# Location Selection for ODF Pet Store in Toronto

Yunyi Ren

January 10, 2021

## Introduction

ODF is a pet store in Greater Vancouver area, and they are known for their friendly service and product selections. Currently, they are planning to open another store in Toronto and trying to pick a location. They hope to locate their store near dog parks so that it can bring traffic to their stores. Meanwhile, as a small retailer, they do not want to compete with pet store chains such as PetSmart. Hence, they would like to pick a location that stay away from other pet stores.

## Data

Information of neighbourhoods in Toronto will be sourced from Wikipedia webpage: https://en.wikipedia.org/wiki/List_of_postal_codes_of_Canada:_M

The geographic coordinates of Toronto neighbourhoods are gained from this webpage: http://cocl.us/Geospatial_data

Foursquare location data will also be used to get venues in each Toronto neighbourhoods.

## Methodology

First, the information of each neighbourhoods in Toronto are scraped from Wikipedia Page: https://en.wikipedia.org/wiki/List_of_postal_codes_of_Canada:_M. The table from this page contains the name of each neighbourhoods, its postal code, and its borough. By converting the table into dataframe and cleaning up the data, neighbourhoods with the same postal code are merged into the same row, separated by comma.

Next, the geographic coordinates of Toronto neighbourhoods are gained from this webpage: http://cocl.us/Geospatial_data. After converting the data into dataframe, it is merged with last dataframe to produce a table showing the postal code and name of each neighbourhood, and its latitude and longitude.

| | Postal Code | Borough | Neighbourhood | Latitude | Longitude |
|---|---|---|---|---|---|
| 0 | M3A | North York | Parkwoods | 43.753259 | -79.329656 |
| 1 | M4A | North York | Victoria Village | 43.725882 | -79.315572 |
| 2 | M5A | Downtown Toronto | Regent Park, Harbourfront | 43.654260 | -79.360636 |
| 3 | M6A | North York | Lawrence Manor, Lawrence Heights | 43.718518 | -79.464763 |
| 4 | M7A | Downtown Toronto | Queen's Park, Ontario Provincial Government | 43.662301 | -79.389494 |

Then, Foursquare URL is defined and the information of venues that are nearby (within 3km and limited to 10000 number of venues) each neighbourhood are queried from Foursquare. The information is returned in json file and is converted into a dataframe that contains the venue name, its category, and its geographic coordinates.

| | Neighbourhood | Neighbourhood Latitude | Neighbourhood Longitude | Venue | Venue Latitude | Venue Longitude | Venue Category |
|---|---|---|---|---|---|---|---|
| 0 | Parkwoods | 43.753259 | -79.329656 | Allwyn's Bakery | 43.759840 | -79.324719 | Caribbean Restaurant |
| 1 | Parkwoods | 43.753259 | -79.329656 | Tim Hortons | 43.760668 | -79.326368 | Café |
| 2 | Parkwoods | 43.753259 | -79.329656 | Galleria Supermarket | 43.753520 | -79.349518 | Supermarket |
| 3 | Parkwoods | 43.753259 | -79.329656 | Graydon Hall Manor | 43.763923 | -79.342961 | Event Space |
| 4 | Parkwoods | 43.753259 | -79.329656 | LCBO | 43.757774 | -79.314257 | Liquor Store |

Venues belong to the category of “Dog Run” are dog parks. The neighbourhoods that contains a Dog Run are selected to build a new data frame. Likely, the neighbourhoods that contains a pet store are extracted as well.

After that, the data of neighbourhoods with a pet store will be removed from the dog parks dataframe. The remaining locations are dog parks that do not have a pet store nearby.

| | Neighbourhood | Neighbourhood Latitude | Neighbourhood Longitude | Venue | Venue Latitude | Venue Longitude | Venue Category |
|---|---|---|---|---|---|---|---|
| **299** | Regent Park, Harbourfront | 43.654260 | -79.360636 | Cherry Beach Off-Leash Dog Area | 43.636727 | -79.344335 | Dog Run |
| **1679** | Eringate, Bloordale Gardens, Old Burnhamthorpe... | 43.643515 | -79.577201 | Doggie Central | 43.623252 | -79.575922 | Dog Run |
| **1870** | The Beaches | 43.676357 | -79.293031 | Kew Beach Off Leash Dog Park | 43.665815 | -79.296988 | Dog Run |
| **2534** | Cedarbrae | 43.773136 | -79.239476 | Thomson Memorial Dog Park | 43.756253 | -79.253294 | Dog Run |
| **2757** | Bathurst Manor, Wilson Heights, Downsview North | 43.754328 | -79.442259 | Avondale Park | 43.757053 | -79.408127 | Dog Run |
| **3106** | Scarborough Village | 43.744734 | -79.239476 | Thomson Memorial Dog Park | 43.756253 | -79.253294 | Dog Run |
| **3421** | East Toronto, Broadview North (Old East York) | 43.685347 | -79.338106 | Withrow Park Off Leash Dog Park | 43.674019 | -79.346764 | Dog Run |
| **3622** | Little Portugal, Trinity | 43.647927 | -79.419750 | Stanley Park (Dog Park) | 43.641668 | -79.409269 | Dog Run |
| **4268** | Brockton, Parkdale Village, Exhibition Place | 43.636847 | -79.428191 | Stanley Park (Dog Park) | 43.641668 | -79.409269 | Dog Run |
| **4449** | York Mills, Silver Hills | 43.757490 | -79.374714 | Avondale Park | 43.757053 | -79.408127 | Dog Run |

Finally, these locations will be clustered into five groups by k-means clustering. The centroid of each cluster is the point that has the shortest distance to nearby dog parks. The locations and their centers will be visualized by folium map, and geographic coordinate of each centroids will be listed out. ODF staff can start their search for store locations from these cluster centers.

## Results

After filtering out neighbourhoods that do not meet the requirement, 26 dog parks are listed out. After dividing them into clusters, the following centroids are found.

| | lat | lng |
|---|---|---|
| **0** | 43.737218 | -79.399558 |
| **1** | 43.643360 | -79.437120 |
| **2** | 43.623252 | -79.575922 |
| **3** | 43.756253 | -79.253294 |
| **4** | 43.653322 | -79.333105 |

## Discussion

Since there are 26 dog parks that do not have a pet store nearby, people live nearby would have to go far away to buy pet supplies, which means, for ODF, it is a good choice to open a pet store nearby.

Meanwhile, two out of the five centroids are overlapped with a dog park. It means while these two locations are dog parks, they are also the nearest location to other dog parks nearby. ODF can mark these two points a priority when starting their search.

## Conclusion

The purpose of this report was to find the optimal location for ODF to open their pet store in Toronto. After gaining data from online sources, and leveraging foursquare data, we found 26 dog park location with no pet store nearby. By clustering these locations, 5 centre points are found and ODF staff can start their search from these five points.

These locations are only a recommendation produced by analyzing data. The specific location should be considered thoroughly depending on the actual situations in real world.