Showing Citizens Hospitals Distribution along Toronto and its Boroughs

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Picture: "Toronto" by Blaise Sewell from the Noun Project

Introduction

- The project: "Showing Citizens Hospitals Distribution along Toronto and its boroughs" aims to be a friendly way to inform people where hospitals are and what are their ratings, across the most populated city of Canada.

- The present document represents the Final Project for the IBM Data Science Certificate taught through The Coursera Platform. It is requiered to used "Foursquare", "an independent location data platform for understanding how people move through the real world", according to the firm.

Business Problem

- The purpose of the project is to inform and empower regular citizens from Toronto City in the Canadian province of Ontario or willing to live there, in a simple and graphical way so they can see how hospitals are located and rated across the city boroughs.

- It is important to note that the proximity to a hospital does not necessary imply a better access to health assistance, but the variable can influence the decision on where to live, especially focusing on vulnerable population. This project may facilitate an informed decision of the user on which borough or neighborhood to choose.

Data, Packages and Tools

The data used about hospitals is: name, location, rating and capacity, measured by number of beds. It comes principally from the following sources:

1. Canadian Institute for Health Information (CIHI) for hospitals located in the Health Region of "Toronto Central LHIN" and number of beds of each one

2. Forthsquare for hospitals location

3. Google for hospital location and rating

4. Several python packages for managing and showing data, as pandas, numpy, request, json, folium and geopy.

5. IBM Cloud Pak is the tool used for running the code

Methodology

- A data base is generated for each hospital, showing its coordinates, borough, number of beds and rating.

- Afterwards tables and maps were generated in order to analyze the data and decide, taking account the number of health facilities and their capacity.
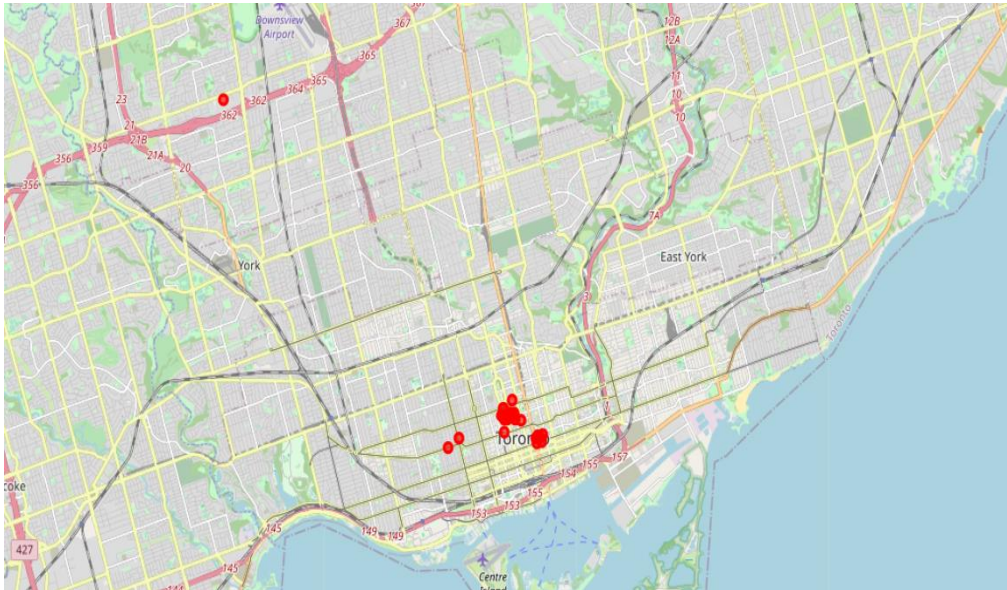
Discussion

- The data base created with Foursquare as a source, had many places too concentrated suggesting duplicates.

- Also due to incongruencies with the CIHI information a new data base was generated. Ratings and location from google and number of beds per hospital from the CIHI were added.

- In the following slide it is possible to see the maps generated with both data bases.
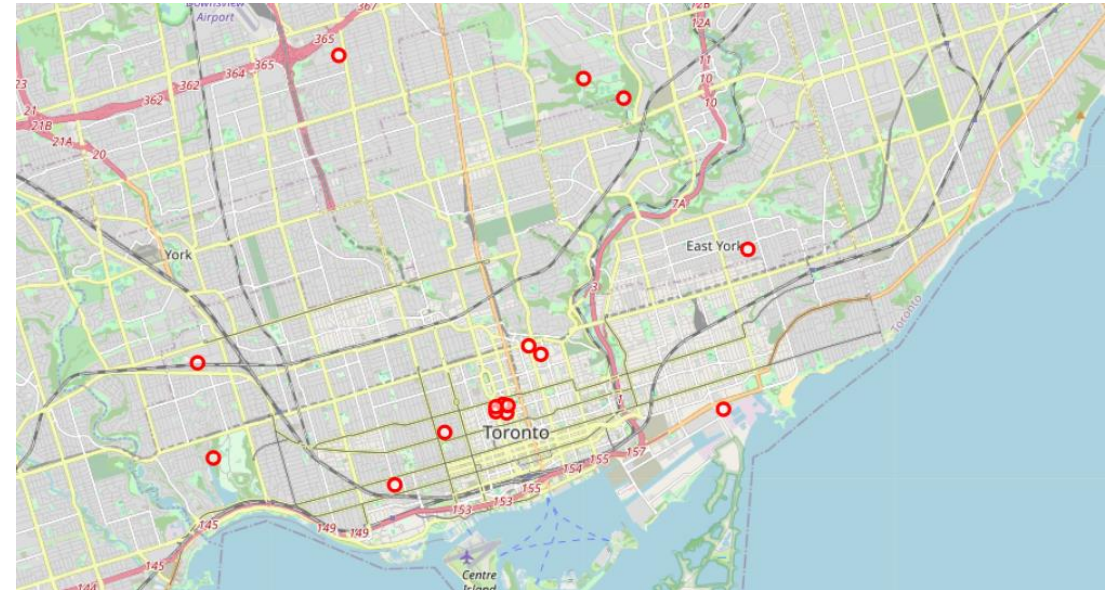
In the second map it is possible to see that the points are less concentrated and that are more, what can be interpreted as better quality of the data.

Map 1. Hospitals in the City of Toronto

Map 2. Hospitals in the City of Toronto
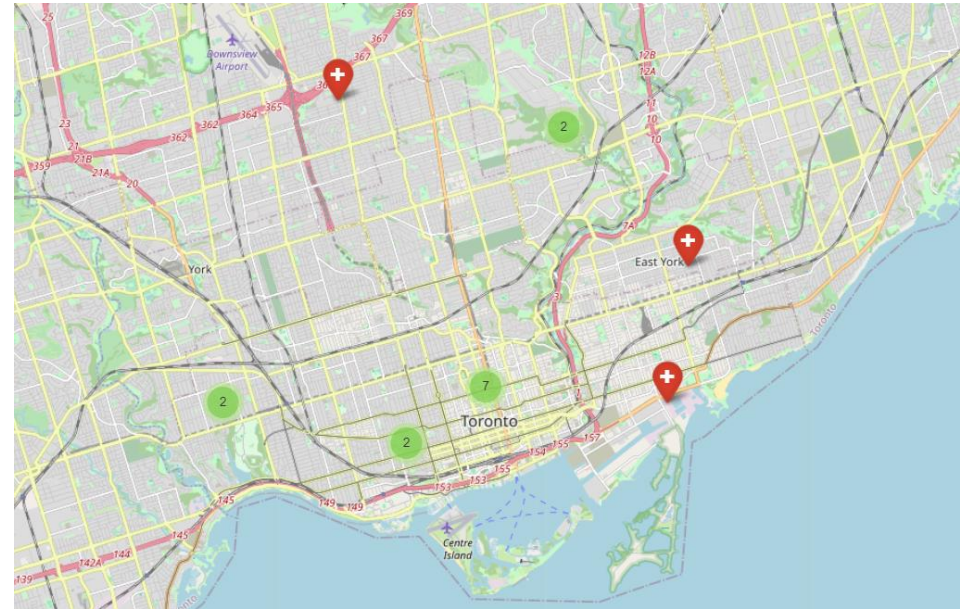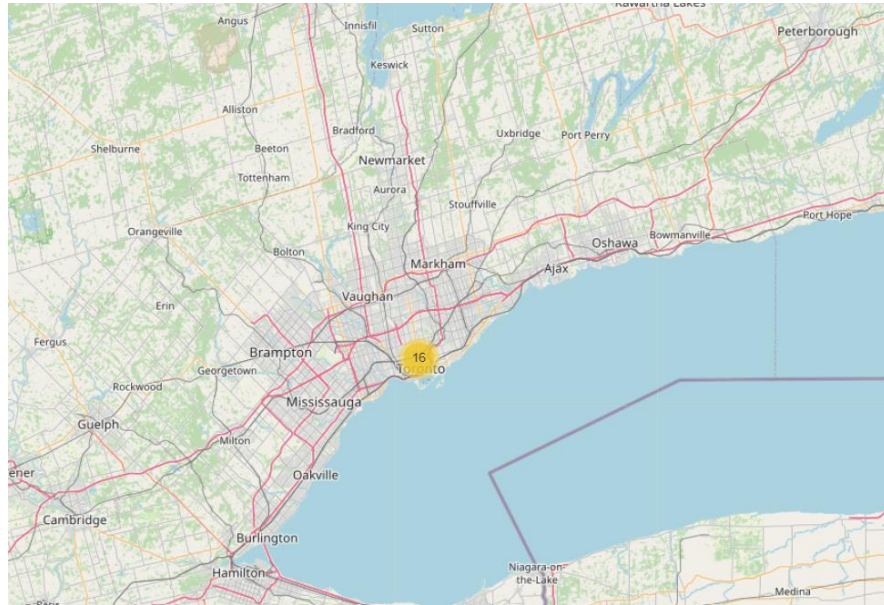

Source: Foursquare

Source: CIHI/Google

Hospitals Clustering

- In order to compare the boroughs, the zones are clustered to understand how the facilities are distributed:

- It is possible to see that most of the hospitals are in the downtown zone.

Results

- The results are set into two charts for a better understanding of the data. The first one shows the capacity of the hospitals and their rating average.

Chart 1. Boroughs ordered by number of hospital beds

borough	Number of beds	Number of hospitals	Rating Average
Downtown Toronto	2483.0	9	4.033333
West Toronto	1127.0	3	3.400000
Central Toronto	1098.0	1	3.400000
East York	430.0	2	3.800000
North York	262.0	1	3.800000

Results

- The second chart shows the best hospital per borough and its rating.

Chart 2. Top Hospital per borough and its rating

borough	Top 1 Hospital	Top 1 Hospital Rating
Downtown Toronto	Casey House	4.8
East York	Holland Bloorview Kids Rehabilitation Hospital	4.7
North York	Baycrest	3.8
West Toronto	Centre for Addiction and Mental Health	3.6
Central Toronto	Sunnybrook Health Sciences Centre	3.4

Conclusion

- It can be concluded by the number of beds and hospitals per borough that **Downtown Toronto** is by far the densest in hospitals and medical beds followed by West, Central and the York's.

- As for the ratings, **Downtown Toronto** has the best rated hospital with "Casey House" as well as the best average, followed closely by East York with the "Holland Bloorview Kids Rehabilitation Hospital" and the same average rating of 3.8 as North York.