1. **Introduction & Business Problem:**

   New York City (**NYC**), often called the **City of New York** or simply **New York** (**NY**), is the most populous city in the United States. With an estimated 2018 population of 8,398,748 distributed over about 302.6 square miles (784 km^2), New York is also the most densely populated major city in the United States There are more than 2 million small businesses in New York state, which employ 4 million people. These small businesses make up 99.8% of all businesses within the state and employ more than half the state's workforce. In 2018, New York's unemployment rate was about 4.7%, slightly higher than the national average, but still healthy. The share of workers employed by small businesses underscores their importance to the state's economy: small businesses created 113,528 net jobs throughout the state.

   Business Problem

   The City of New York is famous for its excelllent cuisine. It's food culture includes an array of international cuisines influenced by the city's immigrant history. There are lot of Indian migrants working in US and love to have Indian food. Moreover Indian cosine is famous globally. And opening a restaurant with Indian food can bring lot of customers and it can be a good business for long term.

   Opening a North Indian restaurant is a tricky decision as it need to fulfil a lot of parameters. It needs to be in area with good amount of Indian people and where competition is less and provide opportunity for growth.

   My client wants to open his business in Manhattan area, so I focus on that borough during my analysis. We define potential neighborhood based on the number of North Indian restaurant which are operating right in each neighborhood. Manhattan has full potential but also is a very challenging district to open a business because of high competition. New North Indian restaurant should be open in an area that inadequate neighborhood in this way the restaurant

can attract more customers. Therefore, this analysis necessary to ensure that we have enough customers and that we are not so close to other north Indian restaurant.

2. Data

Data 1: Neighborhood has a total of 5 boroughs and 306 neighborhoods. In order to segement 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 the latitude and logitude coordinates of each neighborhood. This dataset exists for free on the web. Link to the dataset is: https://geo.nyu.edu/catalog/nyu_2451_34572

	Borough	Neighborhood	Latitude	Longitude
0	Manhattan	Marble Hill	40.876551	-73.910660
1	Manhattan	Chinatown	40.715618	-73.994279
2	Manhattan	Washington Heights	40.851903	-73.936900
3	Manhattan	Inwood	40.867684	-73.921210
4	Manhattan	Hamilton Heights	40.823604	-73.949688

Data2: Newyork city geographical coordinates data will be utilized as input for the Foursquare API, that will be leveraged to provision venues information for each neighborhood. We will use the Foursquare API to explore neighborhoods in New York City. The below is image of the Foursquare API data.

In addition, North Indian resturant ID 54135bf5e4b08f3d2429dfdd is used for retrieving data from Foursquare API.

3. Methodology

In this project, I will use the basic methodology as taught in Week 3 lab.

	Borough	Neighborhood	Latitude	Longitude
0	Bronx	Wakefield	40.894705	-73.847201
1	Bronx	Co-op City	40.874294	-73.829939
2	Bronx	Eastchester	40.887556	-73.827806
3	Bronx	Fieldston	40.895437	-73.905643
4	Bronx	Riverdale	40.890834	-73.912585

Above, I have done convert addresses into their equivalent latitude and longitude values. Then we will use the Foursquare API to explore neighborhoods in Manhattan, New York. After that, explore function to get North Indian restaurant categories in each neighborhood.

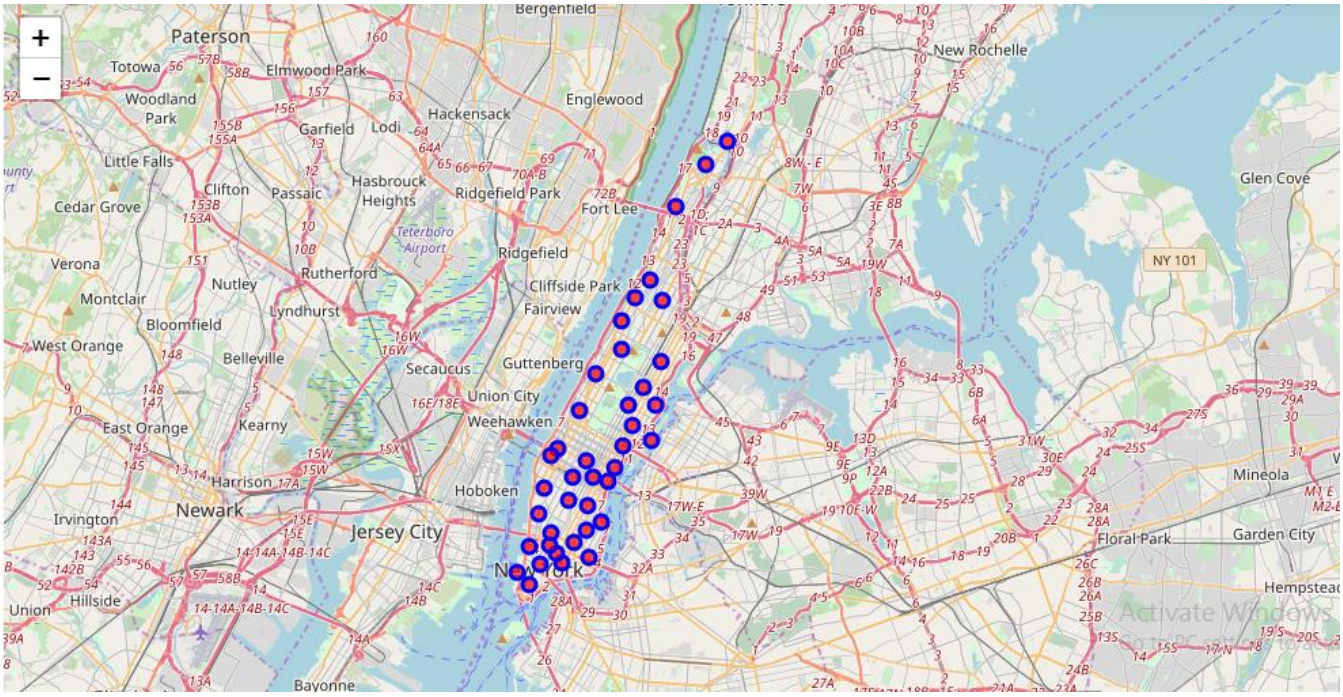
	Neighborhood	Neighborhood Latitude	Neighborhood Longitude	Venue	Venue Latitude	Venue Longitude	Venue Category
0	Chinatown	40.715618	-73.994279	Chili's Indian Cusine	40.719720	-73.990134	North Indian Restaurant
1	Upper East Side	40.775639	-73.960508	Tandoor Oven	40.777140	-73.955696	North Indian Restaurant
2	Upper East Side	40.775639	-73.960508	Anand Indian Cuisine	40.772261	-73.955041	Indian Restaurant
3	Yorkville	40.775930	-73.947118	Tandoor Oven	40.777140	-73.955696	North Indian Restaurant
4	Yorkville	40.775930	-73.947118	Anand Indian Cuisine	40.772261	-73.955041	Indian Restaurant

North Indian Restaurants in Manhattan

	Neighborhood	Indian Restaurant	North Indian Restaurant
0	Chinatown	0	1
1	Upper East Side	0	1
2	Upper East Side	1	0
3	Yorkville	0	1
4	Yorkville	1	0

Then use this feature to group the neighborhoods into clusters K-means clustering algorithm will be use to complete this task. And also, the Folium library to visualize the neighborhoods in Manhattan and its emerging clusters.

	Neighborhood	1st Most Common Venue	2nd Most Common Venue
0	Carnegie Hill	North Indian Restaurant	Indian Restaurant
1	Chinatown	North Indian Restaurant	Indian Restaurant
2	East Village	North Indian Restaurant	Indian Restaurant
3	Flatiron	North Indian Restaurant	Indian Restaurant
4	Gramercy	North Indian Restaurant	Indian Restaurant



4. Results

K-mean Cluster Using K-mean to clustering data area with less number of North Indian Resturants.

Cluster 0

	Neighborhood	1st Most Common Venue	2nd Most Common Venue
1	Chinatown	North Indian Restaurant	Indian Restaurant
18	Greenwich Village	North Indian Restaurant	Indian Restaurant
19	East Village	North Indian Restaurant	Indian Restaurant
20	Lower East Side	North Indian Restaurant	Indian Restaurant
22	Little Italy	North Indian Restaurant	Indian Restaurant
23	Soho	North Indian Restaurant	Indian Restaurant
27	Gramercy	North Indian Restaurant	Indian Restaurant
30	Carnegie Hill	North Indian Restaurant	Indian Restaurant
31	Noho	North Indian Restaurant	Indian Restaurant
33	Midtown South	North Indian Restaurant	Indian Restaurant
37	Stuyvesant Town	North Indian Restaurant	Indian Restaurant
38	Flatiron	North Indian Restaurant	Indian Restaurant

Cluster 1

	Neighborhood	1st Most Common Venue	2nd Most Common Venue
8	Upper East Side	North Indian Restaurant	Indian Restaurant
9	Yorkville	North Indian Restaurant	Indian Restaurant
10	Lenox Hill	North Indian Restaurant	Indian Restaurant
35	Turtle Bay	North Indian Restaurant	Indian Restaurant
36	Tudor City	North Indian Restaurant	Indian Restaurant

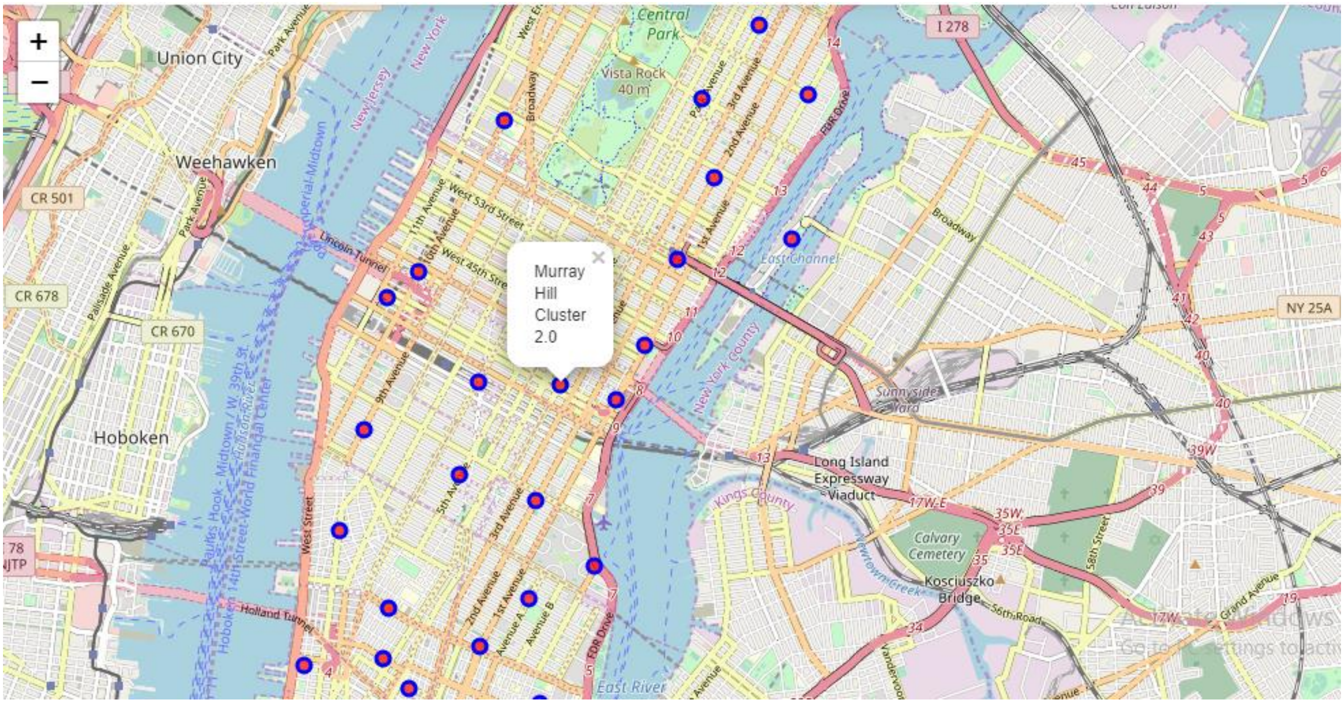
Cluster 2

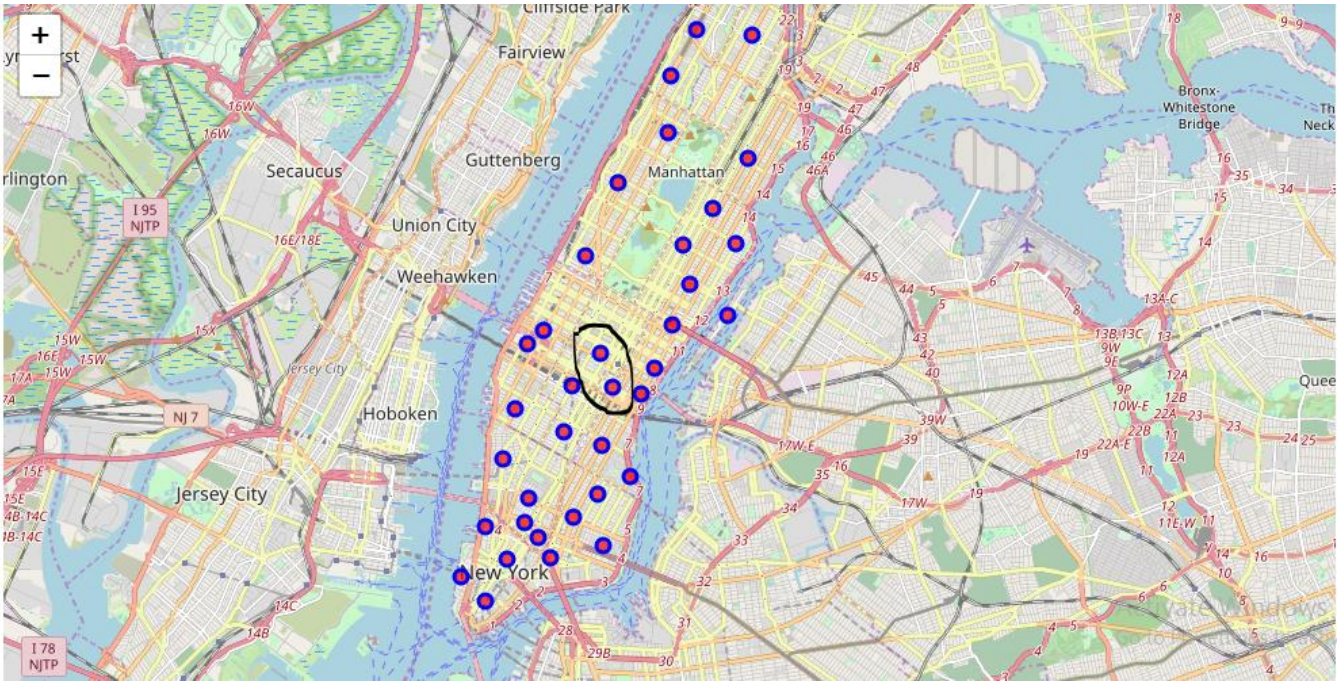
	Neighborhood	1st Most Common Venue	2nd Most Common Venue
16	Murray Hill	North Indian Restaurant	Indian Restaurant

Cluster 3

	Neighborhood	1st Most Common Venue	2nd Most Common Venue
15	Midtown	North Indian Restaurant	Indian Restaurant


Midtown
Cluster
3.0
Union City
Weehawken
Hoboken
Central Park
Vista Rock 40 m
Lincoln Tunnel
Holland Tunnel
East Channel
Sunnyside Yard
Long Island Expressway Viaduct
Calvary Cemetery
Kosciuszko Bridge
Con Edison
CR 505
NJ 495
CR 501
CR 678
CR 670
I 278
I 78 NJTP
Broadway
FDR Drive
West Street
9th Avenue
5th Avenue
3rd Avenue
2nd Avenue
1st Avenue
Park Avenue


Murray
Hill
Cluster
2.0
Union City
Weehawken
Hoboken
Central Park
Vista Rock 40 m
Lincoln Tunnel
Holland Tunnel
West 53rd Street
East Channel
East River
Sunnyside Yard
Long Island Expressway Viaduct
Calvary Cemetery
Kosciuszko Bridge
CR 501
CR 678
CR 670
I 278
NY 25A
Broadway
FDR Drive
West Street
9th Avenue
5th Avenue
3rd Avenue
2nd Avenue
1st Avenue
Park Avenue



Based on data frame analysis above Cluster 2 (Murray Hill) and Cluster 3 (Midtown) areas are the best places to open a new North Indian Restaurant business.

5. Discussion

In this section, I would be discussing the observations I have noted and the recommendation that I can make based on the results.

This analysis is performed on limited data. This may be right or may be wrong. But more the data better can be the accuracy. Foursquare API greatly helps in terms of spatial or location data.

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6. Conclusion

With the available data a result has been achieved to open North Indian style restaurant. This can be a good potential for business with less risk and more profit.