Patterns in Types Of Restaurants in New York

VARSHA GADEKAR

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Problem

The project aims to find out if there is any pattern in the type of restaurants located in every borough and neighborhood of New York.

- Are some cuisines / types of restaurants more represented in certain areas than in others?
- Which cuisines / types of restaurants have delivery options?
- Is it possible to group neighborhoods together based on the sole criteria of food?
- Which borough has the most restaurants?

The project will also focus on the borough with most restaurants in New York and provide a list of top restaurants based on user ratings and likes and dine-out and delivery services considering current covid scenarios.

Data acquisition and cleaning

- Neighborhood has a total of 5 boroughs and 306 neighborhoods. In order to segment the neighborhoods and explore them, we will essentially need a dataset that contains the 5 boroughs and the neighborhoods that exist in each borough as well as the latitude and longitude coordinates of each neighborhood
- This dataset exists for free on the web. Here is the link to the dataset: https://geo.nyu.edu/catalog/nyu_2451_34572.
- Geopy library was used to get the latitude and longitude values of New York City
- Foursquare API was utilized to explore all the neighborhoods and segment them. The API was also used to get details of venue
- For the project only the following features were selected :
    - *borough ->* Borough
    - *Name ->* Neighborhood
    - *Coordinates ->* Latitude, Longitude

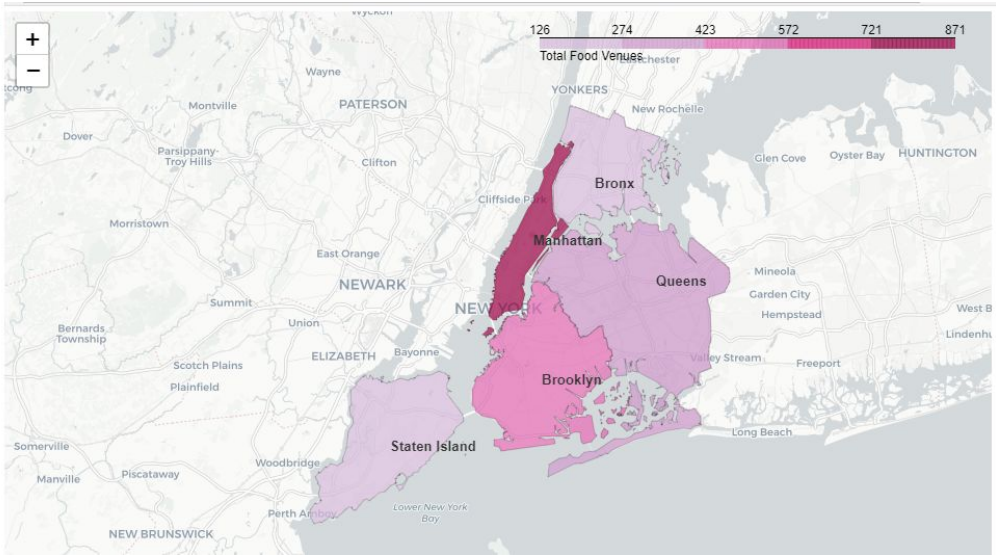
Methodology

In this project we will direct our efforts on:

- Detecting patterns in the type of restaurants located in every borough and neighborhood of New York. We will limit our analysis to area 500m radius.
- collected the required data: location and type (category) of every restaurant within 500m radius.
- calculation and exploration of 'restaurant density' across different areas of New York.
- clustering neighborhoods and boroughs based on types of restaurants

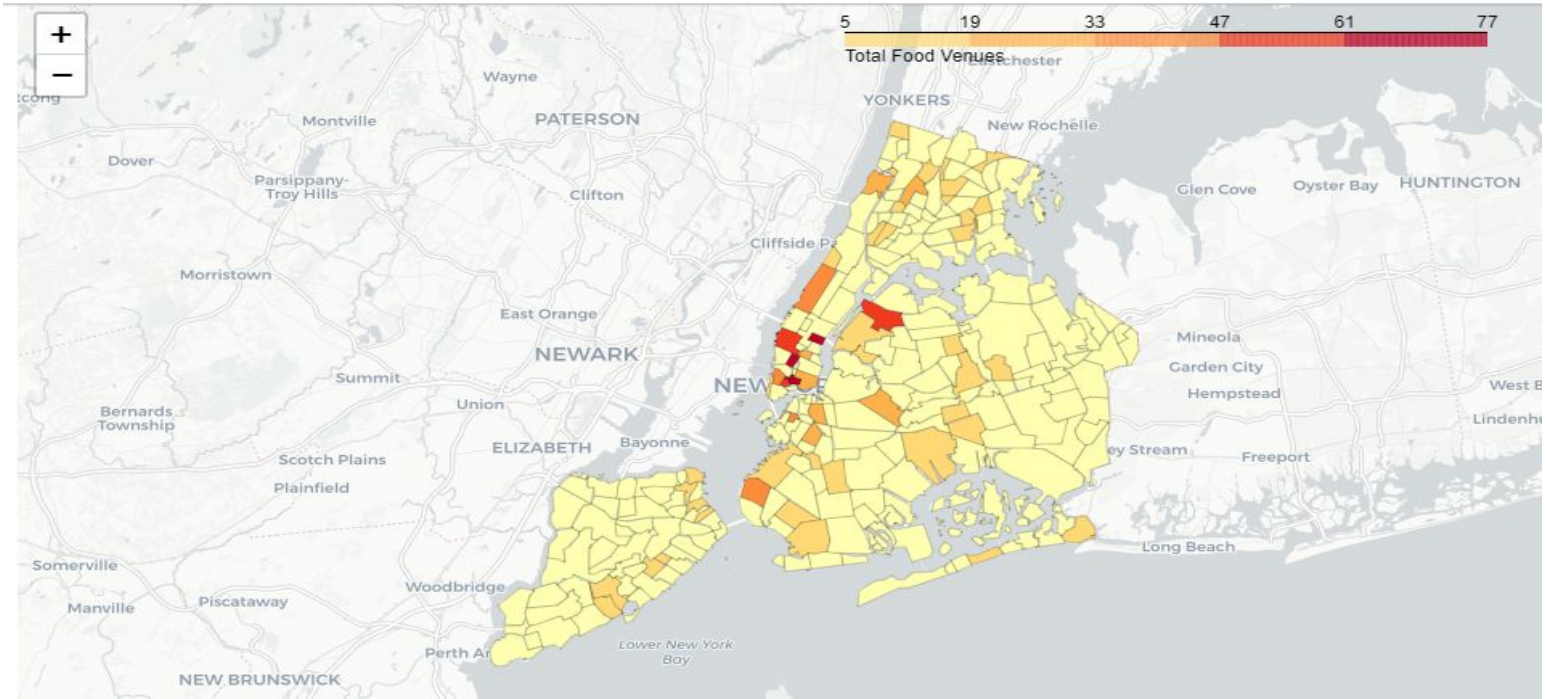
Data Analysis

Density of restaurants in New york Borough:

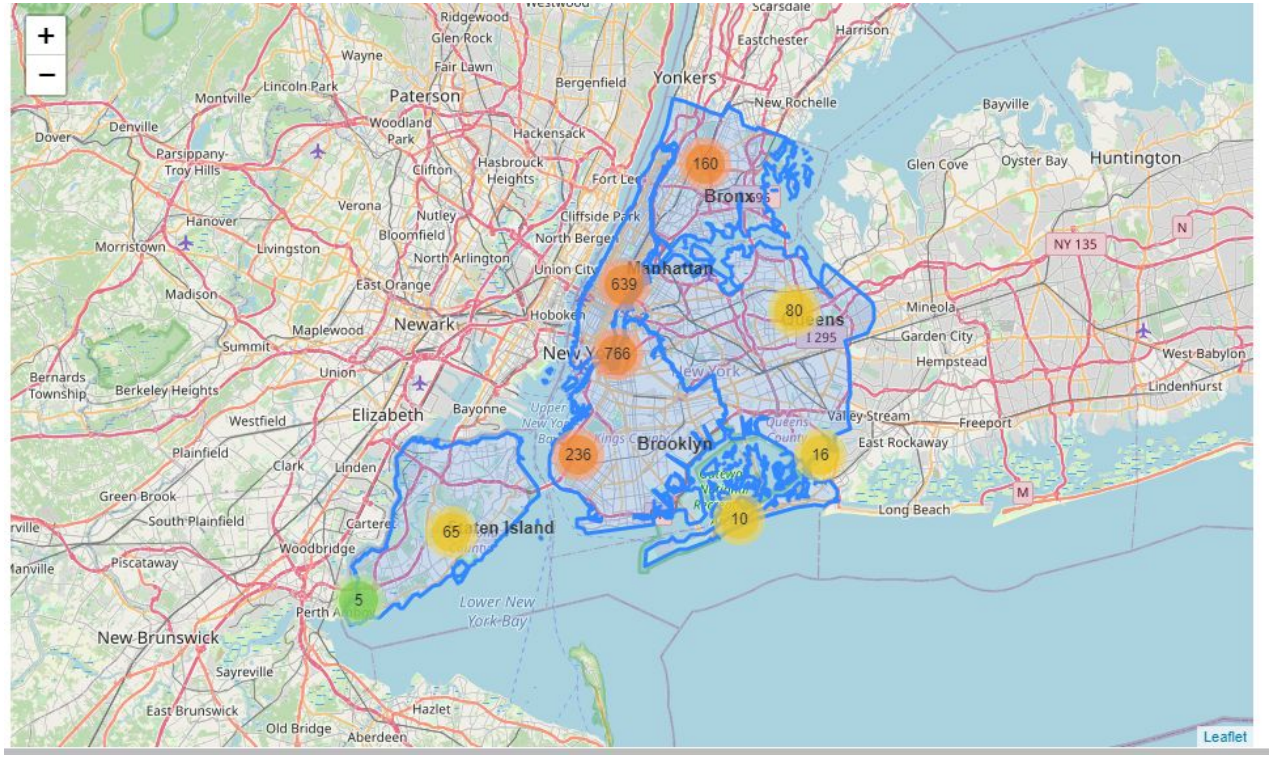


From the above map we can conclude that Manhattan has the highest number of restaurants.

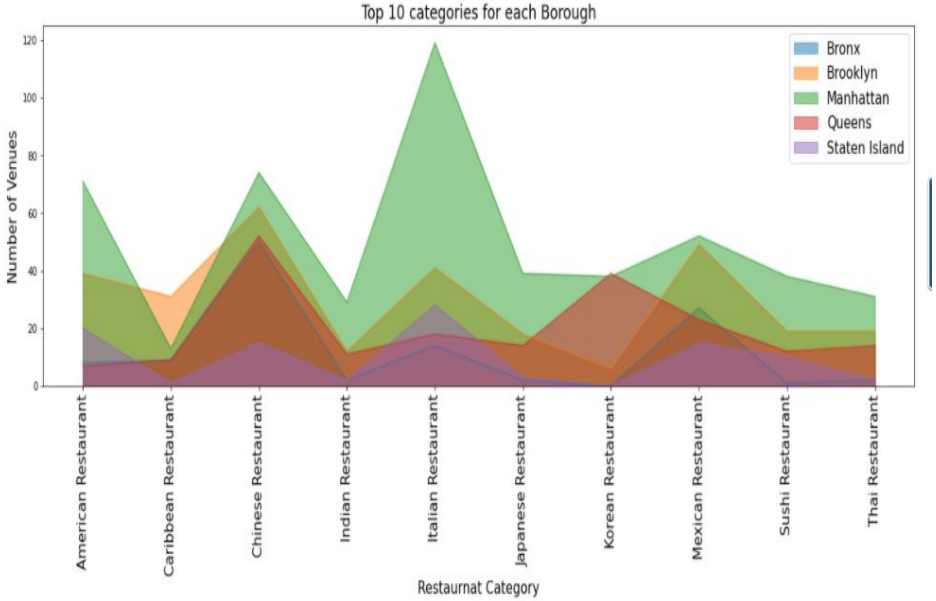
Nieghborhood:



Numerical vision:



Top 10 categories based on density



- In Manhattan most popular are Italian restaurant
- ALL the Boroughs has almost equal popularity for Chinese Restaurants
- Brooklyn, Manhattan, Queens have almost similar popularity in types of restaurants

Restaurants density based on delivery option

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Restaurant list:
 -> Favela Grill -> -> Off The Hook -> -> Al-sham Sweets and Pastries -> -> The Gully -> -> AbuQir Seafood
-> -> Duzan -> -> Sabry's -> -> Seva Indian Cuisine -> -> Viva Viva -> -> Crave Astoria -> -> Mochiron Izak
aya -> -> El Cafetal -> -> Tikka Indian Grill -> -> Ovelia Psistaria Bar -> -> Pochana Thai Kitchen -> -> K
abab Café -> -> Jujube Tree -> -> The Grand -> -> Antika Restaurant & Pizzeria -> -> King of Falafel and Sh
awarma -> -> Kal -> -> Sugar Freak -> -> Farid Kebab, Steinway -> -> Gyro Uno -> -> Mombar -> -> Gyro World
-> -> El Omda -> -> Queens Comfort -> -> Blend Astoria -> -> Elias Corner For Fish -> -> Halal Sandwich Sho
p -> -> Layali Dubai -> -> Via Trenta -> -> Pink Nori -> -> El-Rawsheh -> -> Golden House Chinese Restauran
t -> -> Sampan -> -> Aden Restaurant -> -> Matsu Sushi -> -> Piatsa Souvlaki -> -> Pita Pan -> -> Namaste -
> -> Golden Kitchen -> -> Little Morocco -> -> Mijana Hookah Lounge & Restaurant -> -> Avenue A -> -> Aweso
meSauce -> -> Tikka Roll House -> -> Hangar Astoria ->
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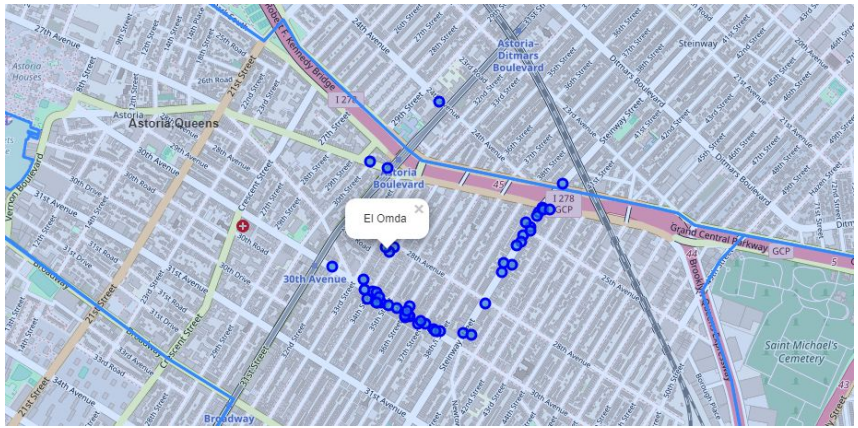
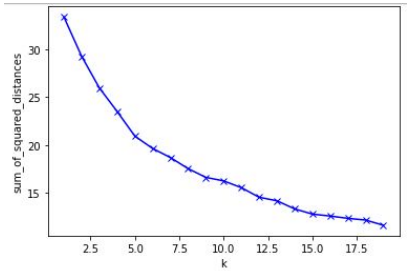


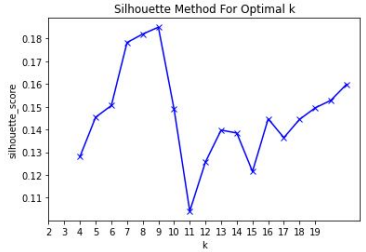
- Most of the restaurants provide home delivery options in New York.
- Function was created which lists and display all the restaurants in a neighborhood which provide home delivery option you just need to pass the name of neighborhood and borough.
- For *neighborhood_name='Astoria' and borough_name='Queens' output:*

Modeling -k means clustering

- an unsupervised machine learning technique used to identify clusters of data objects in a dataset
- Find an optimal value for k
- The Elbow method

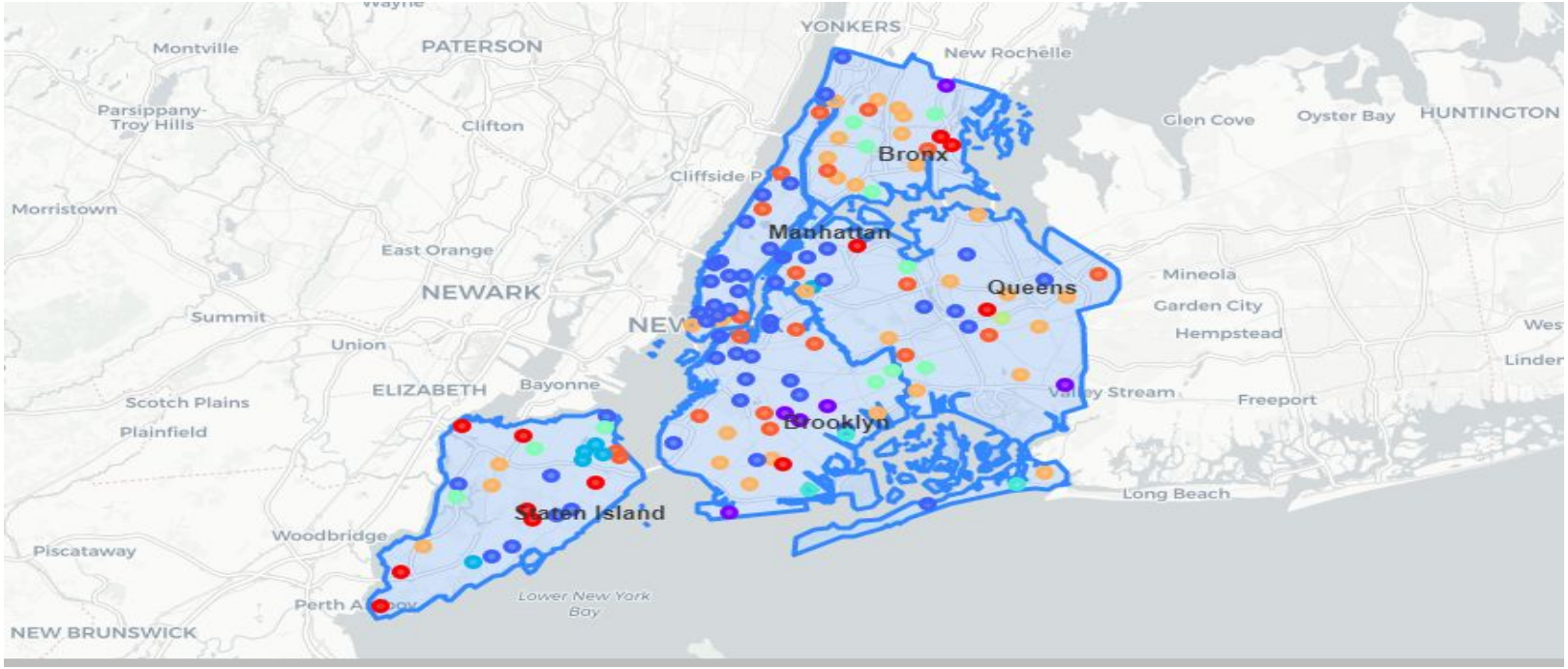
-> The Silhouette Method





- k=9 is optimal value

Neighborhood clustered



Conclusions

- There are a great number of restaurants in New York
- Manhattan has the largest number of restaurants among all boroughs.
- People of Manhattan love Italian food.
- There are 83 types of food category/cuisines in New York among which the top 10 based on density are : Chinese, Italian, Mexican, American, Korean, Sushi, Japanese, Thai, Caribbean and Indian.
- Most of the restaurants provide food delivery options so if you want to grab a bite from the comfort of your own place then you can just ask for home delivery.
- Then we clustered the neighborhood data to find out if there is any relation between the neighborhood based on types of food and we found out neighborhoods who have similar food tastes.