15 MARCH 2021

CAPSTONE PROJECT - THE BATTLE OF NEIGHBOURHOODS

VENDOR MACHINE DISTRIBUTION IN NEW YORK CITY

INTRODUCTION & BUSINESS PROBLEM

A Visual Approach to determine Strategic Locations to put the Surgery Masks and Hand Sanitiser vendor machine distribution for daily hygiene maintenance based on population density of New York City to measure “new normal” readiness.

PROBLEM & DISCUSSION OF THE BACKGROUND

Since the beginning of 2020, New York and many other cities around the world have been under attack by ‘Covid-19’. The City of New York as the most populous city in the United States, the Intensive human activities are inevitable. Although the epidemic has been controlled, people's health awareness needs to be strengthened. For example, wear a mask anytime and use hand sanitiser before meals.

TARGET AUDIENCES

Companies of Pharmaceutical, Medical Devices or Consumer Healthcare, Citizens of New York City, Vendor Machine Distributor

DATA SOURCE & PURPOSE

DATA 1 : NEIGHBOURHOOD - TOTAL OF 5 BOROUGHS AND 306 NEIGHBOURHOODS

In order to segment and explore the neighbourhoods, we will essentially need a dataset that contains the 5 boroughs and the neighbourhoods that exist in each borough as well as the the latitude and longitude coordinates of each neighbourhood.
2014 New York City Neighborhood Names

DATA 2 : WIKIPEDIA

In order to find out the most densely populated neighbourhoods in New York City.
New York Population

DATA 3 : FOURSQUARE API

New York city geographical coordinates data will be utilised as input for the Foursquare API, that will be leveraged to provision venues information for each neighbourhood.
We will use the Foursquare API to explore neighbourhoods in New York City.

METHODOLOGY

ANALYTIC APPROACH

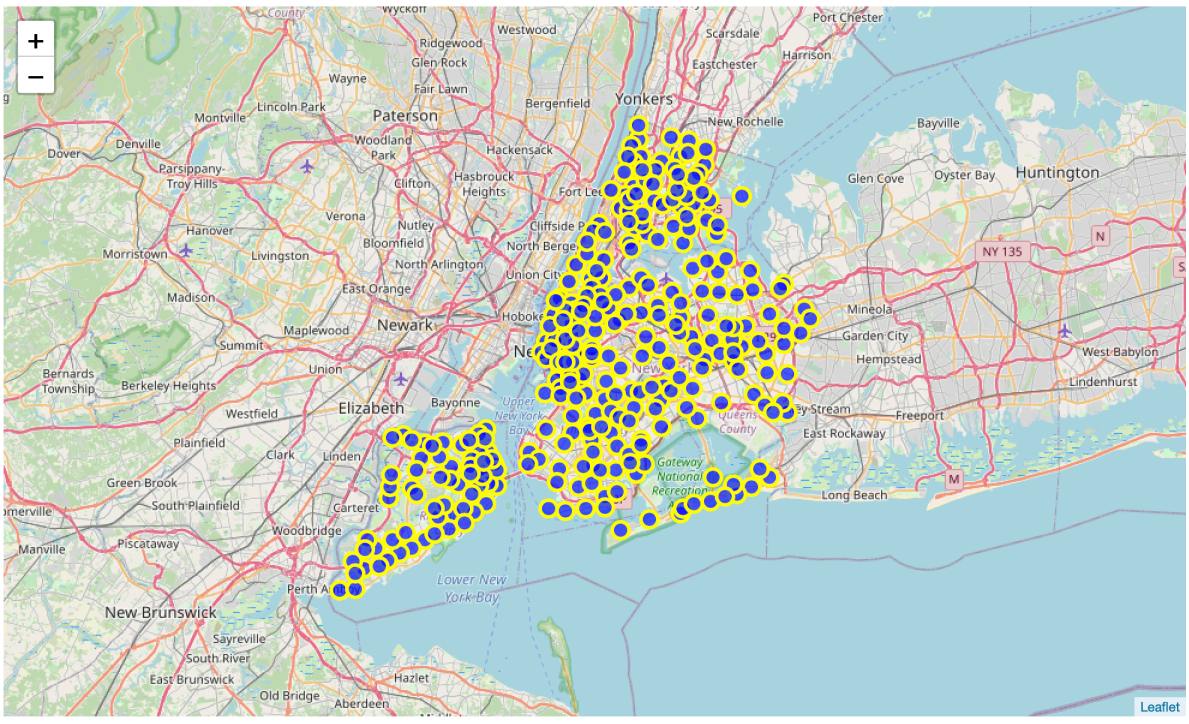
Find out the amount of neighbourhood in New York City which results in total 5 boroughs and 306 neighbourhoods. From the density of population to decided the location and amount of the vendor machines.

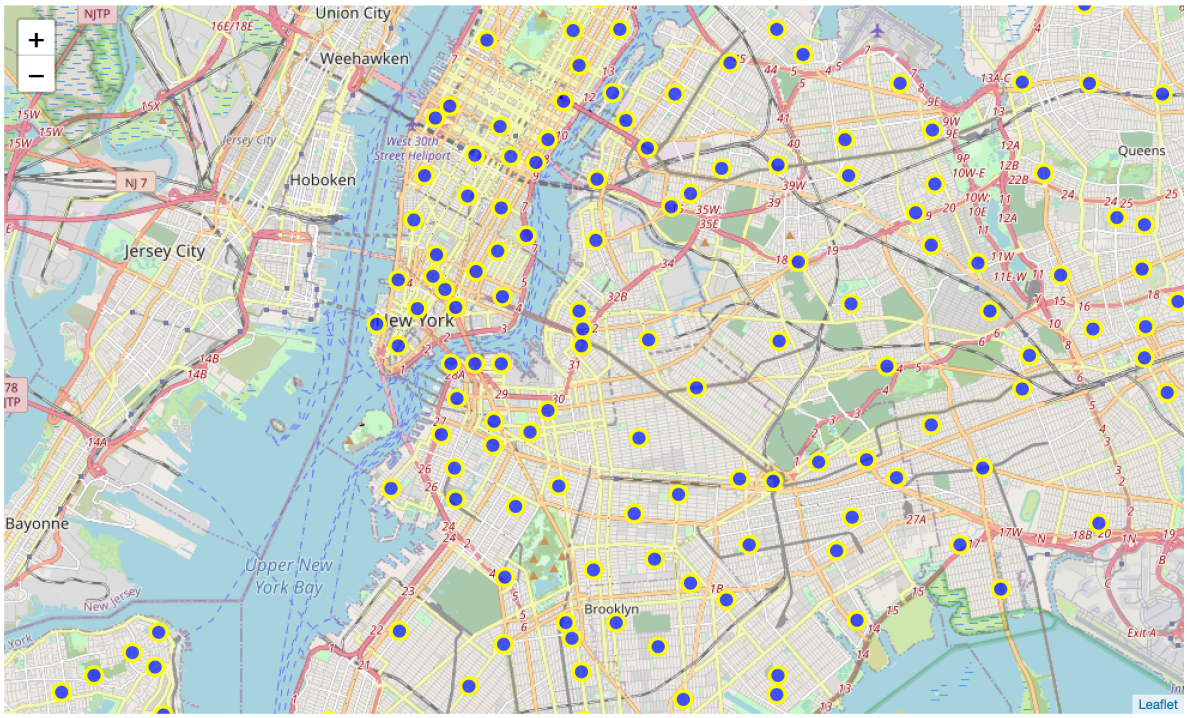
EXPLORATORY DATA ANALYSIS

Data 1: New York City Geographical Coordinates Data

- Load the data and explore data from newyork_data.json file.
- Transform the data of nested python dictionaries into a pandas data-frame (which contains the geographical coordinates of New York city neighbourhoods)
- Use the data to get Venues data from Foursquare.
- Use the Geopy and Folium libraries to create a New York City map with neighbourhoods superimposed on top

New York City neighbourhood Visualisation





Insights: Neighbourhood of New York City are concentrated.

Data 2 : New York City Population Data from Wikipedia

- Use the BeautifulSoup python library. (which creates a parse tree for parsed pages that can be used to extract data from HTML, which is useful for web scraping)

*Beautiful Soup is a Python library for pulling data out of HTML and XML files. It works with your favourite parser to provide idiomatic ways of navigating, searching, and modifying the parse tree.

New York City Population

	Borough	County	Estimate_2017	square_miles	square_km	persons_sq_mi	persons_sq_km
0	The Bronx	Bronx	1,418,207	42.10	109.04	33,867	13,006
1	Brooklyn	Kings	2,559,903	70.82	183.42	36,147	13,957
2	Manhattan	New York	1,628,706	22.83	59.13	71,341	27,544
3	Queens	Queens	2,253,858	108.53	281.09	20,767	8,018
4	Staten Island	Richmond	476,143	58.37	151.18	8,157	3,150
5		City of New York	8,336,817	842.343	783.83	27,547	10,636
6		State of New York	19,453,561	1,731.910	122,056.82	412	159

Insights:
The geographically smallest and most densely populated borough - New York County: Manhattan (the population density of 71,341 people per square mile in 2015) *The highest and dense among all the American cities.

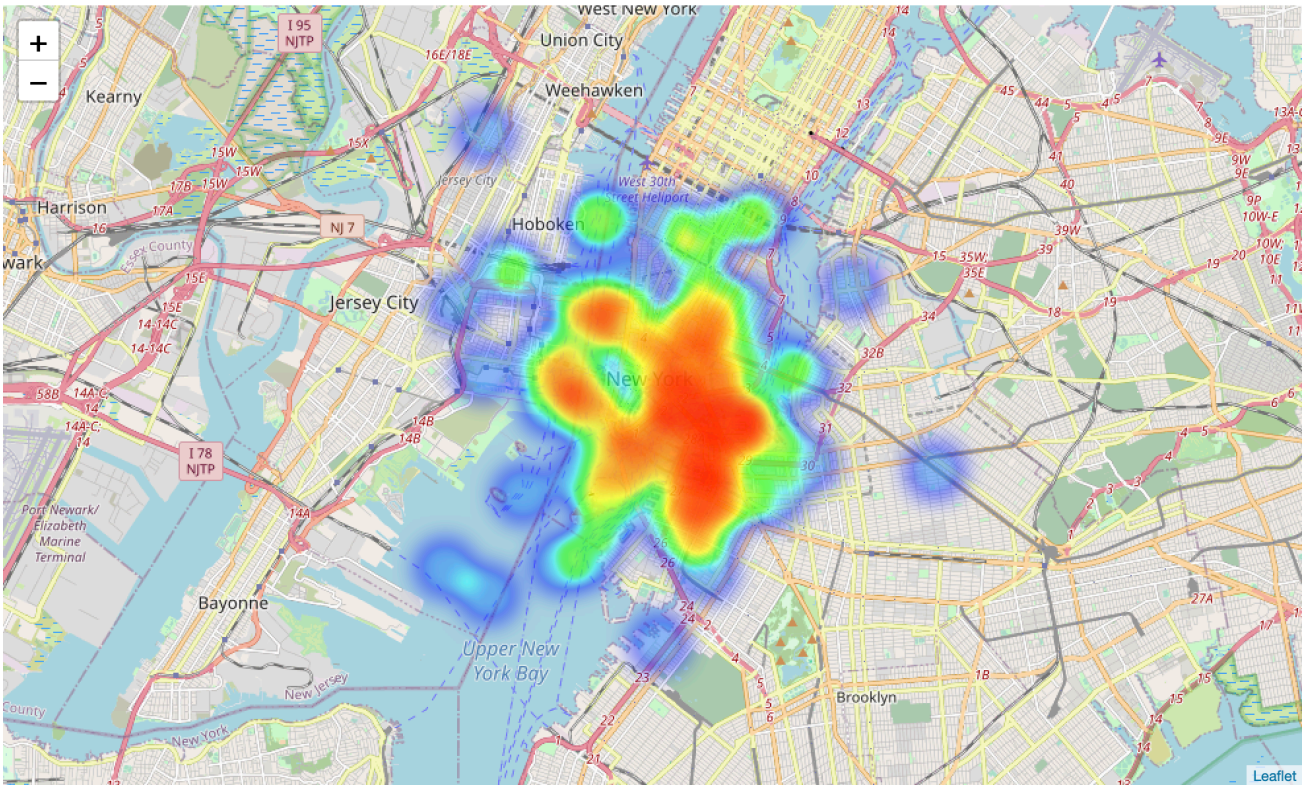
The most populous borough in New York City - Kings County: Brooklyn (Long Island west)

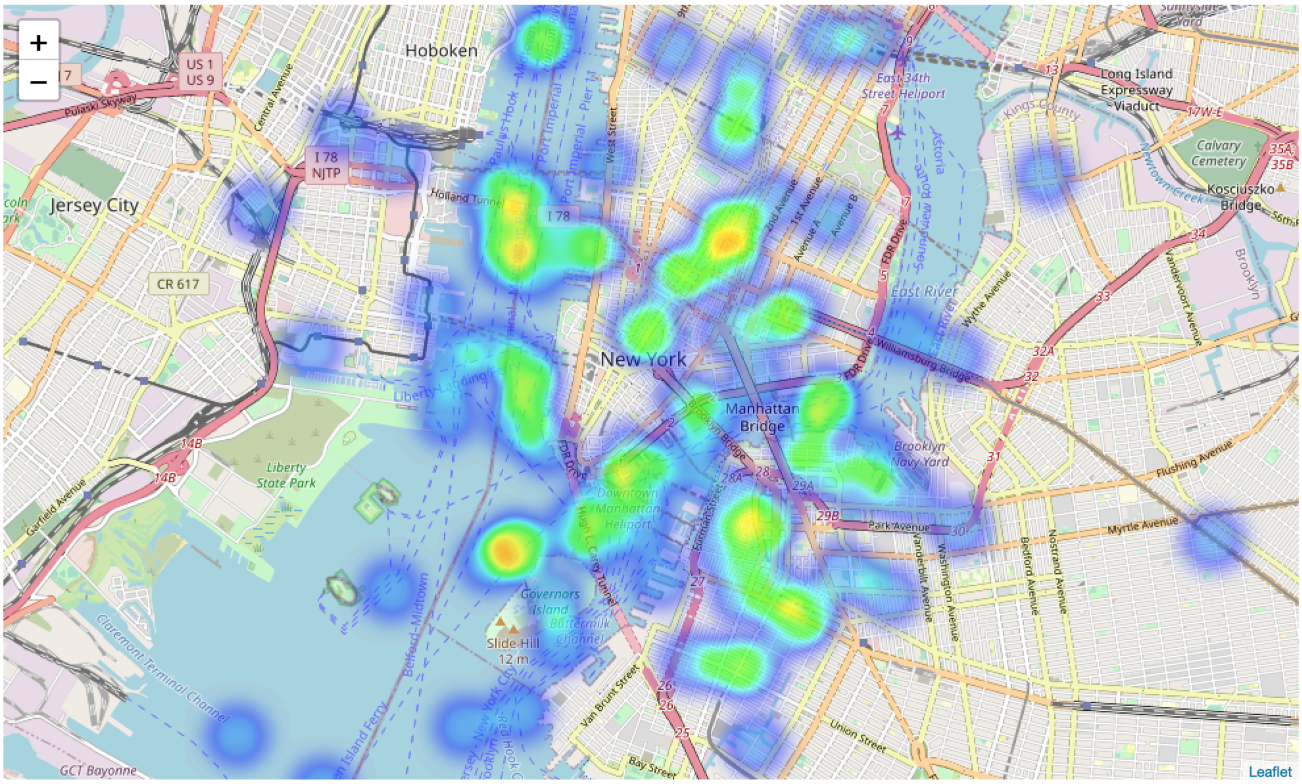
The geographically largest borough - Queens County: Queens (Long Island north and east of Brooklyn)

- Use the Folium libraries to create a New York City heat map to show the density of those neighbourhoods.

*A heatmap is a graphical representation of data where each value of a matrix is represented as a colour. This page explains how to build a heat map with Python, with an emphasis on the Seaborn library.

New York City population Visualisation - Heatmap

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US 9
Pulaski Skyway
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NJTP
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Holland Tunnel
New York
Manhattan
Bridge
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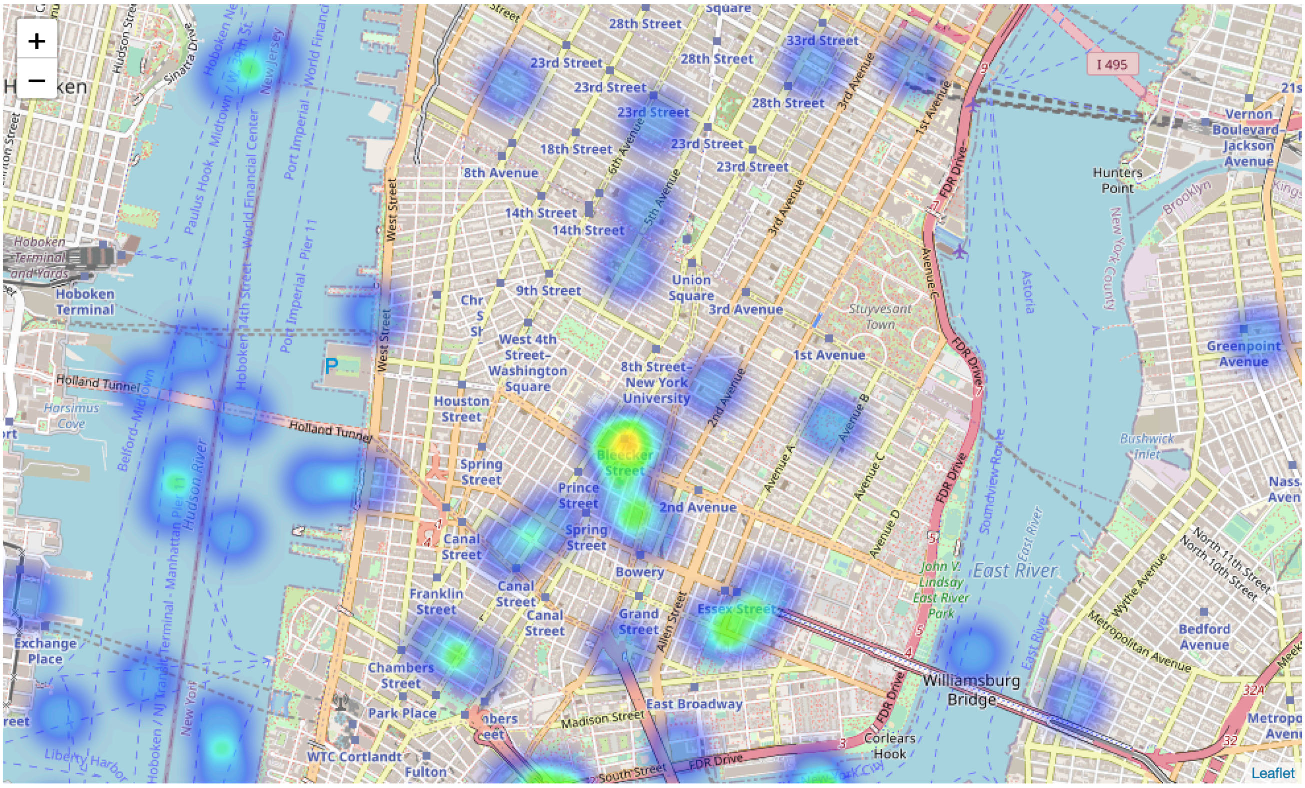
Long Island
Expressway
Viaduct
Calvary
Cemetery
Kosciuszko
Bridge
East River
Williamsburg Bridge
Brooklyn
Navy Yard
Liberty
State Park
Governors
Island
Slide Hill
12 m
Buttermilk
Channel
Downtown
Manhattan
Heliport
Park Avenue
Myrtle Avenue
Flushing Avenue
Union Street
Bay Street
Van Brunt Street
Claremont Terminal Channel
GCT Bayonne
Leaflet


28th Street
23rd Street
18th Street
14th Street
8th Avenue
9th Street
Union
Square
3rd Avenue
1st Avenue
Stuyvesant
Town
West 4th
Street-
Washington
Square
8th Street-
New York
University
Houston
Street
Spring
Street
Prince
Street
Bleecker
Street
2nd Avenue
Canal
Street
Franklin
Street
Bowery
Grand
Street
Essex Street
Chambers
Street
Park Place
East Broadway
Madison Street
WTC Cortlandt
Fulton
Williamsburg
Bridge
Corlears
Hook
Hoboken
Terminal
Holland Tunnel
Exchange
Place
Harsimus
Cove
Hunters
Point
Vernon
Boulevard-
Jackson
Avenue
Greenpoint
Avenue
East River
John V.
Lindsay
East River
Park
Bushwick
Inlet
Bedford
Avenue
Metropolitan Avenue
I 495
FDR Drive
Leaflet

RESULTS

Manhattan required the most of the vendor machines. Brooklyn and Queens also required corresponding vendor machines. The rest of the boroughs can present moderate vendor machines.

DISCUSSION

1. There is scope to increase vendor machine distribution in Brooklyn and Queens.

2. There is scope to explore the potential opportunities for vendor machine distribution in Richmond,City of New York and State of New York.

3. Based on the population density of New York City, Manhattan are in severe cases. So the number of the vendor machine distribution needs to be increased and properly arranged.

*This analysis is performed on limited and outdated data. This may affect the timeliness and practicability.

CONCLUSION

The entire New York City is so densely populated that a large number of Surgery Masks and Hand Sanitiser vendor machine are placed in any neighbourhood to remind citizens to be alert and clean at all times.