Analyzing the distribution of pools in Montreal

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1. Introduction

1.1 Background

Montreal is the second-most populous city in Canada and most populous city in the Canadian province of Quebec. In 2016, the city had a population of 1,704,694, with a population of 1,942,247 in the urban agglomeration, including all of the other municipalities on the Island of Montreal. French is the city's official language and in 2016 was the main home language of 49.8% of the population, while English was spoken by 22.8% at home, and 18.3% spoke other languages

Indoors and outdoors pools in Montreal are the perfect places to go, especially in summer. They are among the best free things to do in Montreal for all ages and numbers in among the best things to do with kids.

1.2 Problem

The goal of the project is to check if there are enough pools in Montreal and incidentally if the order of importance of parks and restaurants. We want to study how they are distributed on the Montreal island, and to check if there are enough in disadvantaged neighbourhoods. So as part of this project , we will list and visualize all major parts of Montreal.

1.3 Questions that can be asked using the above mentioned datasets

In this report we want to answer some questions :

1. What is best location in Montreal City for pool swimming ?
2. Which areas have less pools ?
3. What is the relationship between availability of pools, and mean population age ?
4. Analyses the disadvantaged neighbourhoods in order to propose building new pools in these areas ?

2. Data acquisition and cleaning

In order to answer the question listed in the previous section, we used
For this project we need the following data :

1. Montreal pools data that contains list Locality, pool name,type (indoor, outdoor) along with their latitude and longitude.

2. Montreal Census data,2016 that contains statistics by neighbourhood.

> •Data source : <u>Open data, Montreal city</u>
> •Description : This data set contains the required information, and we will use this data set to explore various locality of Montreal.

3. Nearby places in each locality of Montreal.

> •Data source :Foursquare <u>API</u>
> •Description : By using this API we will get all the venues in each neighbourhood.
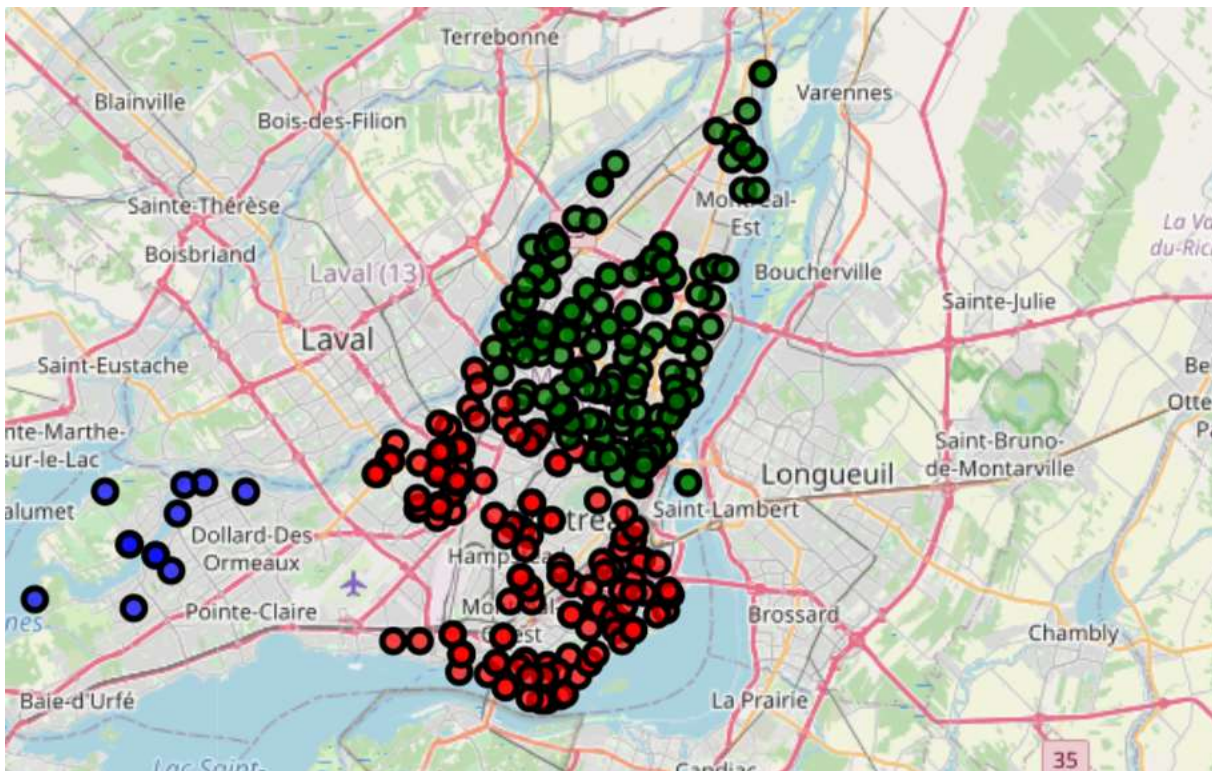
3.   Approach

Here is the sequence of steps we will develop in this report:

> •Collect the Montreal city data from <u>Open data, Montreal city</u>
> •Using FourSquare API we will find all venues for each neighborhood.
> •Filter out all venues that are nearby by locality.
> •Visualize the Ranking of neighborhoods using folium library(python)

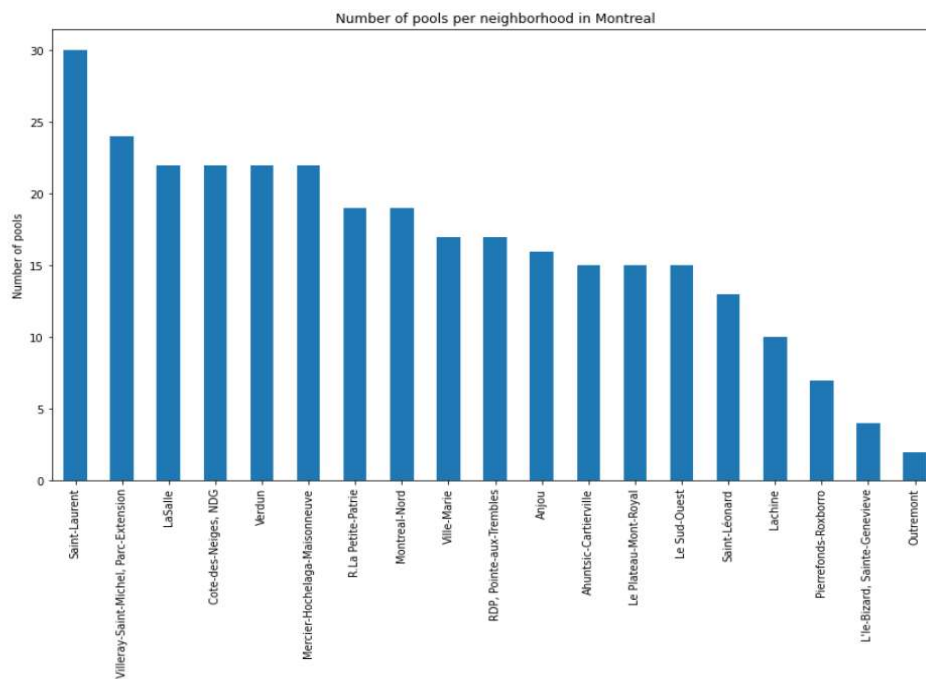### 4. Exploratory Data Analysis

After some cleaning and variable selection on the census data of Montreal 2016 and data on the pool locations, we merged the two sources of data on one data frame based on the id of the neighborhoods.

In order to visualize the pool localizations in Montreal, we started by presenting the following map.
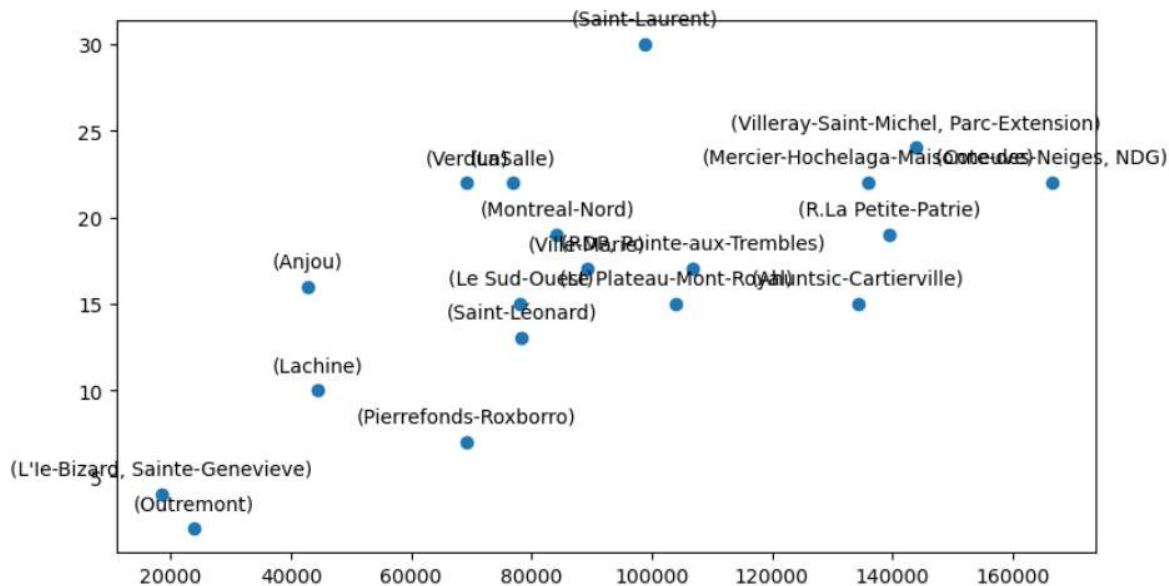
It looks that there are more pools in the East and in the Center of the island. Only few pools in the West of Montreal. We will inverstigate if it's at least proportional to the population number in each area

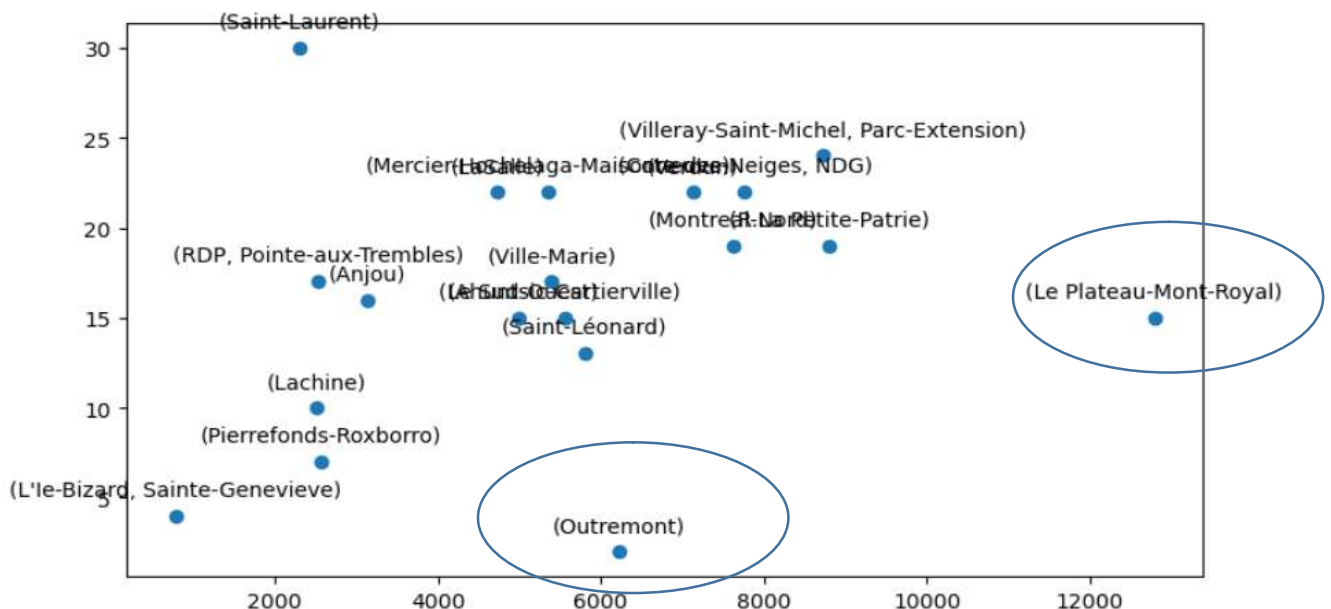We can also visualize the number of pools per neighborhood.

We can see that the number of pools vary a lot from a neighborhood to another with very few in Outremont for instance.

An idea is to check if there is a relationship between the number of pools and population size per neighborhood.
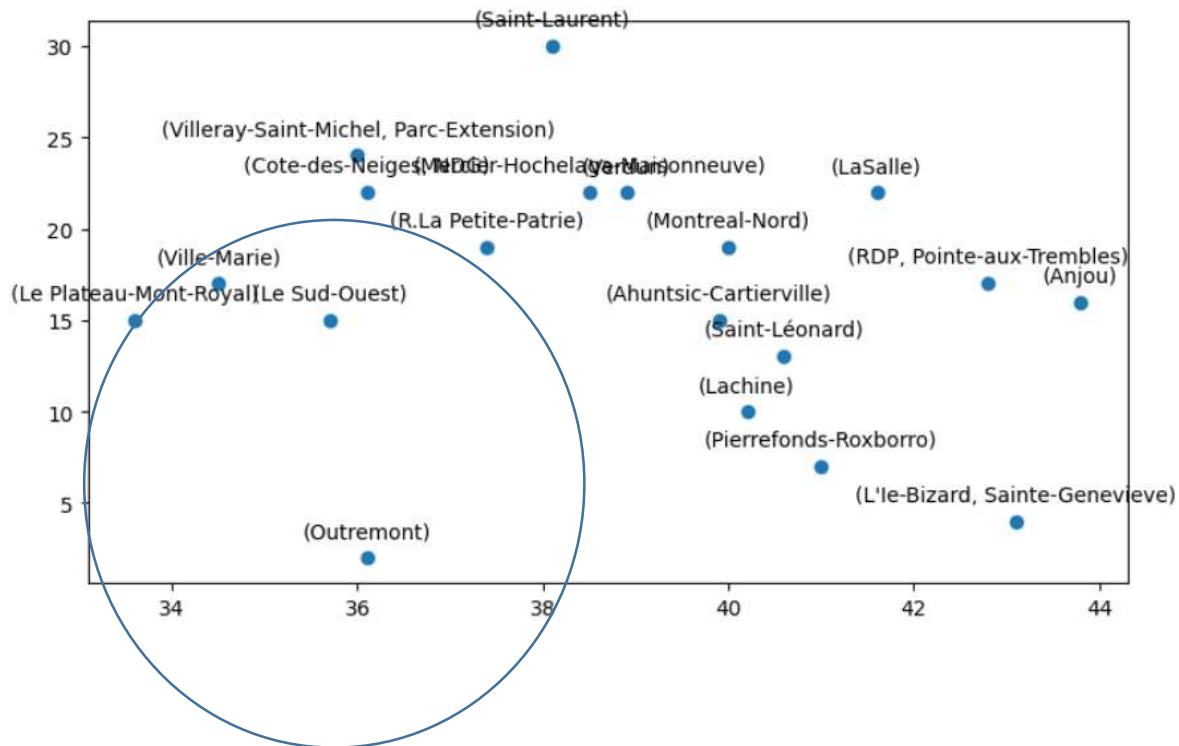

Globally, we can see that there is a good correlation between the number of pools and the population size per neighborhood. Whereas, we want to know if there is a relationship between number of pools and the population density.

There is a good correlation between the number of pools and the population density, except for Plateau Mont-Royal , and Outremont, where we recommend to build new pools.

Another idea was to explore the relationship between number of pools and the median Age.

We notice that: Ville-Marie, Sud-Ouest, and Ville-Marie are neighborhoods with young population but with few pools.

	Locality	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	Ahuntsic-Cartierville	Park	Pharmacy	Restaurant	Coffee Shop	Café	Italian Restaurant	Pizza Place	Fast Food Restaurant	Grocery Store	Clothing Store
1	Anjou	Convenience Store	Pharmacy	Fast Food Restaurant	Pizza Place	Coffee Shop	Supermarket	Gas Station	BBQ Joint	Soccer Field	Sandwich Place
2	Cote-des-Neiges, NDG	Coffee Shop	Fast Food Restaurant	Grocery Store	Pharmacy	Middle Eastern Restaurant	Vietnamese Restaurant	Pizza Place	Bakery	Café	Gas Station
3	L'Ile-Bizard, Sainte-Genevieve	Pizza Place	Construction & Landscaping	Grocery Store	Fast Food Restaurant	Mediterranean Restaurant	Diner	Performing Arts Venue	Convenience Store	Burger Joint	Ice Cream Shop
4	LaSalle	Sandwich Place	Fast Food Restaurant	Pharmacy	Pizza Place	Grocery Store	Discount Store	Ice Cream Shop	Shopping Mall	Skating Rink	Gym / Fitness Center
5	Lachine	Park	Fast Food Restaurant	Pizza Place	Storage Facility	Pharmacy	Skating Rink	Falafel Restaurant	Gun Range	Tunnel	Coffee Shop
6	Le Plateau-Mont-Royal	Café	Bar	Bakery	French Restaurant	Park	Portuguese Restaurant	Coffee Shop	Pizza Place	Breakfast Spot	Vegetarian / Vegan Restaurant
7	Le Sud-Ouest	Restaurant	Café	Pizza Place	Breakfast Spot	Ice Cream Shop	French Restaurant	Park	Grocery Store	Pharmacy	Bakery
8	Mercier-Hochelaga-Maisonneuve	Pharmacy	Coffee Shop	Restaurant	Park	Pizza Place	Fast Food Restaurant	Ice Cream Shop	French Restaurant	Bakery	Hardware Store
9	Montreal-Nord	Fast Food Restaurant	Italian Restaurant	Gas Station	Pharmacy	Sandwich Place	Park	Restaurant	Skating Rink	Grocery Store	Gastropub
10	Outremont	Restaurant	Bakery	Spanish Restaurant	Furniture / Home Store	Mediterranean Restaurant	Café	Gas Station	Sandwich Place	Greek Restaurant	Grocery Store
11	Pierrefonds-Roxborro	Convenience Store	Pharmacy	Baseball Field	Sushi Restaurant	Park	Circus	Coffee Shop	Beach	Dive Bar	Train Station
12	R.La Petite-Patrie	Park	Café	Pharmacy	Ice Cream Shop	Bakery	Pizza Place	Coffee Shop	Grocery Store	Convenience Store	Sushi Restaurant
13	RDP, Pointe-aux-Trembles	Construction & Landscaping	Convenience Store	Park	Liquor Store	Coffee Shop	Pharmacy	Auto Garage	Bus Stop	Supermarket	Bowling Alley
14	Saint-Laurent	Park	Pharmacy	Café	Pizza Place	Grocery Store	Bank	Fast Food Restaurant	Sushi Restaurant	Gym	Sandwich Place
15	Saint-Léonard	Grocery Store	Pharmacy	Bank	Pizza Place	Dessert Shop	Hotel	Sandwich Place	Gas Station	Breakfast Spot	Video Store
16	Verdun	Park	Pizza Place	Restaurant	Pharmacy	Grocery Store	Café	Convenience Store	Food & Drink Shop	Bakery	Breakfast Spot
17	Ville-Marie	Restaurant	Coffee Shop	Park	French Restaurant	Café	Bakery	Fast Food Restaurant	Breakfast Spot	Hotel	Bar
18	Villeray-Saint-Michel, Parc-Extension	Café	Pharmacy	Grocery Store	Park	Bakery	Fast Food Restaurant	Peruvian Restaurant	Tennis Court	Coffee Shop	Indian Restaurant

We notice that some neighborhoods, parks are not in the top 10 of venues: Anjou, Cote des neiges, Lasalle, and Outremont. We recommend then to build parks in these areas.

5. Conclusion

▶ There are two neighborhoods for which we have less pools than it should be according to the population density: Outremont, and Plateau Mont-royal.

▶ Actually, there is no correlation between the number of pools and median age in neighborhoods. We recommend taking in consideration this parameter for future de developments.

▶ Ville-Marie, Sud-Ouest, and Ville-Marie are neighborhoods with young population but with few pools.

▶ Some neighborhoods, parks are not in the top 10 of venues: Anjou, Cote des neiges, Lasalle, and Outremont.