

# PREDICTING NEW LOCATIONS TO START A FAST-FOOD RESTURANTS

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# PROBLEM STATEMENT

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- Renowned fast-food company 'Chicken is Good' is well known in United States for their fried chicken.
- They want to expand their business to Canada and have identified Toronto as a good city to establish first few branches.
- As there are lot of existing competitors already operating in the area, they want to find best Toronto neighbourhoods to start their first few initial fast-food branches.

# DATA SOURCES

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- Following data sources were used to get neighbourhoods data and demographic data.

Data	Source
Different neighbourhoods in Toronto	Scraping Wikipedia website page to get the information <a href="https://en.wikipedia.org/wiki/List_of_postal_codes_of_Canada:_M">https://en.wikipedia.org/wiki/List_of_postal_codes_of_Canada:_M</a>
Different Venues and Details in the Toronto Neighbourhoods	Use Foursquare api to get the venue information
Neighbourhood locations (lng,lat) values	Use google maps API get latitude and longitude information
Demographic details (population) of Toronto Neighbourhoods	Scraping Wikipedia website page to get the information <a href="https://en.wikipedia.org/wiki/Demographics_of_Toronto_neighbourhoods">https://en.wikipedia.org/wiki/Demographics_of_Toronto_neighbourhoods</a>

# DATA CLEANING

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- 'Not Assigned' Boroughs were removed from the dataset.
- In the Demographic dataset following operations were performed.
  - 1. Remove empty lines in the dataset.
  - 2. Remove the summary column at the bottom of the table.
  - 3. Replace Municipality code with the name.
  - 4. Split SecondLng to two columns.
  - 5. Convert all numbers to float values by removing commas in the string.

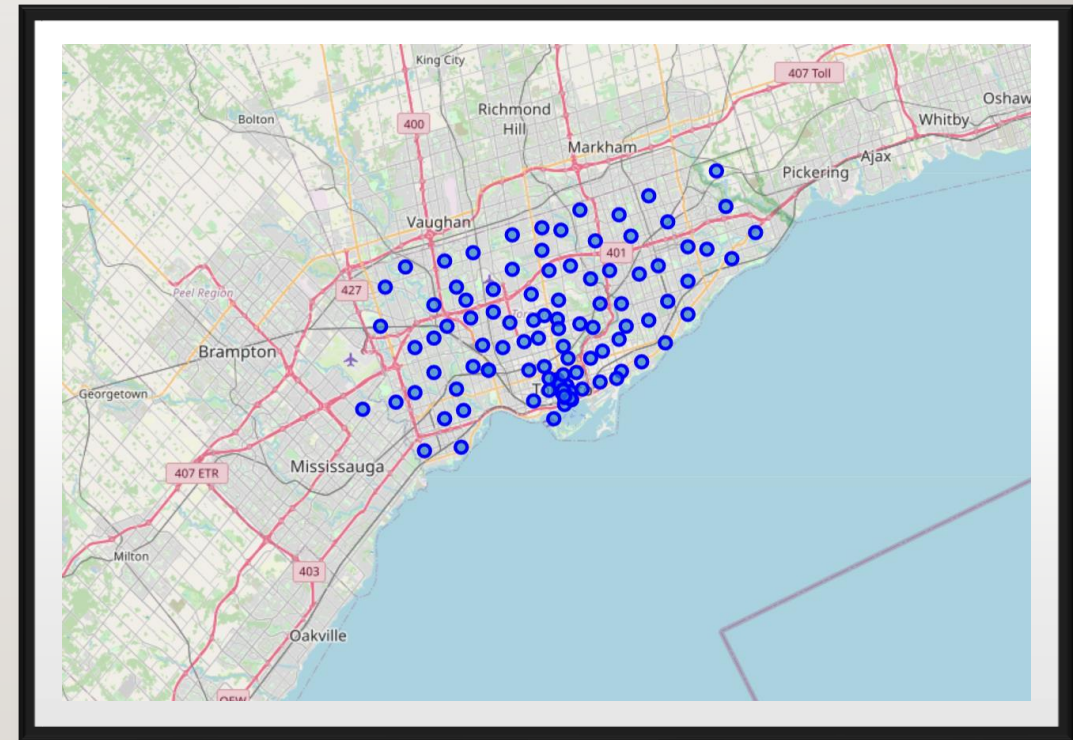


# EXPLORATORY DATA ANALYSIS

## NEIGHBOURHOODS IN TORONTO

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- There are 103 Neighborhoods in Toronto.

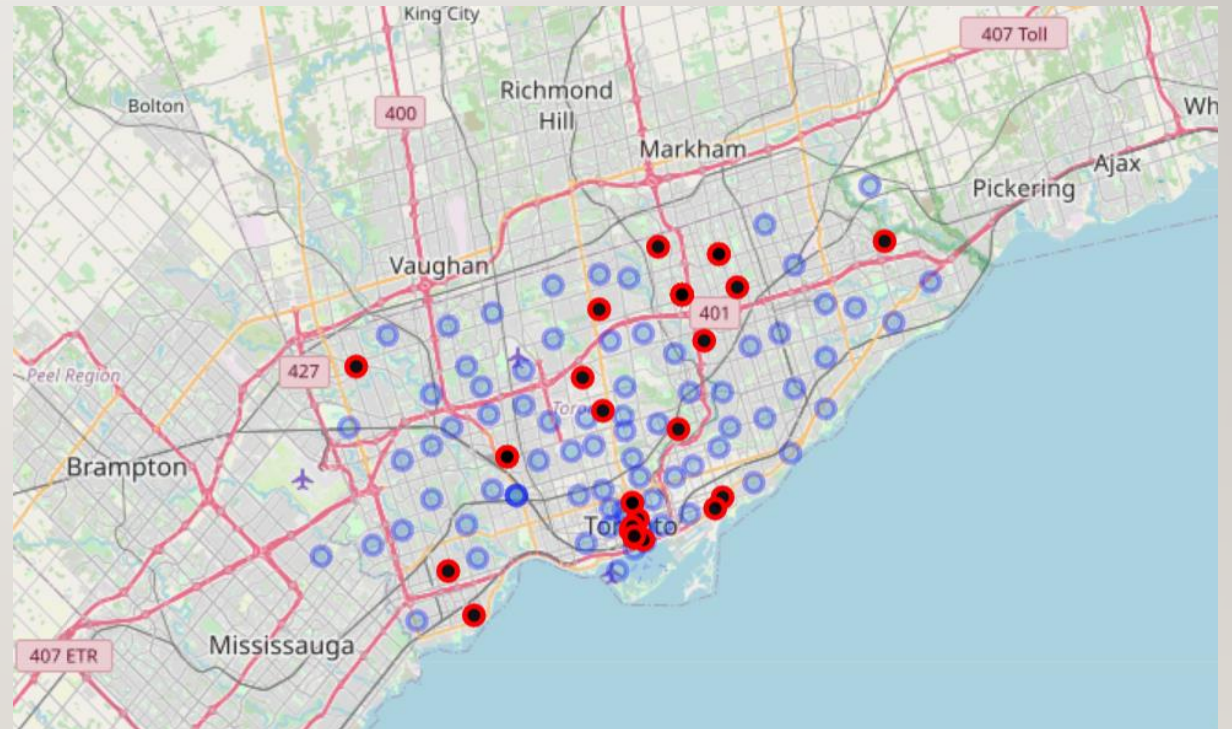


## EXPLORATORY DATA ANALYSIS

### NEIGHBOURHOODS WITH FAST FOOD RESTAURANTS

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- 26 Neighborhoods already have at least one fast-food restaurant.
- Red Circles show the Neighborhoods with at least one fast food restaurant.



## EXPLORATORY DATA ANALYSIS

### FAST-FOOD RESTAURANTS OPERATING IN TORONTO REGION

- There are 32 fast restaurant operating in Toronto Region.
- McDonalds have the greatest number of branches.
- Followed by KFC with 4 branches and Crepe Delicious with 4 branches.

Venue	Number of Restaurants
McDonald's	8
KFC	4
Crepe Delicious	4
iQ Food Co	3
The Burger's Priest	3
A&W	3
Wendy's	2
New York Fries	1
New York Fried Chicken	1
Fit For Life	1
Chick-n-Joy	1
Bourbon St. Grill	1



# MACHINE LEARNING APPROACH

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- **Goal:** Find neighborhoods (without fast food restaurants) which are similar to the neighborhoods that already have fast food restaurants.
- Machine Learning Approach
  - K-Means clustering
  - Number of clusters: 30
  - Number of features: 286



# RESULTS

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- There are 12 clusters which contains neighbourhoods with fast-food restaurants.
- After Clusters are Ranked Cluster 15 is the best cluster to establish new fast food restaurants. But it has only one Neighbourhood which already have some fast food restaurants.
- Therefore, **Cluster 4 is the next best**, we have **2 neighbourhoods without any fast food restaurants**. These 2 neighbourhoods are the ideal places to start the new fast-food restaurants.

# RESULTS

Cluster	Number of Neighbourhoods in the cluster	Number of Neighbourhoods with fast-food restaurants	Rank Based on number fast food restaurants in all neighbourhoods in the cluster	Number of Neighbourhoods that can be used to establish new branches
15.0	1	1	1	0
4.0	4	2	2	2
1.0	37	12	3	25
0.0	7	3	4	4
14.0	2	1	5	1
24.0	2	1	6	1
16.0	4	1	7	3
8.0	1	1	8	0
22.0	2	1	9	1
7.0	3	1	10	2
18.0	2	1	11	1
10.0	4	1	12	3

# RESULTS: BEST PLACES TO START NEW RESTAURANTS

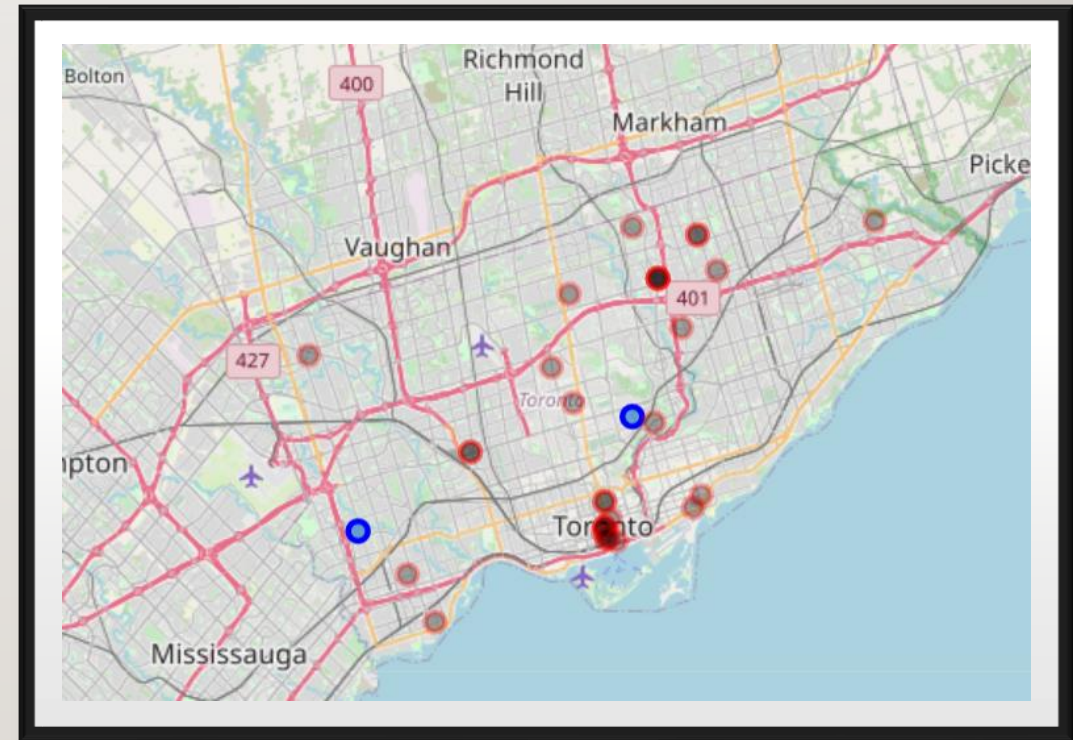
- most suitable locations to start new fast-food restaurant of the 'Chicken is good' company are,
  - **Neighbourhood:** West Deane Park, Princess Gardens, Martin Grove, Islington, Cloverdale |  
**Borough:** Etobicoke
  - **Neighbourhood:** Leaside |  
**Borough:** East York

Cluster	Postal Code	Borough	Neighbourhood	Population	Number of Fast-Food restaurants
4.0	M9B	Etobicoke	West Deane Park, Princess Gardens, Martin Grove, Islington, Cloverdale	13683.0	0
4.0	M4G	East York	Leaside	13876.0	0
4.0	M5M	North York	Bedford Park, Lawrence Manor East	13749.0	1
4.0	M4Y	Downtown Toronto	Church and Wellesley	13397.0	2

# RESULTS: BEST PLACES TO START NEW RESTAURANTS

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- Best Places to start the new locations are shown by red circles.
- West Deane Park, Princess Gardens, Martin Grove, Islington, Cloverdale Neighbourhoods in the Etobicoke Borough is the best place as it is closer to a Airport and there are no competitors near those locations.
- Leaside is also a viable solution as its Neighbourhood profile have high potential and its closer to the city centre.





# CONCLUSION

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- The 'Chicken is Good' company wanted to expand their business to Canada. It wanted to identify neighbourhoods with high potential to attract customers to their renowned fast-food offerings.
- Using a clustering approach, analysis found two potentials neighbourhoods in Toronto for the new branches of the 'Chicken is good' Fast food restaurant chain.