THE BATTLE OF NEIGHBORHOODS

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Do Nguyen Ngoc Minh

Contents

I.   INTRODUCTION

Covid-19 is conquering this world with uncertainty. However, geographical components of the world are not affected. While food industry is hurt by the pandemic, hospitals are needed to strive themselves to cover the increasing number of victims. Thus, the current number of hospitals is not enough, hence, they have to face more and more pressure by Covid-19. Under limited budget, government have to build more hospitals to secure people.

The problem here is to find where to build new hospital(s) to efficiently handle every patient in Toronto, USA.

The problem is, where is the most suitable to build a new one. In this lab, let's leverage data analytics to solve it.

Solution:

Eliminate locations with large number of hospitals

Locations must be near highly populated areas

II.   DATA

Based on the defined problem, factors affect the decision would be:

Number of existing hospitals and there location in the neighborhood

Ratio of hospitals/population in each neighborhood (if possible)

Thus, steps and data needed is:

Round neighborhoods with low number of hospitals in Toronto

Create heatmap of population in Tokyo in rounded area (if possible)

Use K-mean cluster to pick out areas with large number of population and low number of hospitals.

The clustered area are candidates locations for building a new hospital.

III.   METHODOLOGY

We get the dataset after scrapping from Wiki website.

We now have the neighborhoods name without location, let's add them from the available dataset

|	PostalCode	Borough	Neighborhood
0	M3A	North York	Parkwoods
1	M4A	North York	Victoria Village
2	M5A	Downtown Toronto	Regent Park,Harbourfront
3	M6A	North York	Lawrence Manor,Lawrence Heights
4	M7A	Queen's Park	Ontario Provincial Government
...	...	...	...
98	M8X	Etobicoke	The Kingsway,Montgomery Road,Old Mill North
99	M4Y	Downtown Toronto	Church and Wellesley
100	M7Y	East TorontoBusiness reply mail Processing Cen...	Enclave of M4L
101	M8Y	Etobicoke	Old Mill South,King's Mill Park,Sunnylea,Humbe...
102	M8Z	Etobicoke	Mimico NW,The Queensway West,South of Bloor,Ki...

103 rows × 3 columns

We get coordinates for each postal code.

	PostalCode	Borough	Neighborhood	Postal Code	Latitude	Longitude
0	M3A	North York	Parkwoods	M3A	43.753259	-79.329656
1	M4A	North York	Victoria Village	M4A	43.725882	-79.315572
2	M5A	Downtown Toronto	Regent Park,Harbourfront	M5A	43.654260	-79.360636
3	M6A	North York	Lawrence Manor,Lawrence Heights	M6A	43.718518	-79.464763
4	M7A	Queen's Park	Ontario Provincial Government	M7A	43.662301	-79.389494
...	...	...	...	...	...	...
98	M8X	Etobicoke	The Kingsway,Montgomery Road,Old Mill North	M8X	43.653654	-79.506944
99	M4Y	Downtown Toronto	Church and Wellesley	M4Y	43.665860	-79.383160
100	M7Y	East TorontoBusiness reply mail Processing Cen...	Enclave of M4L	M7Y	43.662744	-79.321558
101	M8Y	Etobicoke	Old Mill South,King's Mill Park,Sunnylea,Humbe...	M8Y	43.636258	-79.498509
102	M8Z	Etobicoke	Mimico NW,The Queensway West,South of Bloor,Ki...	M8Z	43.628841	-79.520999

103 rows × 6 columns

Next step is using Foursquare to define hospital in the neighborhood.
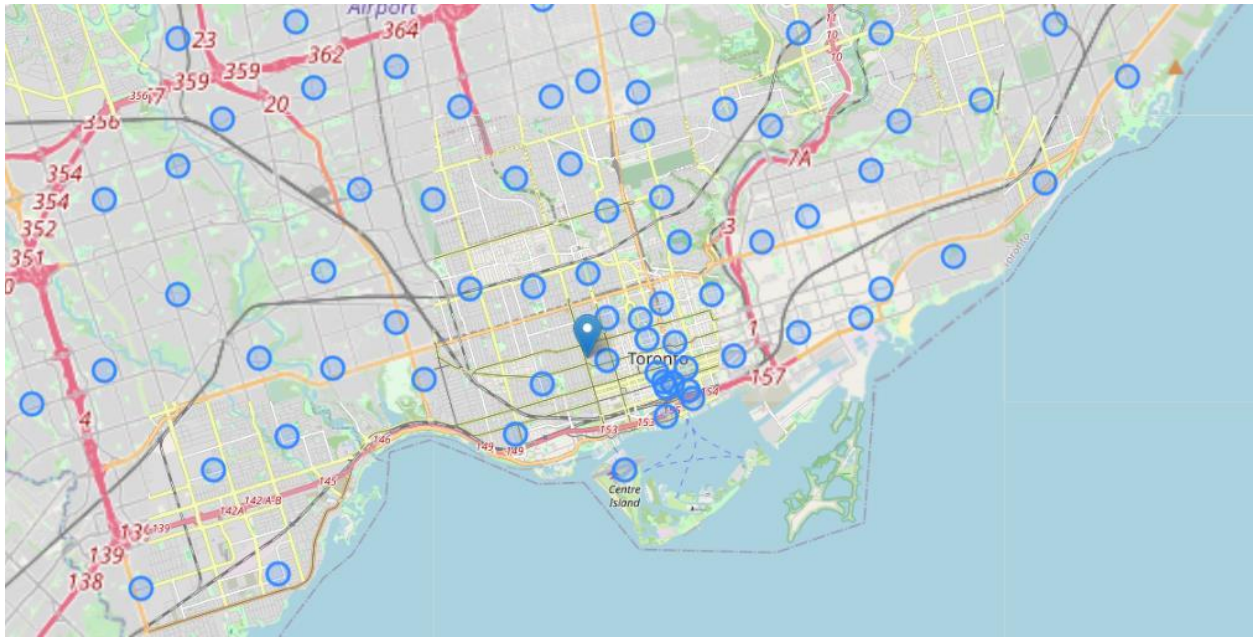
There is only one hospital in the neighborhoods with the mark on the map.

Our main decision making is now moved to the population of the neighborhoods. Let's fetch population data from another source

	Neighborhood	Neighborhood Latitude	Neighborhood Longitude	Venue	Venue Latitude	Venue Longitude	Venue Category	Category ID
1585	Kensington Market,Chinatown,Grange Park	43.653206	-79.400049	Toronto Western Hospital	43.653434	-79.406074	Hospital	4bf58dd8d48988d196941735

Scrapping data from this website - https://en.wikipedia.org/wiki/Demographics_of_Toronto_neighbourhoods

We get the following table. We will use 2 fields: name (neighborhood) and population to map with our neighborhood dataset to cluster by population.

	Name	FM	Census Tracts	Population	Land area (km2)	Density (people/km2)	% Change in Population since 2001	Average Income	Transit Commuting %	% Renters	Second most common language (after English) by name	Second most common language (after English) by percentage
0	Crescent Town	EY	0190.01	8157	0.40	20393	-10.0	23021	24.5	20.3	Bengali (18.1%)	18.1% Bengali
1	Governor's Bridge/Bennington Heights	EY	0186.00	2112	1.87	1129	4.0	129904	7.1	13.3	Polish (1.4%)	01.4% Polish
2	Leaside	EY	0195.00, 0196.00	13876	2.81	4938	3.0	82670	9.7	10.5	Bulgarian (0.4%)	00.4% Bulgarian
3	O'Connor–Parkview	EY	0189.00, 0190.02, 0191.00, 0192.00, 0193.00	17740	4.94	3591	-6.1	33517	15.8	19.4	Urdu (3.2%)	03.2% Urdu
4	Old East York	EY	0180.00, 0181.01, 0181.02, 0182.00, 0183.00, 0...	52220	7.94	6577	-4.6	33172	22.0	19.1	Greek (4.3%)	04.3% Greek
...	...	...	...	...	...	...	...	...	...	...	...	...

IV. ANALYSIS

We now have the neighborhoods name with location and the cluster with different color

	Postal Code	Latitude	Longitude	Neighborhood	Population
0	M1B	43.806686	-79.194353	Malvern,Rouge	67048.0
1	M1C	43.784535	-79.160497	Rouge Hill,Port Union,Highland Creek	36470.0
2	M1E	43.763573	-79.188711	Guildwood,Morningside,West Hill	49924.0
3	M1G	43.770992	-79.216917	Woburn	48507.0
4	M1J	43.744734	-79.239476	Scarborough Village	12796.0
5	M1K	43.727929	-79.262029	Kennedy Park,Ionview,East Birchmount Park	13025.0
6	M1L	43.711112	-79.284577	Golden Mile,Clairlea,Oakridge	24472.0
7	M1M	43.716316	-79.239476	Cliffside,Cliffcrest,Scarborough Village West	23917.0
8	M1N	43.692657	-79.264848	Birch Cliff,Cliffside West	12266.0
9	M1P	43.757410	-79.273304	Dorset Park,Wexford Heights,Scarborough Town C...	14189.0
10	M1R	43.750072	-79.295849	Wexford,Maryvale	26644.0
11	M1S	43.794200	-79.262029	Agincourt	44577.0
12	M1V	43.815252	-79.284577	Milliken,Agincourt North,Steeles East,L'Amorea...	26272.0
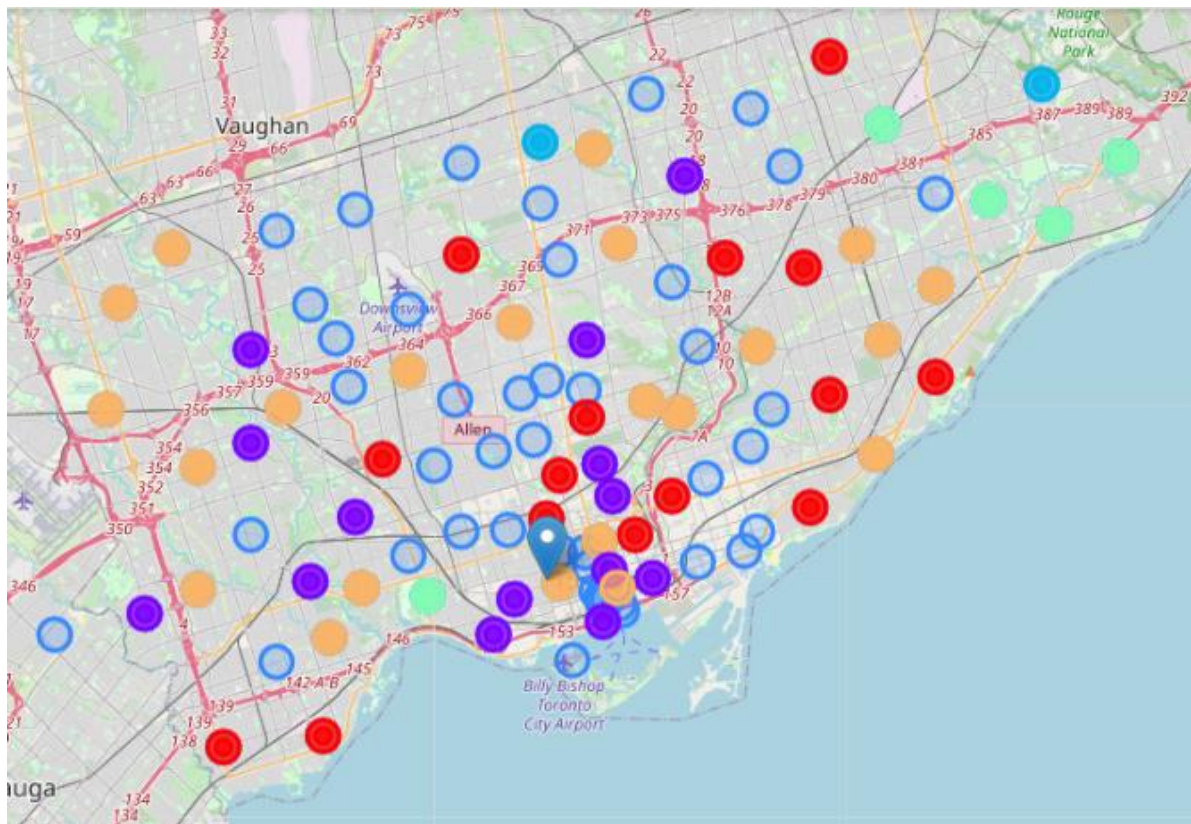
V.   CONCLUSION

Based on the clustering, we can place new hospital in area with red dot (highly populated areas)

Propose with the investors and stake holders to further decide the locations for the new hospital. Other elements should be taken into consideration are budget, time, and number of covid-19 patients currently have.