IBM Applied Data Science

COVID-19 Outbreak

Which hotel to stay in New York?

Capstone Project

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Background

Due to the outbreak of Coronavirus in the world and the growing cases presented by **World Health Organization** (WHO), the United States has become the epicenter of this epidemic, with **New York (NY) State** being the state with the most confirmed positive cases.

In order to address this pandemic, WHO created a delegation of specialist doctors to go to NY. So the delegation needs to find a strategic **hotel** to stay at.

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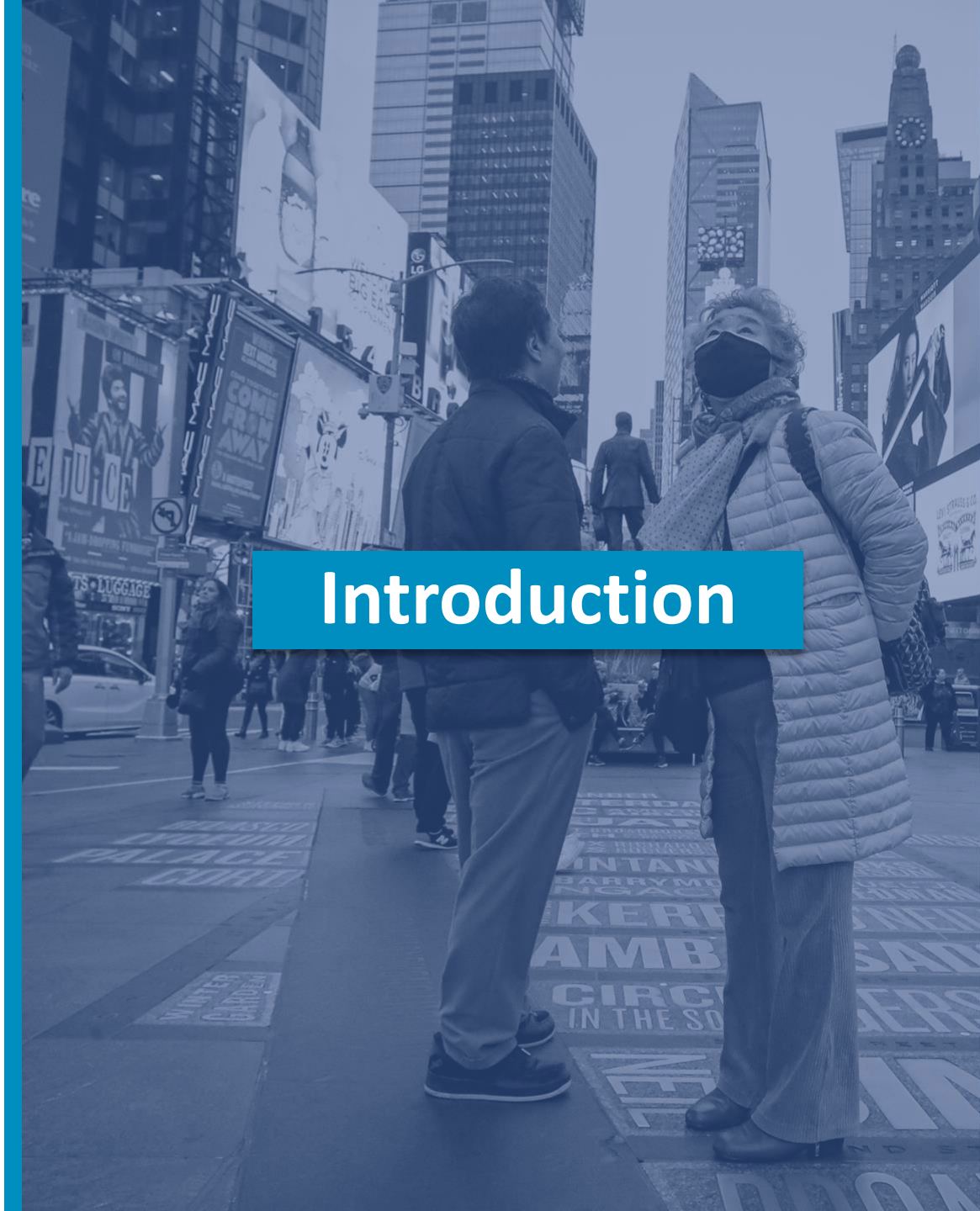
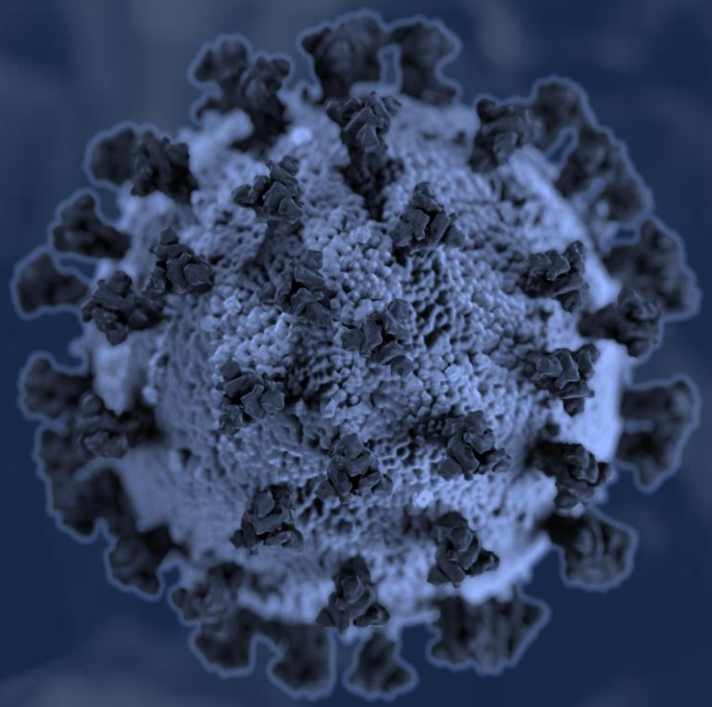


Business problem



The **WHO** delegation needs to find a strategic hotel located:

- In the county with the highest number of confirmed cases of COVID-19 to address the pandemic;
- Closest (less than 1.5 KM) to hospitals.

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Data Sources

In order to achieve the goal of the project we used the following data sources:

- Geodata of Hotels and Hospitals in New York using **Foursquare API.**
- Dataset of New York State Statewide COVID-19 Testing:
  - https://health.data.ny.gov/Health/New-York-State-Statewide-COVID-19-Testing/xdss-u53e

Exploratory Data Analysis

After collecting and preparing the data, we read it into a *pandas* dataframe, sorting the data in descending order by *Total Positives* (confirmed).

Queens** is the county with highest numbers of **Tests Performed** and **Confirmed cases.

Test Date	County	Total Positives	Tests Performed
04/18/2020	Queens	41237	80404
04/18/2020	Kings	36482	74825
04/18/2020	Nassau	30013	69293
04/18/2020	Bronx	28823	58605
04/18/2020	Suffolk	26888	65320
04/18/2020	Westchester	23803	71741
04/18/2020	New York	18220	46204
04/18/2020	Richmond	9674	23535
04/18/2020	Rockland	9364	21949
04/18/2020	Orange	6379	18499

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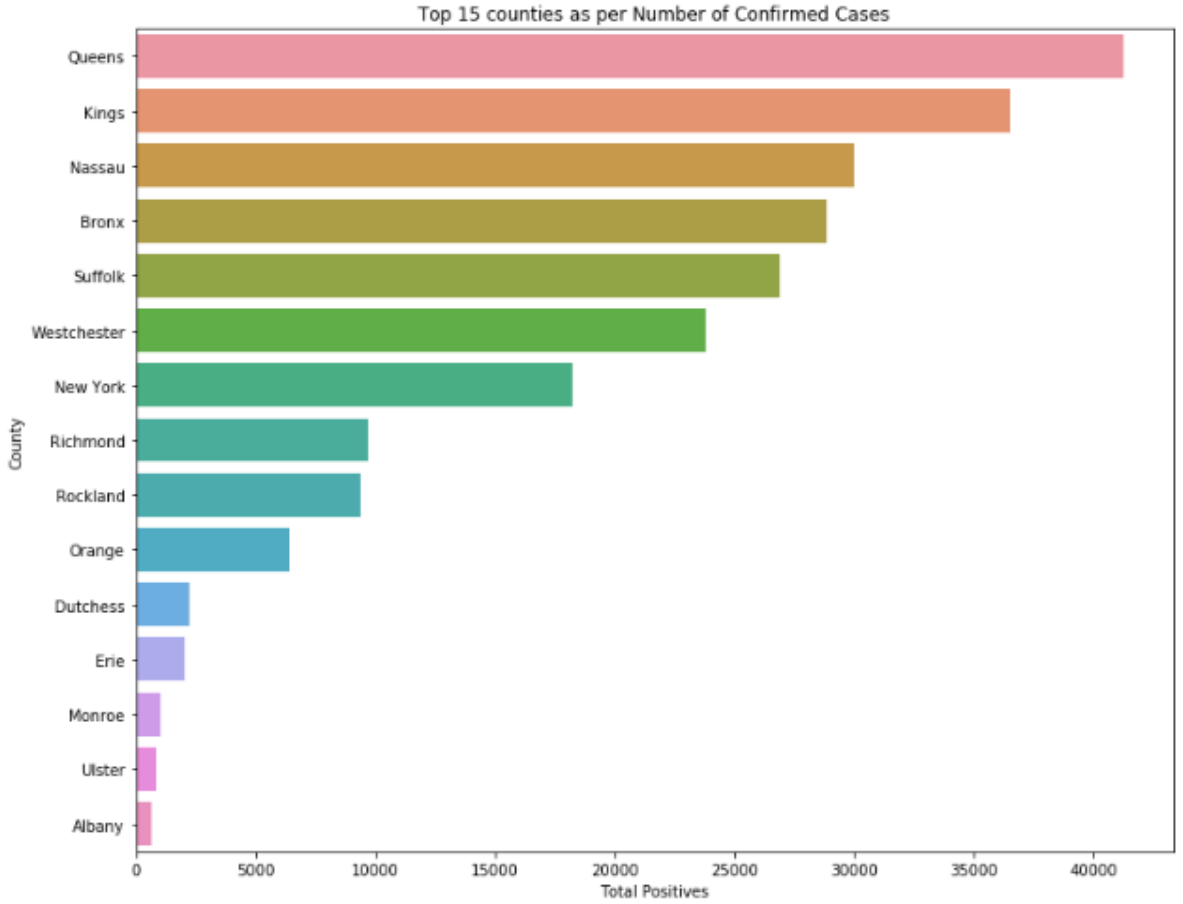
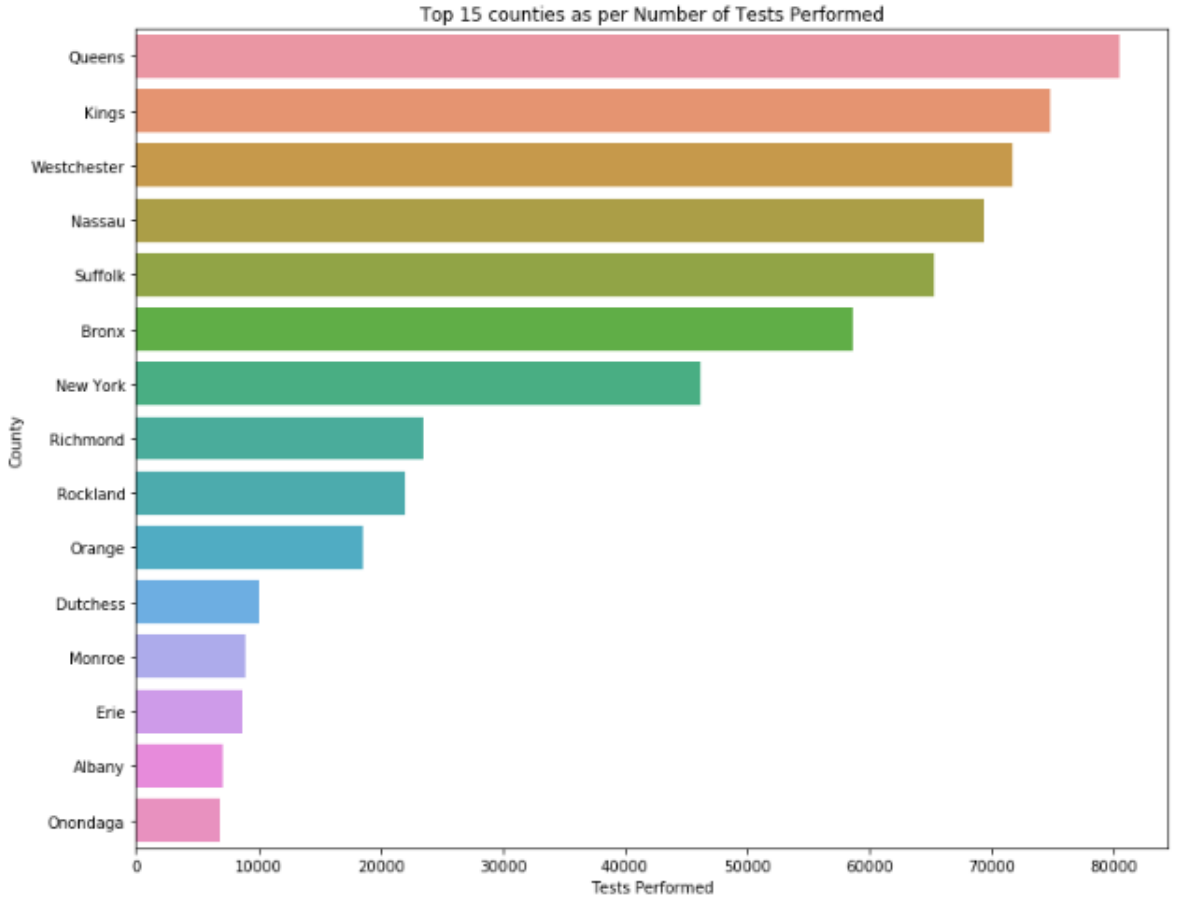
TOP 15 Counties with Tested and Confirmed cases





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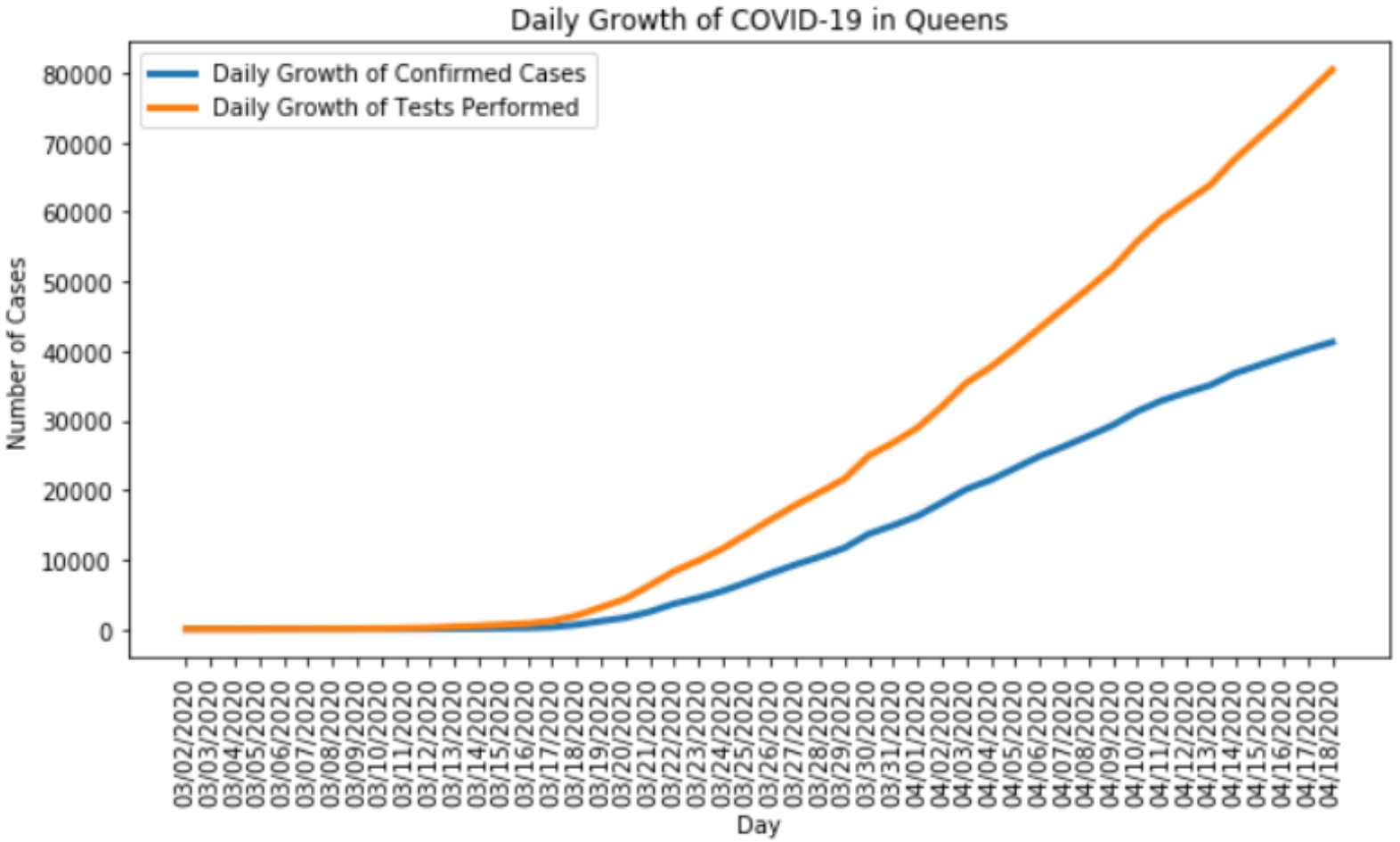
Daily Growth of COVID-19 in Queens



The plot shows that the number of *confirmed cases* grows as the tests of COVID-19 are performed.

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Search Hotels with Foursquare API

List of Hotels nearby Queens

name	categories	lat	lng	distance
Ski Und Golfresort Hotel Riml Obergurgl	Apres Ski Bar	40.749071	-73.812082	1221
Bajwa Hotels	Hotel	40.758244	-73.807939	1278
Hotel Aramie	None	40.757008	-73.810927	1377
Jinfeng Hotel	Hotel	40.757871	-73.820400	2118
Sheraton Laguardia East Hotel	Music Venue	40.765380	-73.817360	2401
Navaratna Hotel In CBD	Indian Restaurant	40.756033	-73.825229	2427
Navaratna Hotel	Indian Restaurant	40.756033	-73.825229	2427
Double tree hotel	Hotel	40.753359	-73.828031	2593
Michelle Hotel	Hotel Bar	40.766609	-73.773380	2770
Sheraton Hotel Flushing	Building	40.757730	-73.829285	2810

The Result of a request to the Foursquare API to search for **Hotels** that is within 2.5 km from **Queens** geolocation.

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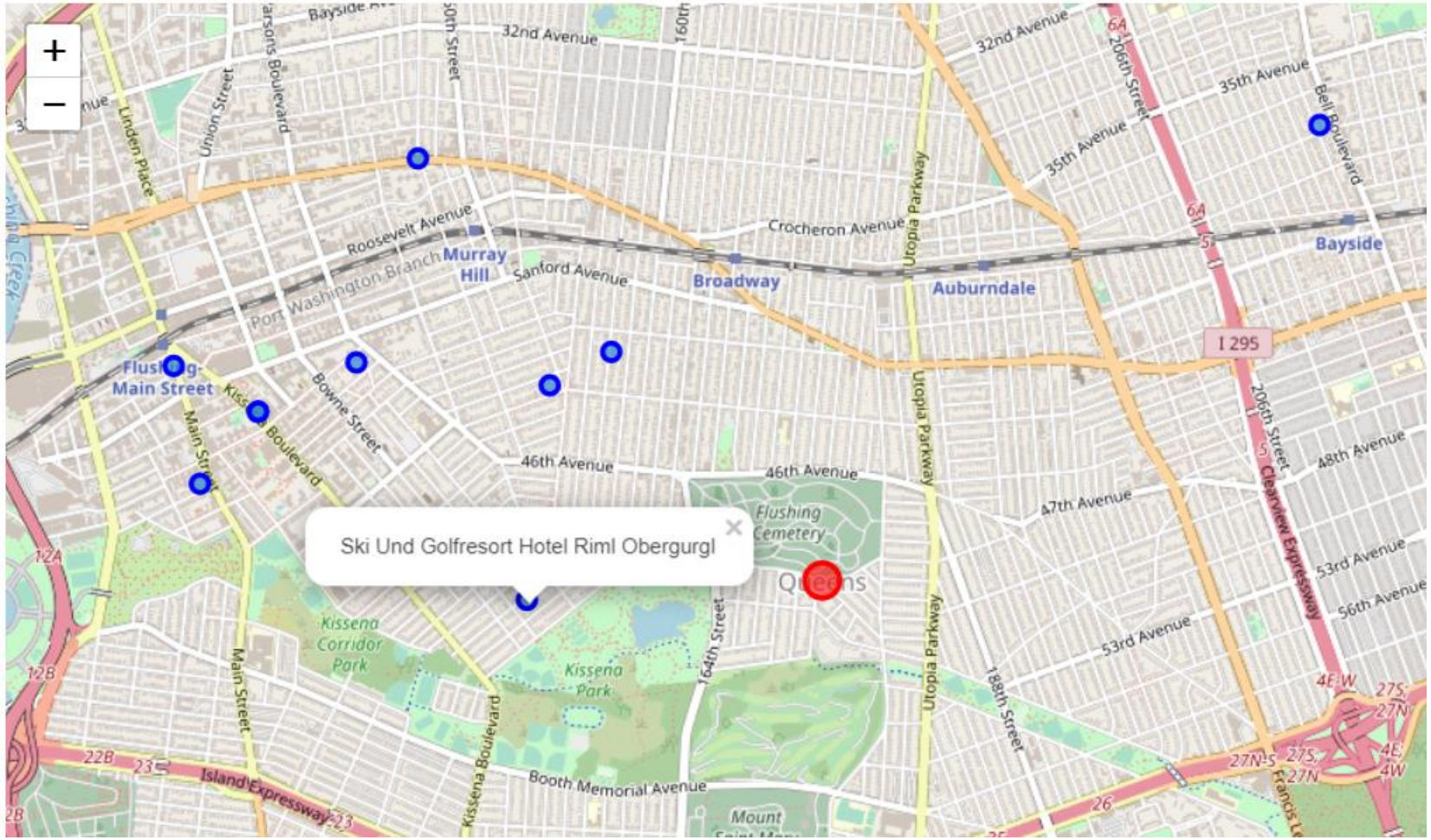
Search Hotels with Foursquare API (Cont.)



Using **Folium** library to map and visualize the Foursquare result.

- Queens circle mark
- Hotels circle mark

Explore Hospitals with Foursquare API

Request to Foursquare API to explore for **Hospitals** that is within 1.5 km from **Hotels** geolocation, grouped in a single dataframe. The table below show the first 5 rows of the dataframe.

Hotel	Hotel Latitude	Hotel Longitude	Hotel distance	Hospital	Hospital Latitude	Hospital Longitude	Hospital distance	Hospital Category
Ski Und Golfresort Hotel Riml Obergurgl	40.749071	-73.812082	1221	NewYork-Presbyterian Queens	40.747248	-73.825336	1136	Hospital
Ski Und Golfresort Hotel Riml Obergurgl	40.749071	-73.812082	1221	Flushing Hospital	40.755268	-73.816618	788	Hospital
Ski Und Golfresort Hotel Riml Obergurgl	40.749071	-73.812082	1221	Flushing Hospital Human Resources	40.755171	-73.816555	776	Hospital
Ski Und Golfresort Hotel Riml Obergurgl	40.749071	-73.812082	1221	FHMC 3W	40.755448	-73.816804	813	Hospital
Ski Und Golfresort Hotel Riml Obergurgl	40.749071	-73.812082	1221	FHMC 4N1	40.755623	-73.817022	839	Hospital

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Descriptive Statistical Analysis

Summary of the data using description method and the number of Hospitals 1.5 km nearby each Hotel

	Number of Hospitals
Sheraton Hotel Flushing	18
Jinfeng Hotel	17
Navaratna Hotel In CBD	17
Double tree hotel	17
Navaratna Hotel	17
Ski Und Golfresort Hotel Riml Obergurgl	15
Hotel Aramie	7
Michelle Hotel	7
Sheraton Laguardia East Hotel	7
Bajwa Hotels	6

	Hotel Latitude	Hotel Longitude	Hotel distance	Hospital Latitude	Hospital Longitude	Hospital distance
count	128.000000	128.000000	128.000000	128.000000	128.000000	128.000000
mean	40.756591	-73.819131	2226.593750	40.753384	-73.819029	950.062500
std	0.004300	0.012901	546.100931	0.007166	0.012792	270.979871
min	40.749071	-73.829285	1221.000000	40.746428	-73.845345	324.000000
25%	40.755365	-73.828031	2118.000000	40.746760	-73.825212	768.750000
50%	40.756033	-73.825229	2427.000000	40.755171	-73.824523	1004.000000
75%	40.757871	-73.812082	2593.000000	40.755623	-73.816804	1135.250000
max	40.766609	-73.773380	2810.000000	40.779088	-73.768463	1481.000000

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Descriptive Statistical Analysis (cont.)

Get details of the Hotel and Hospital with minimum *Hospital distance* (324 metres).

Hotel	Hotel Latitude	Hotel Longitude	Hotel distance	Hospital	Hospital Latitude	Hospital Longitude	Hospital distance	Hospital Category
Double tree hotel	40.753359	-73.828031	2593	Flushing Hospital Pediatric Clinic	40.751156	-73.825506	324	Hospital

Results and Recommendations

Our results show that the **Double tree hotel** is best hotel that the WHO Delegation should go based on the requirements of the *Business Problem*. Including *Flushing Hospital Pediatric Clinic*, which is the closest Hospital to **Double tree hotel** with 324 metres, **Double tree hotel** has 17 Hospitals nearby.

You can feel free to consider another hypothesis, like to take closest Hotel of Queens coordinates: **Ski Und Golfresort Hotel Riml Obergurgl**, and evaluate the minimum distance to each Hospital nearby. Ski Und Golfresort Hotel Riml Obergurgl has 15 Hotels nearby.

Conclusion

The correct analytical approach depends on the business requirements for the problem. If we read objectively our business problem, we'll realize that the solution we are looking for, is based on the current status of COVID-19 in New York State. **Descriptive analysis** is the correct approach to solve this kind of problem, so we used it and the result was great. Another interesting point is the power of **Foursquare API** to deliver incredible results, including geolocation data. Foursquare API made it easy to find the best Hotel that the WHO Delegation could stay.

Thanks!

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