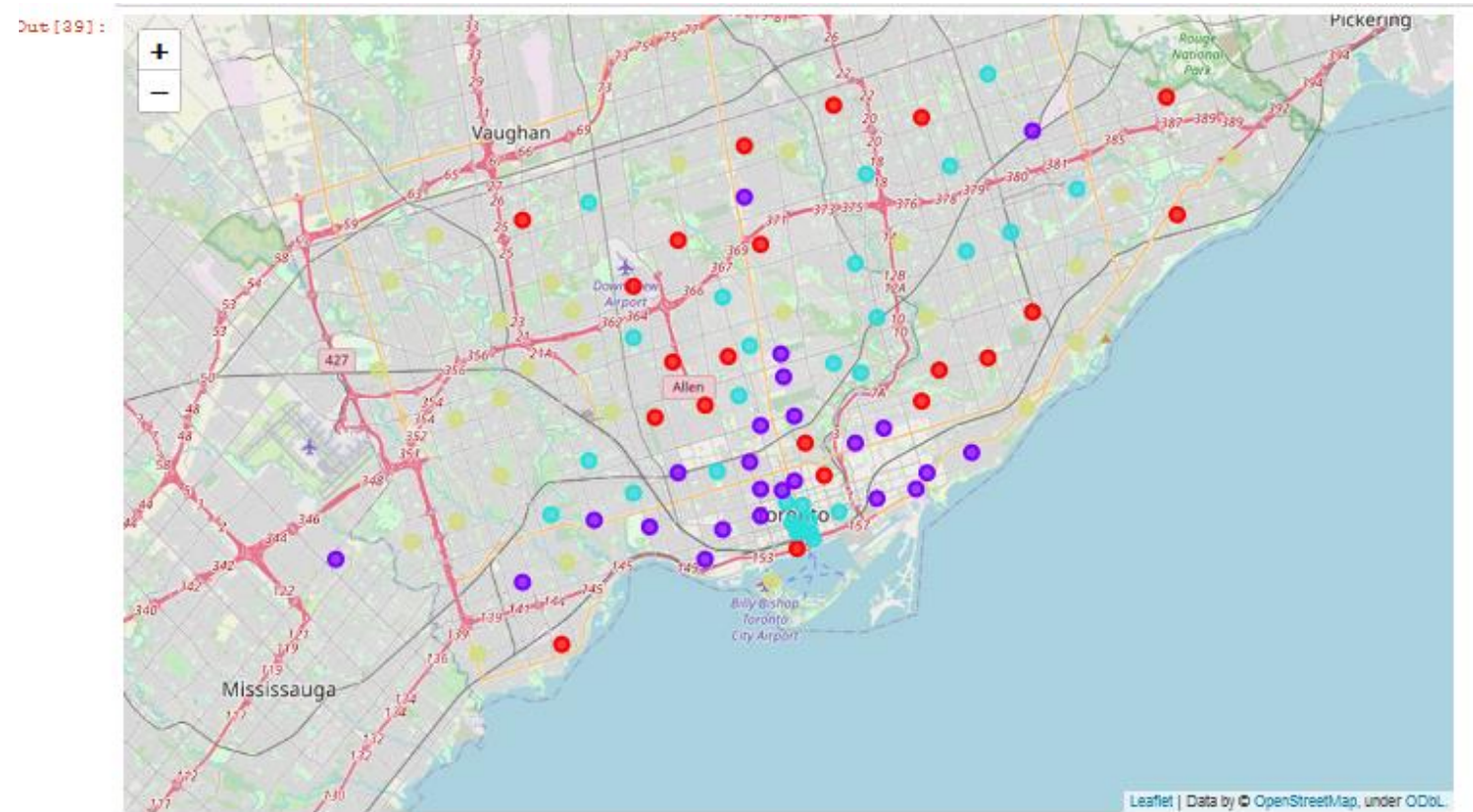
Note: LatLong in this table is meaningless.



Out [25] :

	Neighborhood Latitude	Neighborhood Longitude	Venue Count
count	101.000000	101.000000	101.000000
mean	43.702782	-79.399271	14.425743
std	0.051021	0.096176	8.838944
min	43.602414	-79.615819	1.000000
25%	43.659526	-79.464763	6.000000
50%	43.696319	-79.389494	15.000000
75%	43.739416	-79.340923	22.000000
max	43.815252	-79.160497	32.000000

Figure 5. Imposing neighbourhood cluster on Toronto map



Out [32]:

2	29
3	27
1	24
0	21

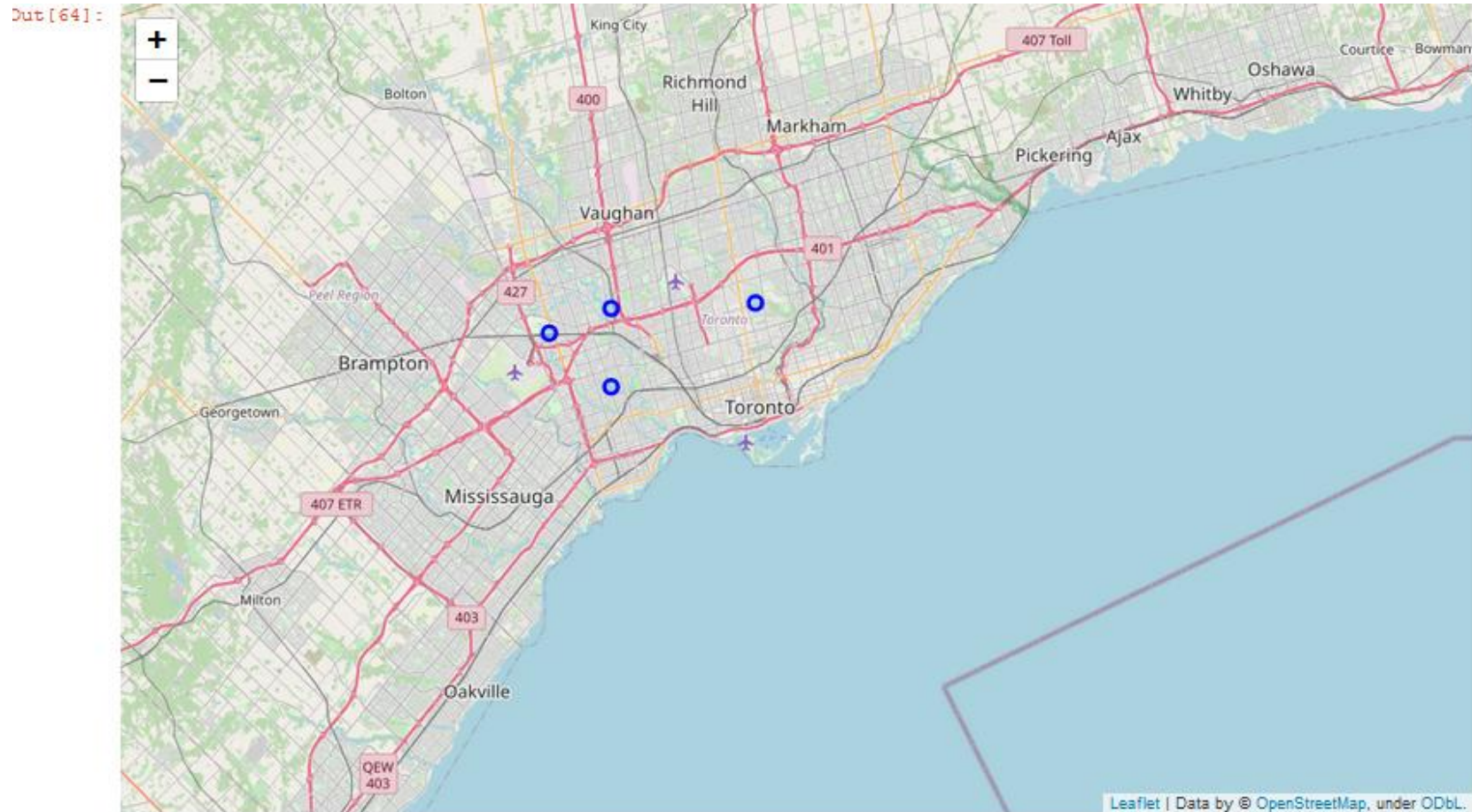
Name: Cluster Labels, dtype: int64

Cluster Labels		Neighborhood	Venue Count
0	0	[Bathurst Manor, Wilson Heights, Downsview Nor...	[8, 8, 10, 11, 14, 9, 9, 13, 8, 10, 14, 8, 8, ...
1	1	[Agincourt, Brookton, Parkdale Village, Exhibi...	[23, 25, 26, 27, 25, 24, 28, 23, 25, 28, 32, 2...
2	2	[Bedford Park, Lawrence Manor East, Berczy Par...	[18, 19, 15, 20, 21, 18, 20, 18, 21, 22, 21, 2...
3	3	[Alderwood, Long Branch, Bayview Village, Birc...	[4, 4, 2, 2, 1, 5, 2, 2, 3, 3, 2, 1, 1, 4, 1, ...

Figure 4. Table showing the list of neighbourhood and the venue count in each of the cluster

Data

Figure 6. Imposing neighbourhood with least food venue count on Toronto map



Data

Figure 7. An overall view of the venues in Toronto neighbourhood

Out [38] :

	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
0	Agincourt	Chinese Restaurant	Shopping Mall	Caribbean Restaurant	Bakery	Bank	Seafood Restaurant	Sushi Restaurant	Discount Store	Supermarket	Intersection
1	Alderwood, Long Branch	Discount Store	Park	Pizza Place	Pharmacy	Gas Station	Shopping Mall	Liquor Store	Donut Shop	Moroccan Restaurant	Sandwich Place
2	Bathurst Manor, Wilson Heights, Downsview North	Bank	Convenience Store	Park	Coffee Shop	Supermarket	Sushi Restaurant	Bridal Shop	Sandwich Place	Fried Chicken Joint	Deli / Bodega
3	Bayview Village	Bank	Japanese Restaurant	Grocery Store	Gas Station	Playground	Park	Skating Rink	Café	Intersection	Restaurant
4	Bedford Park, Lawrence Manor East	Italian Restaurant	Coffee Shop	Sandwich Place	Bank	Fast Food Restaurant	Pub	Bagel Shop	Bakery	Indian Restaurant	Intersection

Discussion

Food venues presence in Toronto:

1. 43.2% of venues returned from Foursquare call are food venues
2. Majority of food venues are found in Downtown Toronto with as much as 32 food venues count with 1km radius
3. The number of food venues are located along Yonge Street and within Downtown Toronto

Neighbourhood:

1. Residential neighbourhood further away from Downtown Toronto has a much lower food venues count
2. There are as little as 1 food venues within 1km radius of in the neighbourhood with least neighbourhood count.
3. The list of neighborhood with least food venues are:
{ 'Clairville, Humberwood, Woodbine Downs, West Humber, Kipling Heights, Rexdale, Elms, Tandridge, Old Rexdale',
'Humberlea, Emery', 'Islington Avenue', 'Lawrence Park' }

Conclusion

Food business owner can consider moving / setting up their food venues in the following neighborhoods:

{ 'Clairville, Humberwood, Woodbine Downs, West Humber, Kipling Heights, Rexdale, Elms, Tandridge, Old Rexdale',
'Humberlea, Emery', 'Islington Avenue', 'Lawrence Park' }