

Capstone Project - The Battle of Neighborhoods (Week 1&2)

Report title:

Covid-19 Explore Analysis in Cairo, Egypt

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Contents

1. Problem Statement.....	2
1- Introduction	2
2- Problem.....	2
2. Data overview	3
3- Methodology.....	4
4- Results.....	7
5- Discussion.....	7
6- Conclusion.....	7

1. Problem Statement

1- Introduction

Since the beginning of Covid-19 outbreak in China, world wide governments had been watching the growth of such disease caused by the novel corona virus. The problem is how to control such exponential growth? Actually it is too late now since the WHO announced it is a world wide pandemic. However, the game is not over yet, we still can slow down the spreading rate at least in the countries where the total number of covid-19 cases is below than 200 such as Cairo, Egypt. In the next section, we will explain the strategy to do that.

The Egyptian Government would be interested in this project

2- Problem

The problem is the exponential growth of Covid-19 cases. The strategy is to slowdown this growth by targeting the areas which has the highest population and the highest traffic (i.e many visitors).

This can be translated into two factors:

- 1- The population: the number of people who lives in each neighborhood in Cairo, Egypt
→ this information is available on population analysis websites on the web.
- 2- The traffic: this factor can be expressed by how many popular places each



Figure 1.1 Corona virus positive test

neighborhood actually has → this info can be found by an explore request to Foursquare API.

The output of this project is simply a map which contains the suggested venues where governments can do massive scans to the people in these areas to try to catch as many Covid-19 positive cases as possible.

2. Data overview

	Governorate	Neighborhood	Population
0	Al-Qāhirah	15 Māyū [15th of May City]	96522
1	Al-Qāhirah	'Ābidīn	41605
2	Al-Qāhirah	Ad-Darb al-Aḥmar	60336
3	Al-Jīzah	Ad-Duqqī	73309
4	Al-Qāhirah	'Ain Schams	633798
5	Al-Jīzah	Al-Ahrām	681383
6	Al-Jīzah	Al-'Ajūzah	287818
7	Al-Qāhirah	Al-Amīriyah	157378
8	Al-Qāhirah	Al-Azbakiyah [Azbakeya]	20393
9	Al-Jīzah	Al-Badrashayn [Badrshayn]	563294
10	Al-Qāhirah	Al-Basātīn	511052
11	Al-Jīzah	Al-Ḥawāmidīyah	198042
12	Al-Qāhirah	Al-Jamāliyah	37517

Figure 2.1 Dataset for neighborhood populations in Cairo

In Fig 2.1, the dataset has 75 rows and 3 columns (Governorates, Neighborhoods and Population). This data will be used to identify the population of each neighborhood to get the information about the first factor.

Fig 2.2 represents the dataset from Foursquare API which has the nearby neighborhoods in great Cairo city, with the column items which has the data of popularity.

	city	name	categories	lat	lng	items
0	وسط البلد	Halawa (حلاوة)	Clothing Store	30.050450	31.244201	[{'summary': 'This spot is popular', 'type': '...
1	وسط البلد	Simonds	Coffee Shop	30.049971	31.242260	[{'summary': 'This spot is popular', 'type': '...
2	Downtown	Happy City Roof Bar	Hotel Bar	30.046346	31.243932	[{'summary': 'This spot is popular', 'type': '...
3	Downtown	Dar El Maaref (دار المعارف)	Bookstore	30.050467	31.242328	[{'summary': 'This spot is popular', 'type': '...
4	Downtown	El Abd (العبد)	Pastry Shop	30.049617	31.239840	[{'summary': 'This spot is popular', 'type': '...
5	وسط البلد	Costa Coffee	Coffee Shop	30.048983	31.242256	[{'summary': 'This spot is popular', 'type': '...
6	Downtown	Kunst Gallery & Cafe	Café	30.049947	31.242113	[{'summary': 'This spot is popular', 'type': '...

Figure 2.2 Foursquare API dataset of different venues in Cairo

3- Methodology

Step1:

To get the spots with the highest probability of Covid-19 virus spread, the dataset in Fig 2.1 has to be grouped by 'Governorate' and summed by Population. The output is the following table:

	Governorate	Population
Al-Jīzah	Al-Jīzah	7056914
Al-Qalyūbyah	Al-Qalyūbyah	3742834
Al-Qāhirah	Al-Qāhirah	9840591
Ash-Sharqiyah	Ash-Sharqiyah	234770

Figure 3.1 Dataset of Governorate population in Cairo

Step2:

The Governorate with the highest population is chosen, which is 'Al-Qāhirah'.

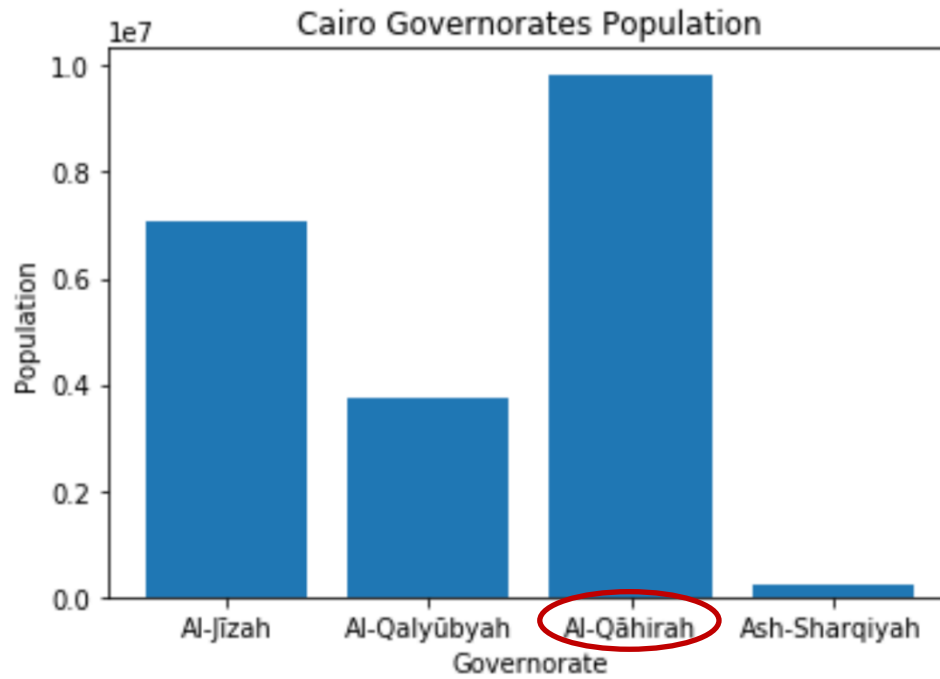


Figure 3.2 A bar chart for Governorates population in Cairo

Step3:

Geocoder is used to obtain the coordinates of 'Al-Qāhirah'

Step4:

Foursquare API is used to explore the existing venues in the highest populated Governorate 'Al-Qāhirah'.

```
[{'reasons': {'count': 0,
  'items': [{'summary': 'This spot is popular',
    'type': 'general',
    'reasonName': 'globalInteractionReason'}]}],
'venue': {'id': '53d928bd498ea9f619d7fa4f',
  'name': 'Halawa (حلاوة)',
  'location': {'address': '165 Mohamed Farid St',
    'crossStreet': 'Abd El Khalek Tharwat St',
    'lat': 30.050450186118397,
    'lng': 31.244201225229514,
    'labeledLatLngs': [{'label': 'display',
      'lat': 30.050450186118397,
      'lng': 31.244201225229514}],
    'distance': 188,
    'cc': 'EG',
    'city': 'وسط البلد',
    'state': 'القاهرة',
    'country': 'مصر',
    'formattedAddress': ['165 Mohamed Farid St (Abd El Khalek Tharwat St)',
```

Figure 3.3 Part of Foursquare results

Step5:

Fig 3.4 represents filtering the results by the most popular venues in 'Al-Qāhirah', (in the results all the venues were popular).

	name	categories	lat	lng	items
0	Halawa (حلاوة)	Clothing Store	30.050450	31.244201	['summary': 'This spot is popular', 'type': '...]
1	Simonds	Coffee Shop	30.049971	31.242260	['summary': 'This spot is popular', 'type': '...]
2	Happy City Roof Bar	Hotel Bar	30.046346	31.243932	['summary': 'This spot is popular', 'type': '...]
3	Dar El Maaref (دار المعارف)	Bookstore	30.050467	31.242328	['summary': 'This spot is popular', 'type': '...]
4	El Abd (العبد)	Pastry Shop	30.049617	31.239840	['summary': 'This spot is popular', 'type': '...]
5	Costa Coffee	Coffee Shop	30.048983	31.242256	['summary': 'This spot is popular', 'type': '...]
6	Kunst Gallery & Cafe	Café	30.049947	31.242113	['summary': 'This spot is popular', 'type': '...]
7	Al Gomhuria Theatre (مسرح الجمهورية)	Theater	30.046137	31.246186	['summary': 'This spot is popular', 'type': '...]
8	Koshary El Tahrir (كشري التحرير)	Egyptian Restaurant	30.050429	31.240675	['summary': 'This spot is popular', 'type': '...]
9	West El Balad	Café	30.047301	31.243266	['summary': 'This spot is popular', 'type': '...]
10	El Abd (العبد)	Pastry Shop	30.052543	31.242388	['summary': 'This spot is popular', 'type': '...]
11	Eish + Malh	Italian Restaurant	30.051188	31.243782	['summary': 'This spot is popular', 'type': '...]
12	Koueider (قويدر)	Pastry Shop	30.051721	31.241295	['summary': 'This spot is popular', 'type': '...]
13	El Duplex Abia Fahita	Theater	30.048955	31.239014	['summary': 'This spot is popular', 'type': '...]
14	Central Cairo (وسط مدينة القاهرة)	Neighborhood	30.050702	31.241150	['summary': 'This spot is popular', 'type': '...]

Figure 3.4 Foursquare results with popularity

4- Results

Plotting all the popular places existing in the Governorate with the highest population in Great Cairo. The highest populated Governorate is 'Al-Qāhirah', which venues was explored and plotted in Fig 4.1.

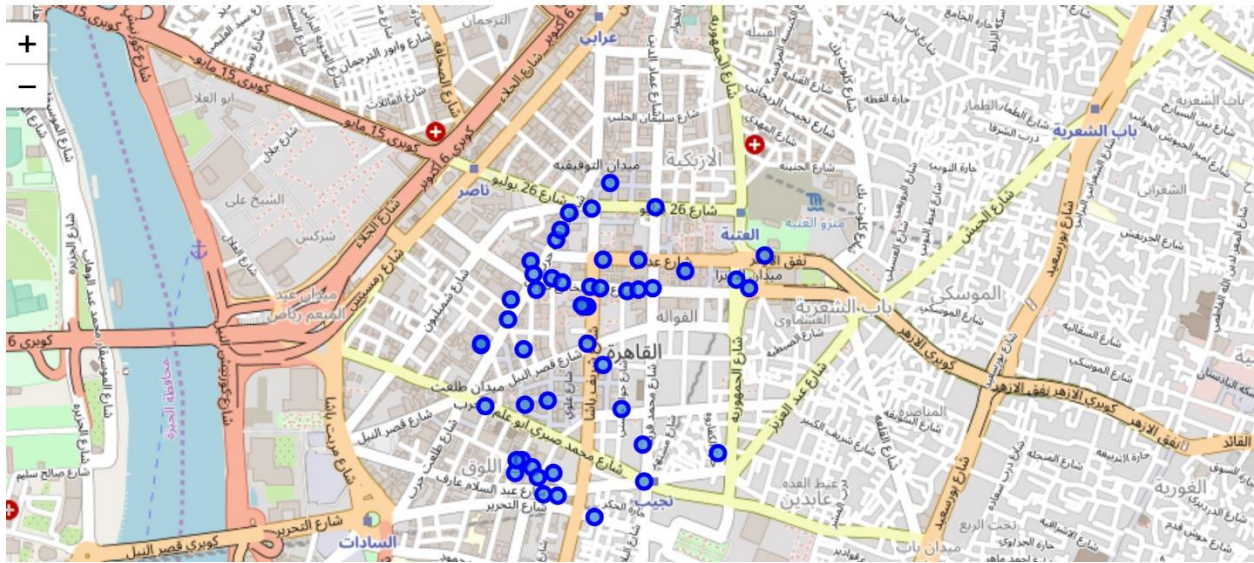


Figure 4.1 Cairo Map with the highest probability places where Covid-19 virus can spread

5- Discussion

- Two data resources were used to reach the places with the highest probability of Covid-19 virus spread inside Cairo.
- The first data resource was the population data of all Governorates inside Cairo
- The second resource was the Foursquare API dataset by exploring the most popular nearby venues in the governorate with the highest population (which was obtained from the first data resource)
- The highest populated Governorate is 'Al-Qāhirah', which venues was explored and plotted in Fig 4.1.

6- Conclusion

- 'Al-Qāhirah' was the highest population governorate data was used from city population website.
- Foursquare API was used to obtain the popular venues in the 'Al-Qāhirah'
- A map was plotted with the popular venues to guide the Egyptian government to do massive scans on people in these places to find out the most possible number of positive cases with Covid-19 virus. Hence slow down the growth rate of the pandemic.