ANALYSING COVID-19 PATIENTS DISTRIBUTION FOR VACCINATION

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Covid-19 : The growing threat

- On February 11, 2020, the World Health Organization announced an official name for the disease that is causing the 2019 novel coronavirus outbreak.
- The new name of this disease is coronavirus disease 2019, abbreviated as COVID-19. In COVID-19, 'CO' stands for 'corona,' 'VI' for 'virus,' and 'D' for disease.
- Formerly, this disease was referred to as "2019 novel coronavirus" or "2019-nCoV."
- Animal coronaviruses rarely infect people and then spread between people. This occurred with two earlier coronaviruses, MERS-CoV and SARS-CoV.

2. Problem Statement

- The supply of COVID-19 vaccines in the United States is currently limited and the County of Sonoma is following State and Federal guidelines for distribution.
- Priority administration of the vaccine has been determined by a number of factors including risk of exposure from work or living environments, as well as vulnerabilities due to age and medical conditions.
- Goal is to and keeping the factors in mind we can reduce the amount of time for distribution of vaccines.

3.Data acquisition and cleaning

- The files contained a lot of irrelevant data like assigned id, ids etc.
- They had to be arranged in a way that the elderly age group could be of priority .
- The irrelevant columns were dropped and rest were created as a new data frame to be merged with the other file of geospatial data

```
[12]: data=pd.merge(covid,data,on='Postal Code')
      data.head(20)
```

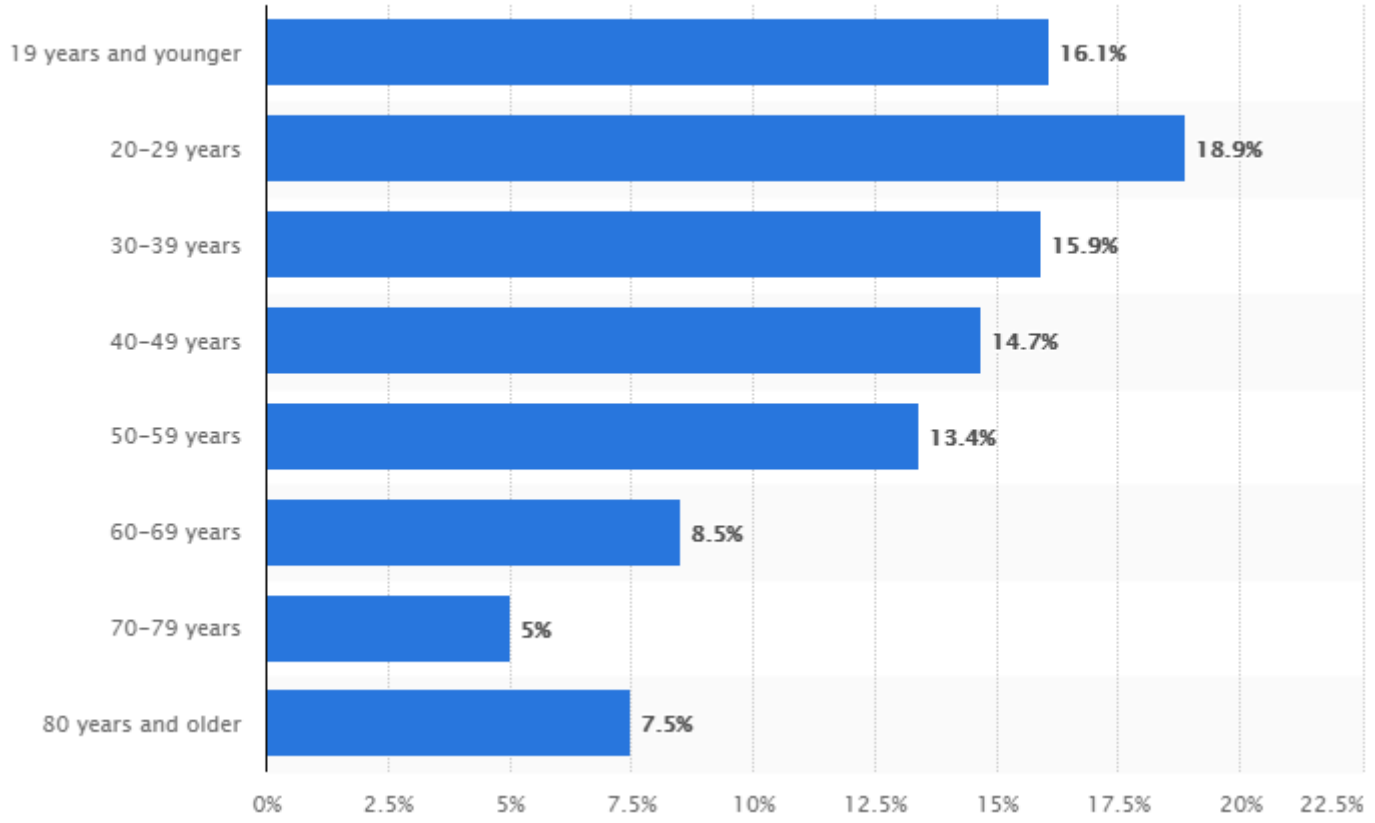
[12]:

	Neighbourhood Name	Postal Code	Classification	Client Gender	Latitude	Longitude
0	Willowdale East	M2N	CONFIRMED	FEMALE	43.77012	-79.408493
1	Willowdale East	M2N	CONFIRMED	MALE	43.77012	-79.408493
2	Willowdale West	M2N	CONFIRMED	MALE	43.77012	-79.408493
3	Willowdale East	M2N	CONFIRMED	MALE	43.77012	-79.408493
4	Willowdale East	M2N	CONFIRMED	MALE	43.77012	-79.408493
5	Willowdale East	M2N	CONFIRMED	MALE	43.77012	-79.408493
6	Willowdale East	M2N	CONFIRMED	FEMALE	43.77012	-79.408493
7	Willowdale East	M2N	CONFIRMED	MALE	43.77012	-79.408493
8	Willowdale East	M2N	CONFIRMED	FEMALE	43.77012	-79.408493
9	Willowdale East	M2N	CONFIRMED	MALE	43.77012	-79.408493
10	Willowdale East	M2N	CONFIRMED	MALE	43.77012	-79.408493
11	Willowdale East	M2N	CONFIRMED	FEMALE	43.77012	-79.408493
12	Willowdale East	M2N	CONFIRMED	MALE	43.77012	-79.408493
13	Willowdale East	M2N	PROBABLE	MALE	43.77012	-79.408493
14	Willowdale West	M2N	CONFIRMED	MALE	43.77012	-79.408493
15	Lansing-Westgate	M2N	CONFIRMED	MALE	43.77012	-79.408493
16	Bay Street Corridor	M2N	CONFIRMED	FEMALE	43.77012	-79.408493

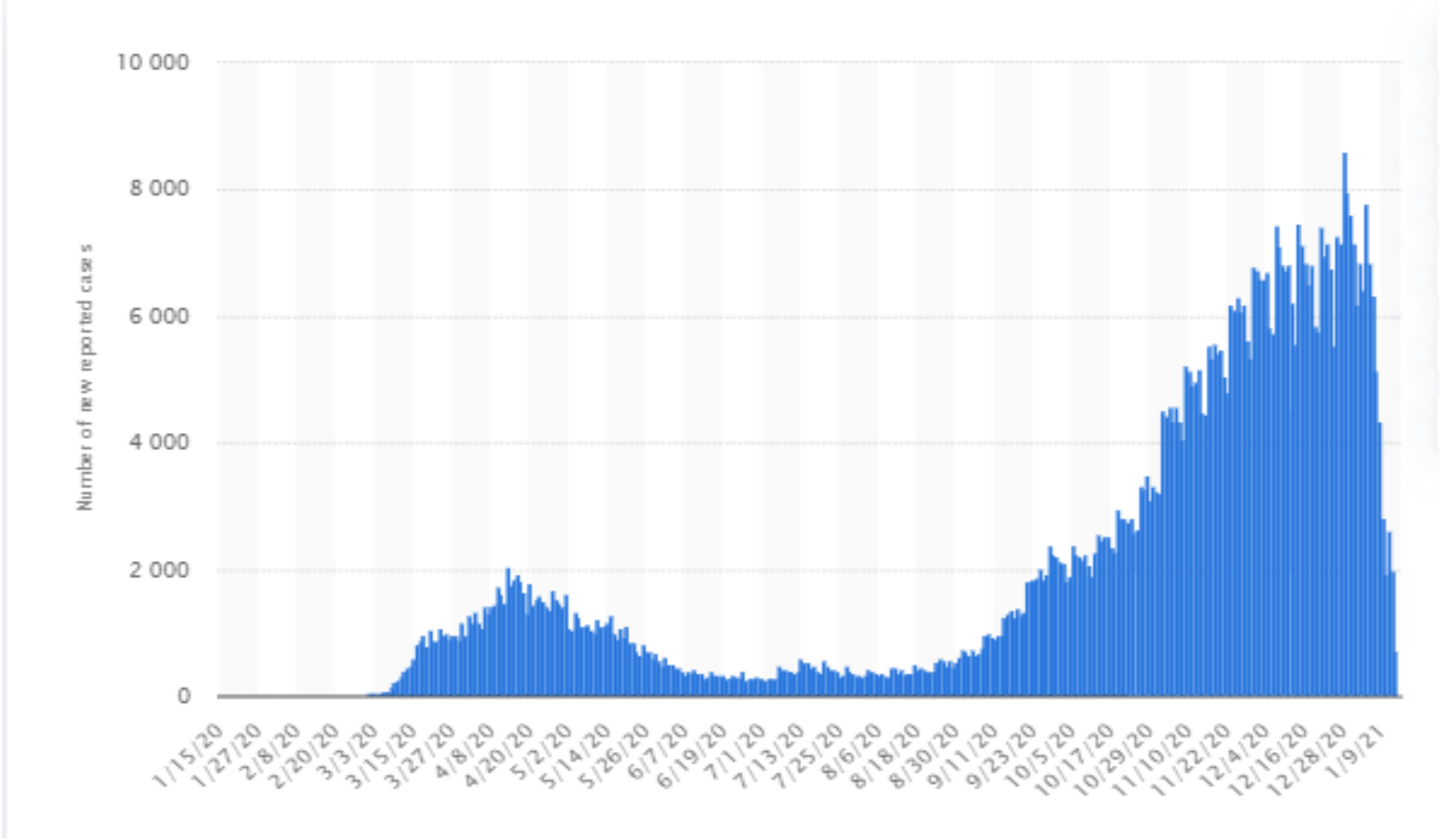
4.Exploratory Data Analysis

- **CURRENT POPULATION AFFECTED IN CANADA**
- Top two most affected areas are Quebec and Ontario
- As of January 24, 2021, there had been 747,383 confirmed cases of coronavirus (COVID-19) in Canada.
- We have to visualize the trend of affected people according to the age group
- which group of people are more likely to be affected by the virus and are in-need of urgent care.
- the risk to older people and those with preexisting conditions are much greater and these cases are of high concern.

Age group vs active cases



5.VISUALIZING NUMBER OF ACTIVE CASES



6. EXPLORING AND VISUALIZING TORONTO DATA

```
address= 'Toronto, CA'
geolocator=Nominatim(user_agent='cn_explorer')
location=geolocator.geocode(address)
latitude=location.latitude
longitude=location.longitude

print('The geograpical coordinate of Ontario are {}, {}.'.format(latitude, longitude))
```

```
The geograpical coordinate of Ontario are 43.6534817, -79.3839347.
```

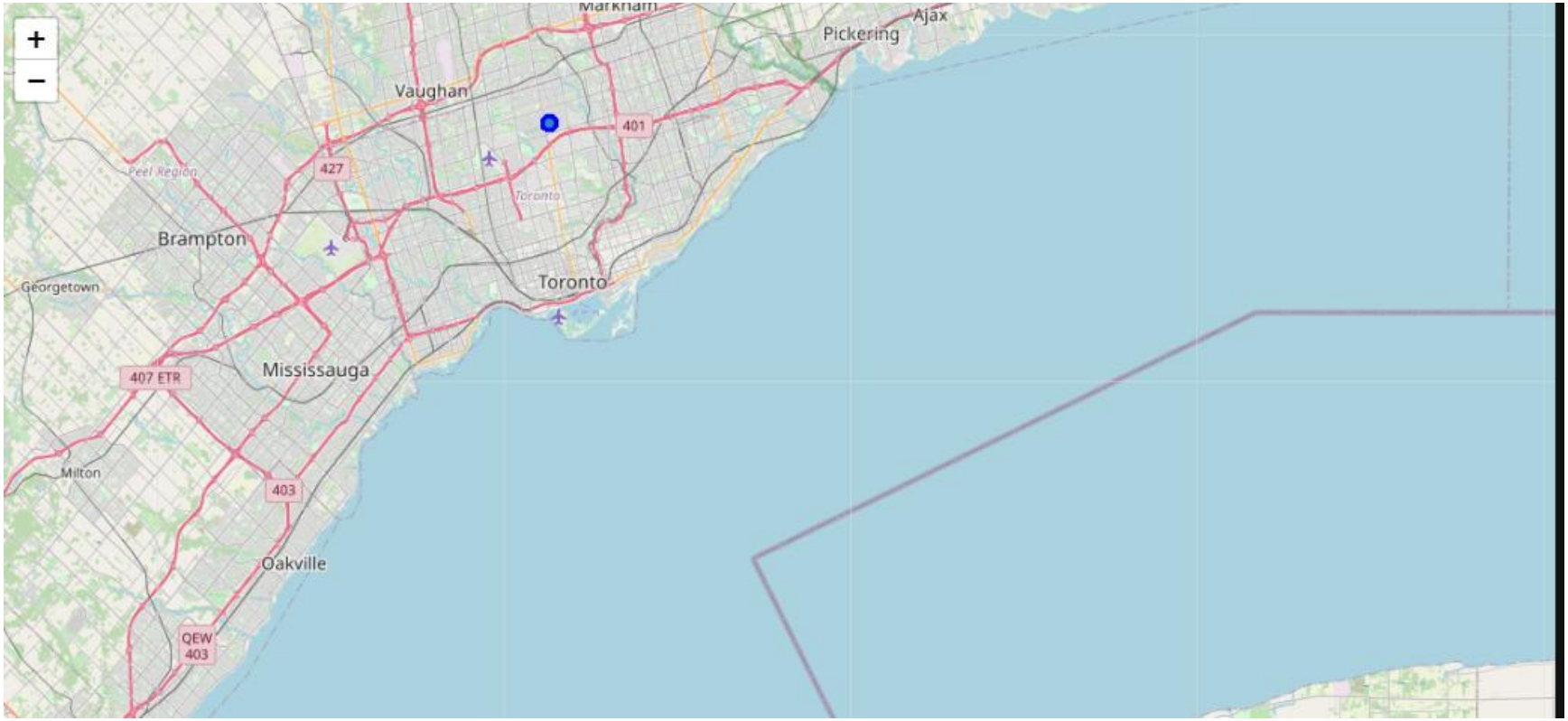
```
# create map of New York using latitude and longitude values

map_ontario=folium.Map(location=[latitude,longitude], zoom_start=10)

#add markers too map
for lat,lng,gen,neighborhood,classi in zip(new_covid['Latitude'], new_covid['Longitude'], new_covid['Client Gender'], new_covid['Neighbourhood Name'],new_cov
    label='{},{}'.format(neighborhood,classi)
    label=folium.Popup(label,parse_html=True)
    folium.CircleMarker(
        [lat, lng],
        radius=5,
        popup=label,
        color='blue',
        fill=True,
        fill_color='#3186cc',
        fill_opacity=0.7,
        parse_html=False).add_to(map_ontario)

map_ontario
```

The result of this is the map of our current location in Toronto, Ontario, depicted by a blue circle. We can see the unlabeled neighborhoods here.



Visualizing the hospitals near to the current location

Searching for hospitals near the current location

```
search_query = 'Hospital'
radius = 500
print(search_query + ' .... OK!')
```

```
Hospital .... OK!
```

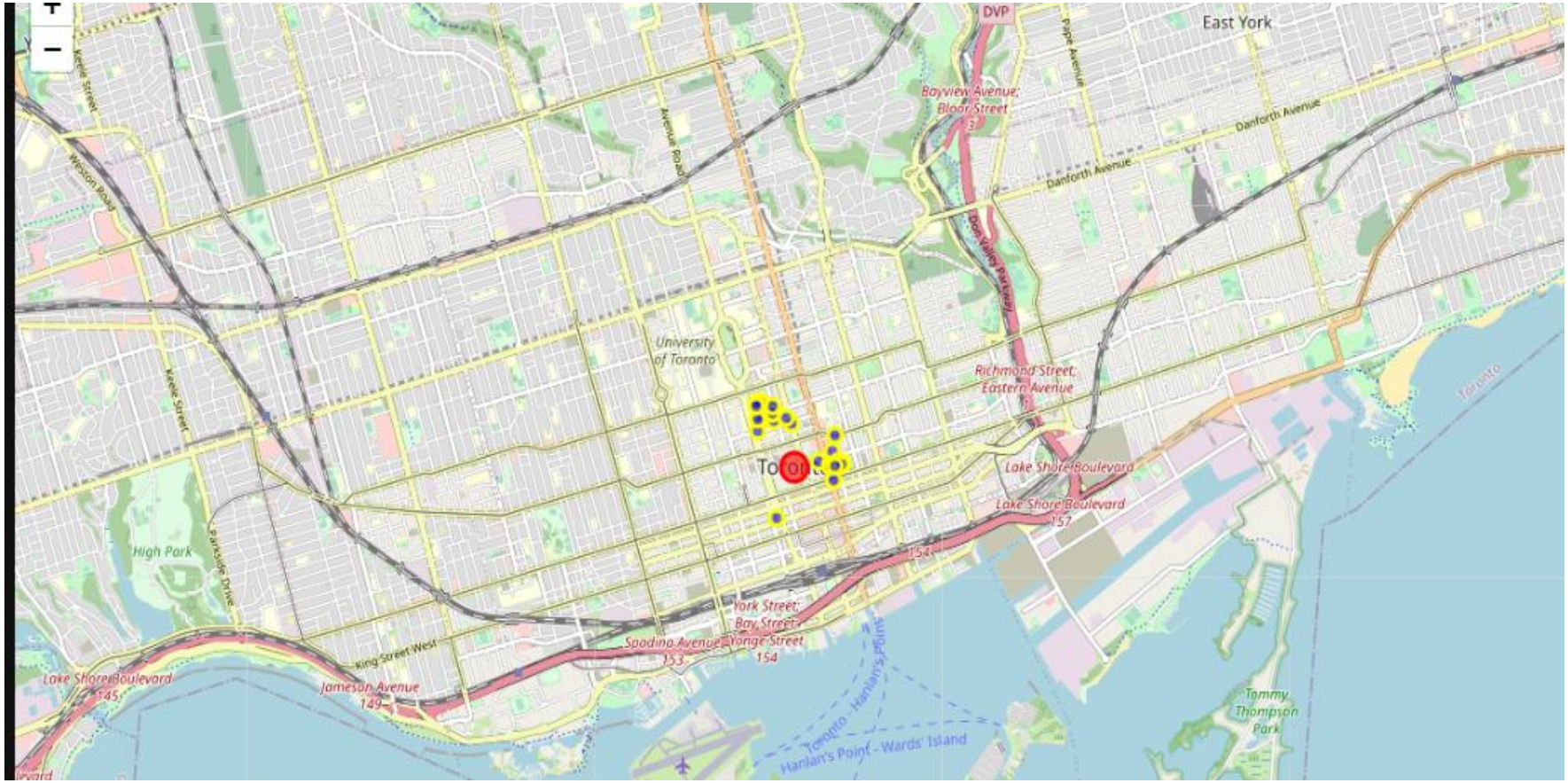
```
url_h = 'https://api.foursquare.com/v2/venues/search?client_id={}&client_secret={}&ll={},{}&oauth_token={}&v={}&query={}&radius={}&limit={}'.format(CLIENT_ID
url_h
```

```
'https://api.foursquare.com/v2/venues/search?client_id=LDMJ2QUV1CHFILPCH021GF1VITI1QIIANWDQ4X5X5ANNENHE&client_secret=PZ20JILHNNIUPM0MD324AP0B4FE2B0B3WQVDSYV
GPG1ES4&ll=43.6534817,-79.3839347&oauth_token=FL0CQ00TX0YNDLEPYOWDNBPPHCTIC55W42TVBC0ELY5V4IV0&v=20180604&query=Hospital&radius=500&limit=100'
```

```
# Send GET request for result
results = requests.get(url_h).json()
results
```


```
{'meta': {'code': 200, 'requestId': '600e5f33520d1f65397b87e7'},
 'notifications': [{'type': 'notificationTray', 'item': {'unreadCount': 0}}],
 'response': {'venues': [{'id': '4ad4c064f964a5206ef820e3',
    'name': 'The Hospital for Sick Children (SickKids)',
    'location': {'address': '555 University Ave.',
     'crossStreet': 'at Gerrard St.',
     'lat': 43.657498668962646,
     'lng': -79.3865121609307,
     'labeledLatLngs': [{'label': 'display',
       'lat': 43.657498668962646,
       'lng': -79.3865121609307}],
     'distance': 492,
```

Here the hospitals(YELLOW) near to the current location(RED) are displayed. We can further add more data points to visualize more neighborhoods and compare the patient ratios.



CONCLUSION

- We can clearly see that the hospitals which are near our location.
- This makes it a lot easier to spot the red zones as well as the hot spots for the people.
- It can be used to spot all the areas where there can be the distributions of vaccines in order to make it reach to a larger group of people much easier.
- This project on a large scale can immensely help in solving this problem and within a much shorter amount of time.