# The Battle of Neighborhoods
# Toronto

Picking up a location for opening a new restaurant

# The Goal

- The entrepreneur is planning to open a new restaurant in Toronto, but he is not sure which location would be most appropriate for his new venue. We noticed that the Toronto already has a lot of restaurants in town, but we need to give an advise on best possible location.

# The Data

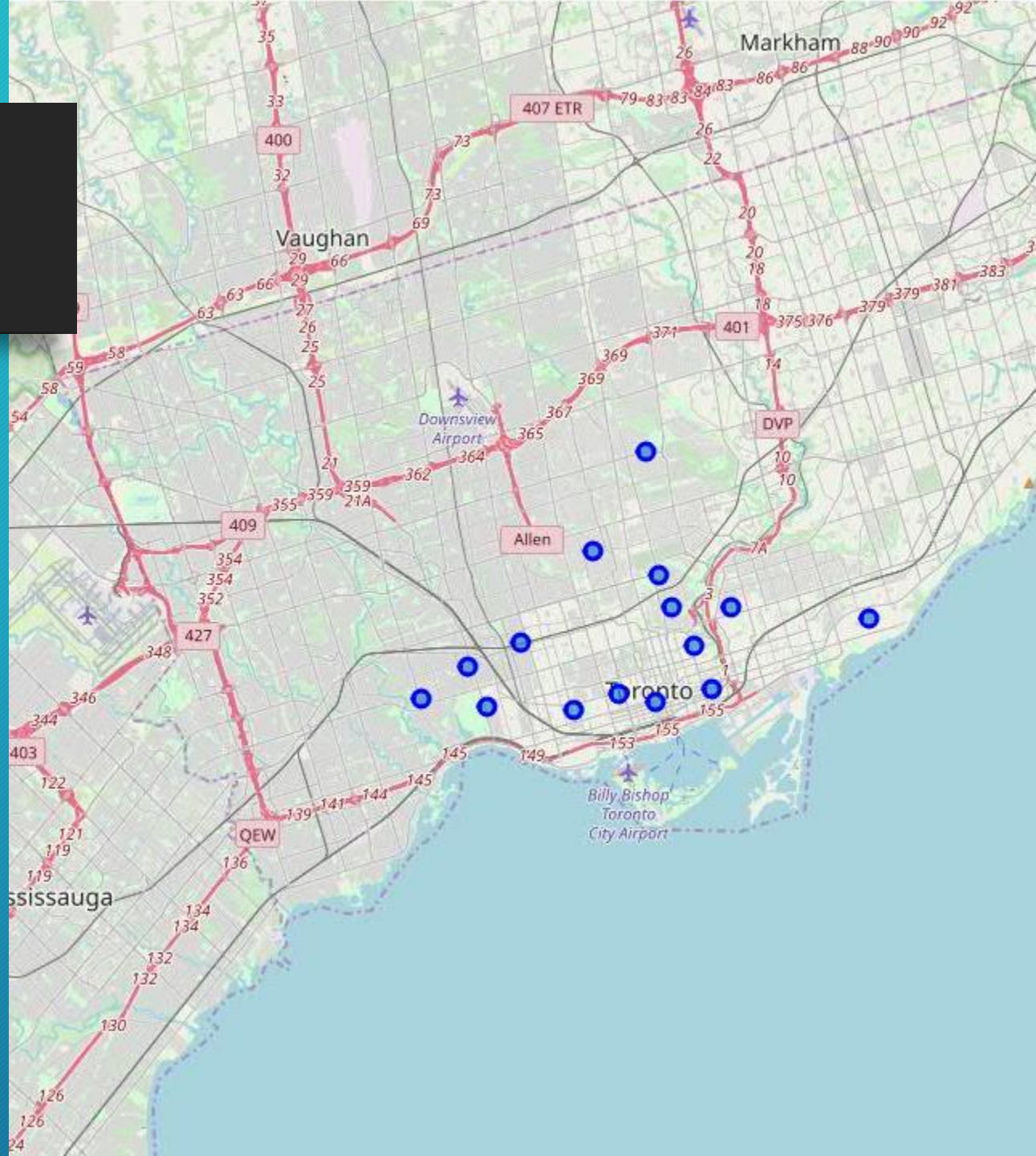
- We can identify the most important factors that contribute to the restaurant's success to be among the following list: neighborhood wealth, accessibility, crime rates, visibility, competition, etc.
- We should use the datasets from Toronto Opendata website to address some of these considerations.
- Due to the scope of this project we would limit our data to the city's average housing prices list, which we could get from "Get Wellbeing Toronto - Economics data set".
- Also we will use the Foursquare location data to retrieve the food venues. This location data in conjunction with the average house price by Neighborhood should help us to determine the best possible location for a new restaurant.

# The Methodology

- We should combine the average house price from “Get Wellbeing Toronto – Economics” data set with the Neighborhood postal code dataset to get house prices per postal codes.
- We should get the venues from food category using the “Foursquare” location data. We would cluster the combined data and would try to determine the best possible location for the new restaurant.

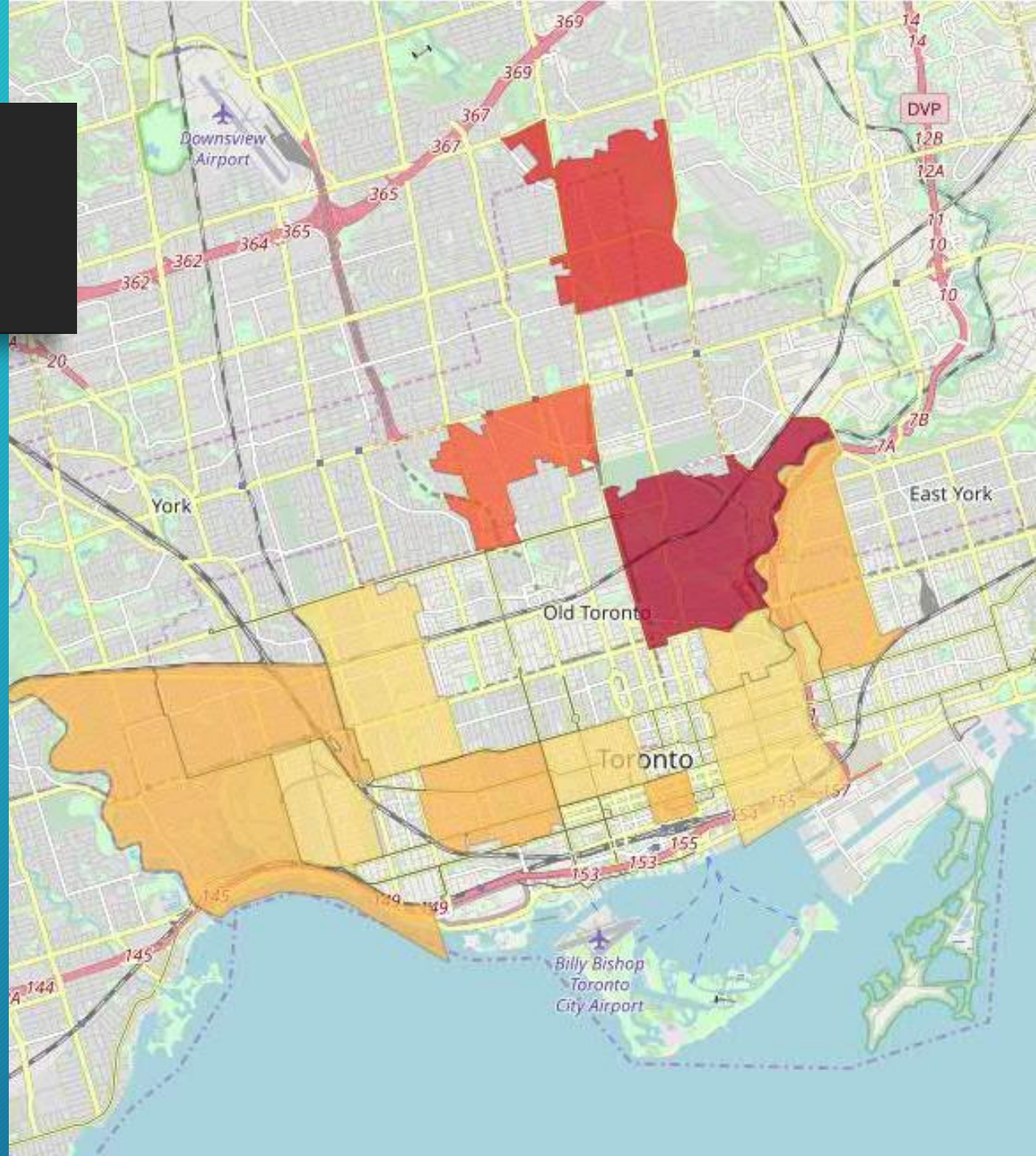
# Neighborhoods

- When we grouped the average house price data with the Neighborhood postal code dataset we were able to get a new dataset for house prices per postal codes.
- This provided us with 14 Toronto postal codes areas.



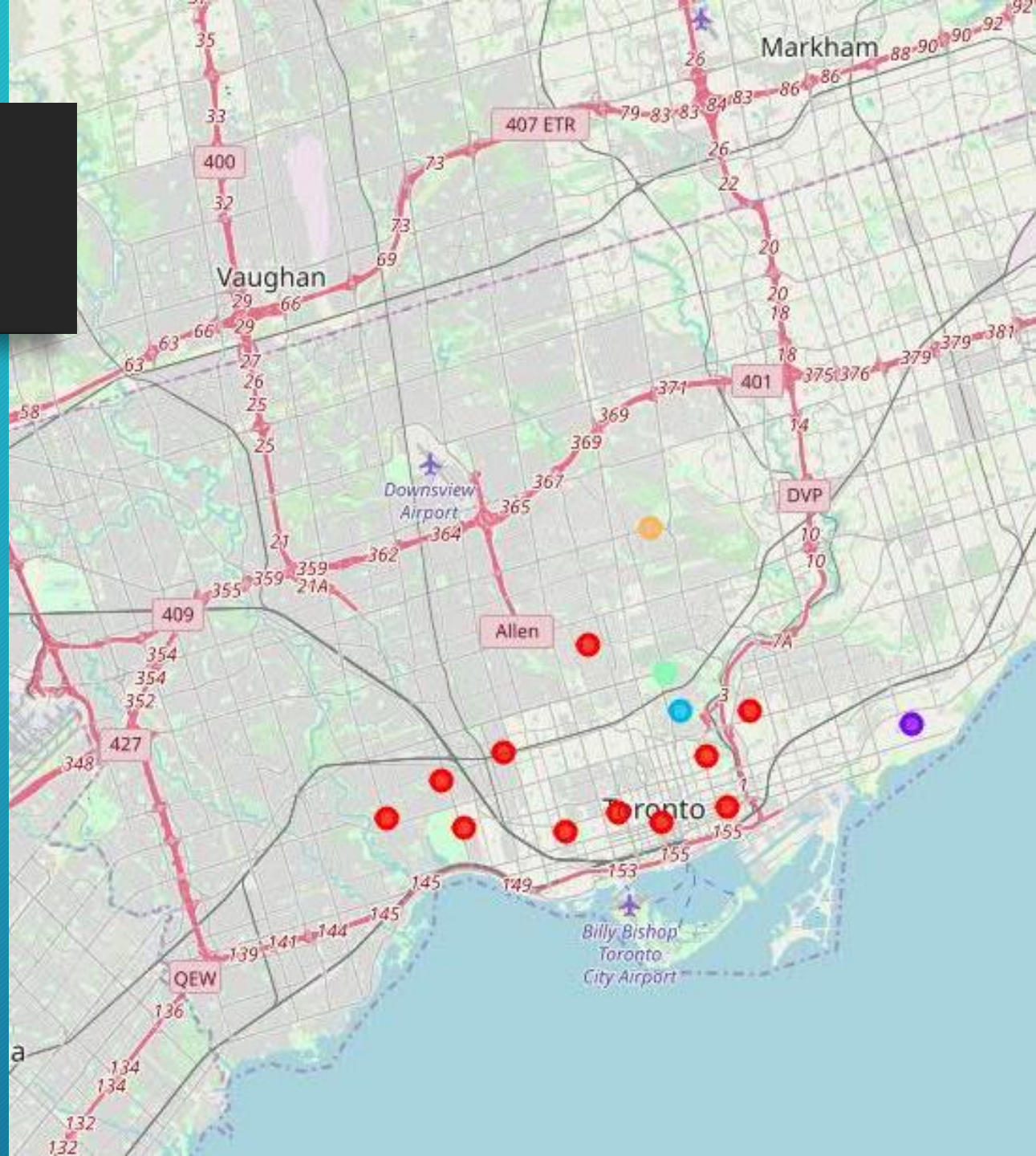
# House Prices

- Unfortunately we were unable to get the average price data for all Toronto neighborhoods, but we still can identify areas that could interest our client.
- We see three areas where the average house price is above 1 million - around Rosedale, Summerhill East and Lawrence Park.



# The Clusters

- Got nearby venues from Food category for all Toronto neighborhoods, giving us all restaurants in the selected area.
- Get 10 most common venues.
- Run *k*-means to cluster the neighborhood into 5 clusters.



# The Results

- Most of the neighborhoods are located in the 1st cluster.
- In the 1st cluster, the most common venues in the neighborhoods are cafes and pizza places.
- Three clusters are around the most expensive neighborhoods.

Cluster 0

```
toronto_merged.loc[toronto_merged['Cluster Labels'] == 0, toronto_merged.columns[[2] + list(range(5, toronto_merged.shape[1]))]]
```

| | Neighborhood | Cluster Labels | AvHomePrice | 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 | The Danforth West, Riverdale | 0 | 0.677840 | Greek Restaurant | Sushi Restaurant | Italian Restaurant | Pizza Place | Café | Restaurant | American Restaurant | Breakfast Spot | Caribbean Restaurant | Japanese Restaurant |
| 5 | Cabbagetown, St. James Town | 0 | 0.537025 | Pizza Place | Restaurant | Café | Chinese Restaurant | Italian Restaurant | Sandwich Place | Gastropub | Indian Restaurant | Japanese Restaurant | Diner |
| 6 | Harbourfront, Regent Park | 0 | 0.484444 | Café | Bakery | Restaurant | Mexican Restaurant | Breakfast Spot | Seafood Restaurant | Greek Restaurant | Italian Restaurant | Sandwich Place | Japanese Restaurant |
| 7 | Adelaide, King, Richmond | 0 | 0.617042 | Restaurant | Sandwich Place | Café | American Restaurant | Asian Restaurant | Salad Place | Deli / Bodega | Steakhouse | Thai Restaurant | Burger Joint |
| 8 | Forest Hill North, Forest Hill West | 0 | 0.957688 | French Restaurant | Sushi Restaurant | Restaurant | Mexican Restaurant | Sandwich Place | Vietnamese Restaurant | Donut Shop | Deli / Bodega | Dim Sum Restaurant | Diner |
| 9 | Chinatown, Grange Park, Kensington Market | 0 | 0.477989 | Café | Vietnamese Restaurant | Vegetarian / Vegan Restaurant | Bakery | Chinese Restaurant | Mexican Restaurant | Dim Sum Restaurant | Comfort Food Restaurant | Burger Joint | Caribbean Restaurant |
| 10 | Dovercourt Village, Dufferin | 0 | 0.502736 | Bakery | Pizza Place | Café | Portuguese Restaurant | Middle Eastern Restaurant | Fast Food Restaurant | Brazilian Restaurant | Vietnamese Restaurant | Dim Sum Restaurant | Diner |
| 11 | Little Portugal, Trinity | 0 | 0.619435 | Asian Restaurant | Vietnamese Restaurant | New American Restaurant | Bakery | Pizza Place | Café | Cuban Restaurant | Vegetarian / Vegan Restaurant | French Restaurant | Restaurant |
| 12 | High Park, The Junction South | 0 | 0.615948 | Mexican Restaurant | Café | Thai Restaurant | Fried Chicken Joint | Gastropub | Diner | Steakhouse | Bakery | Fast Food Restaurant | Italian Restaurant |
| 13 | Parkdale, Roncesvalles | 0 | 0.540739 | Breakfast Spot | Cuban Restaurant | Restaurant | Eastern European Restaurant | Burger Joint | Deli / Bodega | Italian Restaurant | Fish & Chips Shop | Filipino Restaurant | Fast Food Restaurant |
| 14 | Runnymede, Swansea | 0 | 0.644205 | Pizza Place | Café | Sushi Restaurant | Italian Restaurant | Diner | Restaurant | Fish & Chips Shop | Burrito Place | Food | Sandwich Place |

Cluster 1

```
toronto_merged.loc[toronto_merged['Cluster Labels'] == 1, toronto_merged.columns[[2] + list(range(5, toronto_merged.shape[1]))]]
```

| | Neighborhood | Cluster Labels | AvHomePrice | 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 | The Beaches | 1 | 0.751945 | Pizza Place | Burger Joint | Asian Restaurant | BBQ Joint | Dim Sum Restaurant | Diner | Doner Restaurant | Donut Shop | Dumpling Restaurant | Eastern European Restaurant |

Cluster 2

```
toronto_merged.loc[toronto_merged['Cluster Labels'] == 2, toronto_merged.columns[[2] + list(range(5, toronto_merged.shape[1]))]]
```

| | Neighborhood | Cluster Labels | AvHomePrice | 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 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 4 | Rosedale | 2 | 1.265389 | Japanese Restaurant | Vietnamese Restaurant | Falafel Restaurant | Dim Sum Restaurant | Diner | Doner Restaurant | Donut Shop | Dumpling Restaurant | Eastern European Restaurant | Fast Food Restaurant |

Cluster 3

```
toronto_merged.loc[toronto_merged['Cluster Labels'] == 3, toronto_merged.columns[[2] + list(range(5, toronto_merged.shape[1]))]]
```

| | Neighborhood | Cluster Labels | AvHomePrice | 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 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 3 | Moore Park, Summerhill East | 3 | 1.265389 | Restaurant | Vietnamese Restaurant | Eastern European Restaurant | Deli / Bodega | Dim Sum Restaurant | Diner | Doner Restaurant | Donut Shop | Dumpling Restaurant | Falafel Restaurant |

Cluster 4

```
toronto_merged.loc[toronto_merged['Cluster Labels'] == 4, toronto_merged.columns[[2] + list(range(5, toronto_merged.shape[1]))]]
```

| | Neighborhood | Cluster Labels | AvHomePrice | 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 | Lawrence Park | 4 | 1.09811 | Dim Sum Restaurant | Vietnamese Restaurant | Gastropub | Deli / Bodega | Diner | Doner Restaurant | Donut Shop | Dumpling Restaurant | Eastern European Restaurant | Falafel Restaurant |

# The Discussion

- Where should we open a new restaurant? Housing price maps show that the Lawrence Park cluster (4) neighborhood might be a good candidate. This area looks like a quite densely populated area, so we expect the region to have a lot of foot and car traffic, so good visibility. This neighborhood has also reasonable average house prices.

# The Conclusion

- This is only a first-order solution to the question 'Where to open a new restaurant in Toronto?' Using public datasets, we were able to partially address one of the factors that we have mentioned at the beginning - average house prices. There certainly is lot of room for improvement. For example, we have to factor in crime rates, competition etc. Toronto Opendata website should have other datasets that we might use to further improve the results.