



# Capstone Project

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AN ANALYSIS OF TORONTO POSTCODES TO  
DETERMINE POSSIBLE LOCATIONS FOR A  
NEW FAST FOOD RESTAURANT

# Introduction

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What locations are ideal for your new fast food restaurant? To help you answer this question, I am going to use data to answer the following three questions:

- 1) How many neighborhoods are there in each postcode area?
- 2) How many restaurants are there overall in each postcode?
- 3) How many similar restaurants are there in each postcode?

The answer to these questions will provide some valuable insights into possible locations for highest profitability.

# Data

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I have data on postcodes, their geospatial location, and their numbers of neighborhood's.

	Postcode	Borough	Neighbourhood	Latitude	Longitude	# Neighbourhoods
0	M1B	Scarborough	Rouge, Malvern	43.806686	-79.194353	2
1	M1C	Scarborough	Highland Creek, Rouge Hill, Port Union	43.784535	-79.160497	3
2	M1E	Scarborough	Guildwood, Morningside, West Hill	43.763573	-79.188711	3
3	M1G	Scarborough	Woburn	43.770992	-79.216917	1
4	M1H	Scarborough	Cedarbrae	43.773136	-79.239476	1

I used this data as input into the foursquare API to gather data on venues near each postcode.

	Postcode	Postcode Latitude	Postcode Longitude	Venue	Venue Latitude	Venue Longitude	Venue Category
0	M1B	43.806686	-79.194353	Wendy's	43.802008	-79.198080	Fast Food Restaurant
1	M1B	43.806686	-79.194353	Wendy's	43.807448	-79.199056	Fast Food Restaurant
2	M1B	43.806686	-79.194353	Staples Morningside	43.800285	-79.196607	Paper / Office Supplies Store
3	M1B	43.806686	-79.194353	Harvey's	43.800020	-79.198307	Restaurant
4	M1B	43.806686	-79.194353	Caribbean Wave	43.798558	-79.195777	Caribbean Restaurant

# Data Preparation

Through OneHot encoding and filtering of venue categories, I was able to gather data on the number of restaurants in near each postcode and the number of specifically fast food restaurants near each as well.

	Postcode	Postcode Latitude	Postcode Longitude	Afghan Restaurant	American Restaurant	Asian Restaurant	Belgian Restaurant	Brazilian Restaurant	Cajun / Creole Restaurant	Cantonese Restaurant	...	Taiwanese Restaurant	Tapas Restaurant	Thai Restaurant	Theme Restaurant	Tibetan Restaurant	Turkish Restaurant	Udon Restaurant	Vegetarian / Vegan Restaurant	Vie Re
0	M1B	43.806686	-79.194353	0	0	0	0	0	0	0	...	0	0	0	0	0	0	0	0	0
1	M1C	43.784535	-79.160497	0	0	0	0	0	0	0	...	0	0	0	0	0	0	0	0	0
2	M1E	43.763573	-79.188711	0	0	0	0	0	0	0	...	0	0	0	0	0	0	0	0	0
3	M1G	43.770992	-79.216917	0	0	0	0	0	0	0	...	0	0	0	0	0	0	0	0	0
4	M1H	43.773136	-79.239476	0	0	1	0	0	0	0	...	0	0	1	0	0	0	0	0	0

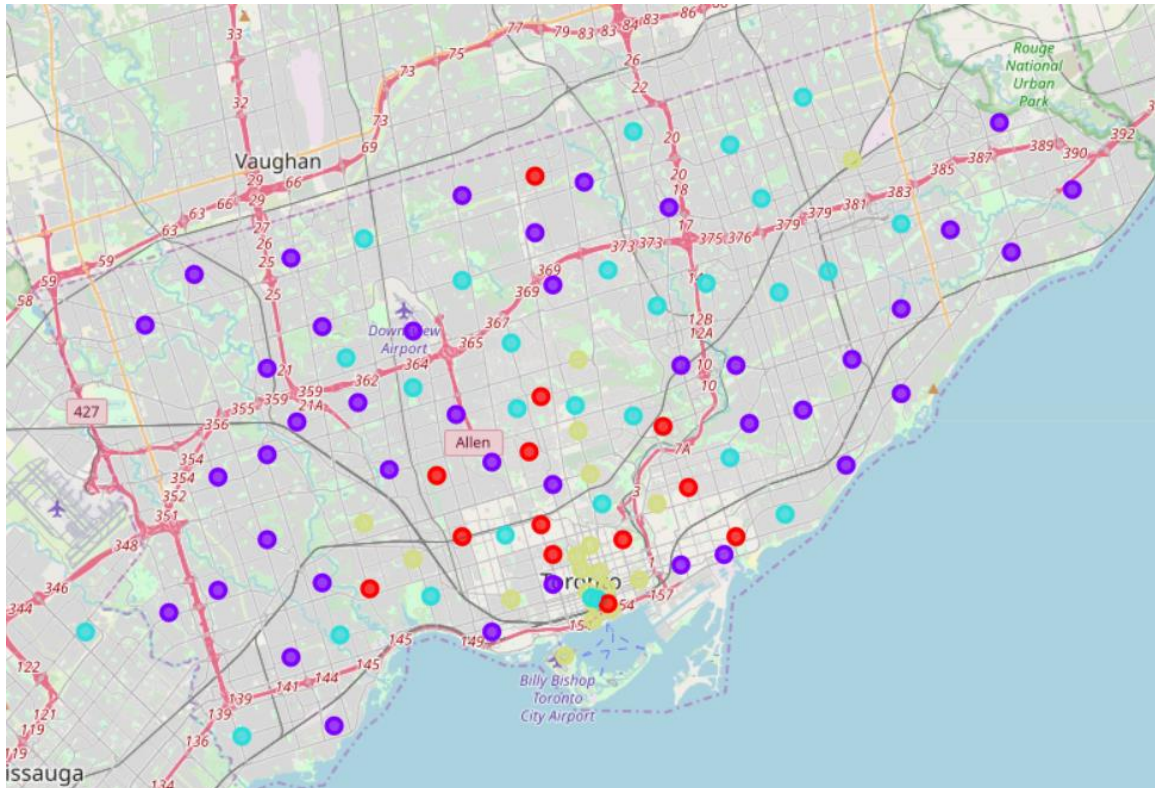
5 rows × 67 columns

	Postcode	Postcode Latitude	Postcode Longitude	# Neighbourhoods	Fast Food Restaurant	Total Restaurants	Percent Fast Food
0	M1B	43.806686	-79.194353	2	2	6	0.33
1	M1C	43.784535	-79.160497	3	0	1	0.00
2	M1E	43.763573	-79.188711	3	2	3	0.67
3	M1G	43.770992	-79.216917	1	1	3	0.33
4	M1H	43.773136	-79.239476	1	1	8	0.12

# Clustering

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Using the k-means algorithm, I was able to cluster the postcodes with similar characteristics.



This clustering allowed us to group postcodes into low, medium, medium-high, and high sets of neighborhoods, total number of restaurants, and percentages of fast food restaurants in each post code.



# Red Cluster

Postcode	Postcode	Latitude	Postcode	Longitude	# Neighbourhoods	Fast Food Restaurant	Total Restaurants	Percent Fast Food	Cluster Labels
21	M2N	43.789053		-79.408493	2	5	38	0.13	0
39	M4J	43.705369		-79.349372	1	3	27	0.11	0
40	M4K	43.685347		-79.338106	1	3	32	0.09	0
46	M4S	43.715383		-79.405678	1	2	36	0.06	0
51	M4Y	43.667967		-79.367675	2	1	32	0.03	0
84	M7A	43.651571		-79.484450	2	1	29	0.03	0
42	M4M	43.668999		-79.315572	2	0	29	0.00	0
64	M5R	43.696948		-79.411307	2	0	31	0.00	0
65	M5S	43.672710		-79.405678	3	0	27	0.00	0
66	M5T	43.662696		-79.400049	2	0	30	0.00	0
69	M5X	43.646435		-79.374846	1	0	30	0.00	0
74	M6G	43.689026		-79.453512	1	0	35	0.00	0
76	M6J	43.669005		-79.442259	2	0	30	0.00	0

Number of neighborhoods:

Low

Total Number of  
Restaurants:

High

Fast Food Market Percent:

Low

# Purple Cluster

	Postcode	Postcode Latitude	Postcode Longitude	# Neighbourhoods	Fast Food Restaurant	Total Restaurants	Percent Fast Food	Cluster Labels
2	M1E	43.763573	-79.188711	3	2	3	0.67	1
34	M4B	43.725882	-79.315572	1	1	2	0.50	1
100	M9V	43.688905	-79.554724	4	1	2	0.50	1
0	M1B	43.806686	-79.194353	2	2	6	0.33	1
7	M1L	43.711112	-79.284577	3	1	3	0.33	1
24	M3A	43.782736	-79.442259	1	1	3	0.33	1
79	M6M	43.713756	-79.490074	3	1	3	0.33	1
6	M1K	43.727929	-79.262029	3	2	6	0.33	1
5	M1J	43.744734	-79.239476	1	1	3	0.33	1
3	M1G	43.770992	-79.216917	1	1	3	0.33	1
16	M2H	0.000000	0.000000	1	1	4	0.25	1
80	M6N	43.691116	-79.476013	4	1	4	0.25	1
87	M8V	43.662744	-79.321558	1	1	5	0.20	1
73	M6E	43.693781	-79.428191	1	1	6	0.17	1
92	M9A	43.628841	-79.520999	5	0	0	0.00	1
88	M8W	43.605647	-79.501321	3	0	1	0.00	1
90	M8Y	43.653654	-79.506944	3	0	3	0.00	1
96	M9M	43.756303	-79.565963	1	0	0	0.00	1
93	M9B	43.667856	-79.532242	1	0	2	0.00	1

Number of neighborhoods:

High

Total Number of  
Restaurants:

Low

Fast Food Market Percent:

High

# Teal Cluster

	Postcode	Postcode Latitude	Postcode Longitude	# Neighbourhoods	Fast Food Restaurant	Total Restaurants	Percent Fast Food	Cluster Labels
71	M6B	43.718518	-79.464763	2	3	9	0.33	2
15	M1W	43.799525	-79.318389	1	2	7	0.29	2
32	M3N	43.728496	-79.495697	1	2	7	0.29	2
14	M1V	43.815252	-79.284577	4	2	11	0.18	2
13	M1T	43.781638	-79.304302	3	2	12	0.17	2
70	M6A	43.648429	-79.382280	2	2	12	0.17	2
61	M5M	43.648198	-79.379817	2	2	13	0.15	2
17	M2J	43.803762	-79.363452	1	1	7	0.14	2
10	M1P	43.757410	-79.273304	3	2	14	0.14	2
4	M1H	43.773136	-79.239476	1	1	8	0.12	2
86	M7Y	43.636966	-79.615819	1	1	9	0.11	2
28	M3J	43.754328	-79.442259	3	1	10	0.10	2
63	M5P	43.711695	-79.416936	1	1	11	0.09	2
45	M4R	43.712751	-79.390197	1	1	11	0.09	2
38	M4H	43.709060	-79.363452	1	1	12	0.08	2
91	M8Z	43.636258	-79.498509	8	1	16	0.06	2
36	M4E	43.695344	-79.318389	1	0	15	0.00	2
50	M4X	43.679563	-79.377529	1	0	10	0.00	2

Number of neighborhoods:

Medium

Total Number of  
Restaurants:

Medium

Fast Food Market Percent:

Medium



# Yellow Cluster

Postcode	Postcode	Latitude	Longitude	# Neighbourhoods	Fast Food Restaurant	Total Restaurants	Percent Fast Food	Cluster Labels
44	M4P	43.728020	-79.388790	1	4	25	0.16	3
81	M6P	43.673185	-79.487262	2	1	22	0.05	3
52	M5A	43.665860	-79.383160	1	1	20	0.05	3
41	M4L	43.679557	-79.352188	2	1	19	0.05	3
53	M5B	43.654260	-79.360636	1	1	25	0.04	3
12	M1S	43.794200	-79.262029	1	0	23	0.00	3
59	M5K	43.640816	-79.381752	3	0	26	0.00	3
82	M6R	43.661608	-79.464763	2	0	22	0.00	3
77	M6K	43.647927	-79.419750	2	0	24	0.00	3
68	M5W	43.628947	-79.394420	7	0	22	0.00	3
60	M5L	43.647177	-79.381576	2	0	25	0.00	3
56	M5G	43.644771	-79.373306	1	0	26	0.00	3
58	M5J	43.650571	-79.384568	3	0	19	0.00	3
57	M5H	43.657952	-79.387383	1	0	24	0.00	3
55	M5E	43.651494	-79.375418	1	0	18	0.00	3
54	M5C	43.657162	-79.378937	2	0	18	0.00	3
48	M4V	43.689574	-79.383160	2	0	25	0.00	3
47	M4T	43.704324	-79.388790	1	0	20	0.00	3

Number of neighborhoods:

Medium

Total Number of  
Restaurants:

Medium-High

Fast Food Market Percent:

Low

# Discussion

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My Recommendations based on these results:

- 1) Purple Cluster: This cluster has postcodes with a high number of total restaurants, but a low percentage of restaurants that are of the fast food category. This would be an ideal mix as it would indicate that there is a lot of people traffic, but low number of direct competitors to a fast food restaurant. It is my first recommendation of postcodes to research.
- 2) Teal Cluster: While they do have a lower number of total restaurants and a higher percentage of fast food restaurants, they also have a higher number of neighbourhoods, which would suggest more families looking for a quick meal. It also suggests that the cost of ownership in that area is likely lower as well.

# Conclusion

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There are some meaningful insights to be gained from these data and through a k-means clustering, we were able to identify some postcode areas that are likely better candidates for a new fast food restaurant than others.

It is important to note, though, that while these are powerful data results, more research could be done regarding cost of ownership in certain postcodes and populations sizes as well.

Despite that, I believe we have some excellent information to move forward with seeking a location for your new fast food restaurant.