

Coursera

# Capstone Project Final

BEST LOCATION FOR OPENING AN INDIAN RESTAURANT IN  
MANHATTAN

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## BEST LOCATION FOR OPENING AN INDIAN RESTAURANT IN MANHATTAN

### TABLE DES MATIERES

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Best location for opening an Indian restaurant in Manhattan .....	1
Table of contents .....	<b>Erreur ! Signet non défini.</b>
1 - Introduction: Business Problem .....	1
2 - Data Description to solve the problem .....	1
• Neighborhood in Manhattan : .....	2
3 - Methodology .....	2
4 - Analysis ¶ .....	3
Cluster the Neighborhoodq : .....	4
Visualize the clusters on the maps¶ .....	4
5 - Results and Discussion .....	7
6 - Conclusion .....	8

### 1 - INTRODUCTION: BUSINESS PROBLEM

The goal of the project is to open a Indian Restaurant in Manhattan, so the business problem, is to find the best place for opening the restaurant. The target will be a investor who want to opening a restaurant, and to help him to find the best place base on Data Science algorithm (K-means Cluster).

The main obejective is to find the best neighborhood for opening based on these criterias :

- Attractivity of the area
- no competition (no other Indian restaurant nearby)
- great potential (good review, attractive, crowded area)
- Area with lot of restaurant

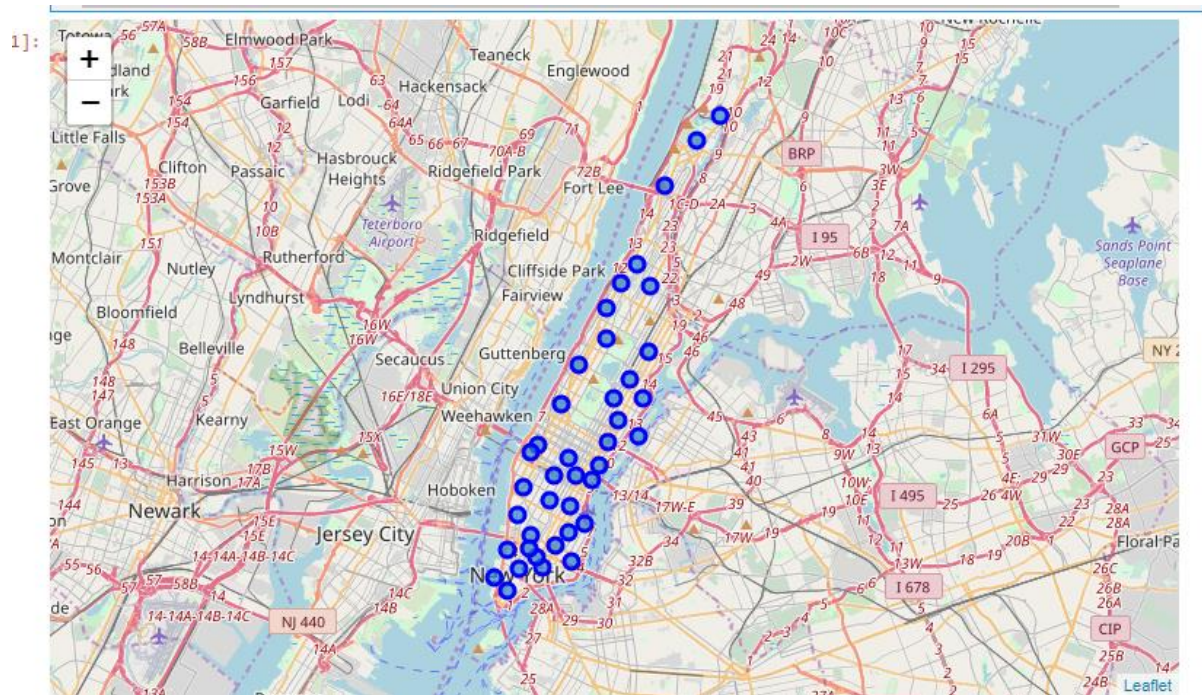
### 2 - DATA DESCRIPTION TO SOLVE THE PROBLEM

For this Business problem, we will use the API FourSquare for :

- Get and analyse the venues of Paris
- Finding the neighborhoods, where you can find Lebanese restaurant
- Analyse each fo these neighborhood to find the best one, based on these criterias : Good revenues, Attractive area, good reviews etc...
- Find a similar neighborhood, but with no Indian restaurant opened yet.

- Neighborhood in Manhattan :

	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



### 3 - METHODOLOGY

In this project we will find the best neighborhoods for opening an indian Restaurant in Manhattan area in New York City.

So the objective is to find an area with many Indian Restaurant, then to find a similar area but with no or few indian restaurant, for avoiding competitions.

Here are the steps :

- The first step will be to analyse the venues for each neighborhood of Manhattan using the Foursquare API.
- The second step is to find for each Neighborhood the top ten Venues, then using K-means to cluster them.
- The third step is to define which cluster containing the more Indian restaurants.

- And finally to find which neighborhoods corresponding to that cluster, but with few Indian restaurant( 0 or 1) for avoiding competition, and visualize it using a map.

We will use Foursquare for searching Indian Restaurants by neighborhood

## 4 - ANALYSIS

Get the venues categories by Neighborhood :

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	Neighborhood	Neighborhood Latitude	Neighborhood Longitude	Venue	Venue Latitude	Venue Longitude	Venue Category
0	Marble Hill	40.876551	-73.91066	Arturo's	40.874412	-73.910271	Pizza Place
1	Marble Hill	40.876551	-73.91066	Bikram Yoga	40.876844	-73.906204	Yoga Studio
2	Marble Hill	40.876551	-73.91066	Tibbett Diner	40.880404	-73.908937	Diner
3	Marble Hill	40.876551	-73.91066	Starbucks	40.877531	-73.905582	Coffee Shop
4	Marble Hill	40.876551	-73.91066	Dunkin'	40.877136	-73.906666	Donut Shop

Verification of the presence of Indian Restaurant in these neighborhood :

	Neighborhood	Neighborhood Latitude	Neighborhood Longitude	Venue	Venue Latitude	Venue Longitude	Venue Category
149	Washington Heights	40.851903	-73.936900	Kismet Indian Restaurant	40.855222	-73.936967	Indian Restaurant
297	Hamilton Heights	40.823604	-73.949688	Clove Indian Restaurant & Bar	40.821280	-73.950620	Indian Restaurant
311	Hamilton Heights	40.823604	-73.949688	Mumbai Masala	40.826866	-73.946486	Indian Restaurant
343	Manhattanville	40.816934	-73.957385	Chapati House - NYC	40.814572	-73.959154	Indian Restaurant
836	Upper West Side	40.787658	-73.977059	Alachi Masala	40.786111	-73.976270	Indian Restaurant
860	Upper West Side	40.787658	-73.977059	Ashoka	40.784842	-73.973253	Indian Restaurant
869	Upper West Side	40.787658	-73.977059	Swagat	40.783573	-73.978030	Indian Restaurant
896	Upper West Side	40.787658	-73.977059	Saravanaa Bhavan	40.783578	-73.977860	South Indian Restaurant
1177	Midtown	40.754691	-73.981669	The Kati Roll Company	40.752656	-73.984778	Indian Restaurant
1191	Midtown	40.754691	-73.981669	indikitch	40.757819	-73.982007	Indian Restaurant
1303	Chelsea	40.744035	-74.003116	Dil-e Punjab Deli	40.744845	-74.002528	Indian Restaurant
1454	Greenwich Village	40.726933	-73.999914	Ahimsa	40.728839	-73.999336	Indian Restaurant
1469	Greenwich Village	40.726933	-73.999914	The Kati Roll Company	40.729570	-74.000861	Indian Restaurant
1485	Greenwich Village	40.726933	-73.999914	THELEwala	40.729724	-74.000730	Indian Restaurant
1687	Tribeca	40.721522	-74.010683	Tamarind TriBeCa	40.719211	-74.008727	Indian Restaurant
2034	West Village	40.734434	-74.006180	Taco Mahal	40.732405	-74.003501	Indian Restaurant
2087	Manhattan Valley	40.797307	-73.964286	Doaba Deli	40.799513	-73.962663	Indian Restaurant

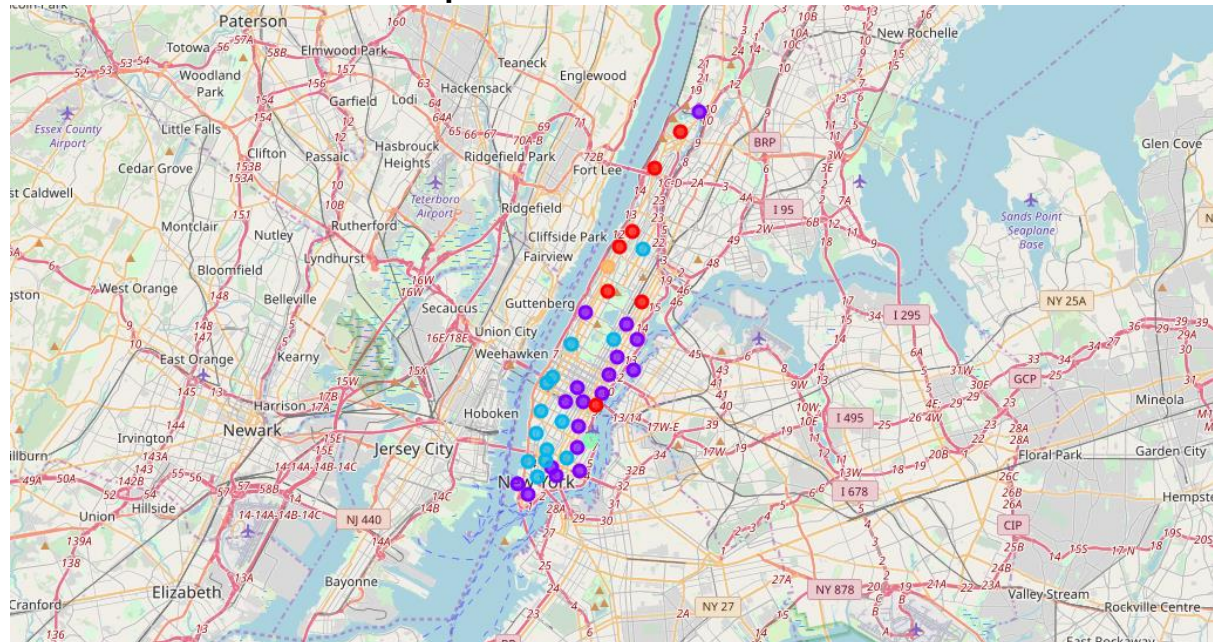
## Cluster the Neighborhood :

First we will get the top 10 venues for each neighborhood.

We will use k-means to cluster the neighborhood into 5 clusters.

	Neighborhood	1st Most Common Venue	2nd Most Common Venue	3rd Most Common Venue	4th Most Common Venue	5th Most Common Venue	6th Most Common Venue	7th Most Common Venue	8th Most Common Venue	9th Most Common Venue	10th Most Common Venue
0	Battery Park City	Park	Coffee Shop	Hotel	Gym	Memorial Site	Wine Shop	Clothing Store	Italian Restaurant	Department Store	Women's Store
1	Carnegie Hill	Coffee Shop	Pizza Place	Café	Yoga Studio	Bookstore	Cosmetics Shop	French Restaurant	Bar	Japanese Restaurant	Spa
2	Central Harlem	African Restaurant	Art Gallery	Seafood Restaurant	American Restaurant	Gym / Fitness Center	French Restaurant	Cosmetics Shop	Chinese Restaurant	Public Art	Grocery Store
3	Chelsea	Coffee Shop	Italian Restaurant	Ice Cream Shop	Nightclub	Bakery	Seafood Restaurant	American Restaurant	Theater	Art Gallery	Hotel
4	Chinatown	Chinese Restaurant	Cocktail Bar	American Restaurant	Dumpling Restaurant	Spa	Ice Cream Shop	Bakery	Vietnamese Restaurant	Bubble Tea Shop	Dim Sum Restaurant

## Visualize the clusters on the maps





Now let's see for each Neighborhood the number of Indian Restaurant

	Neighborhood	Neighborhood Latitude	Neighborhood Longitude	Venue	Venue Latitude	Venue Longitude	Venue Category
0	Carnegie Hill	2	2	2	2	2	2
1	Chelsea	1	1	1	1	1	1
2	Civic Center	1	1	1	1	1	1
3	Financial District	1	1	1	1	1	1
4	Flatiron	1	1	1	1	1	1
5	Gramercy	2	2	2	2	2	2
6	Greenwich Village	3	3	3	3	3	3
7	Hamilton Heights	2	2	2	2	2	2
8	Manhattan Valley	3	3	3	3	3	3
9	Manhattanville	1	1	1	1	1	1
10	Midtown	2	2	2	2	2	2
11	Morningside Heights	1	1	1	1	1	1
12	Noho	1	1	1	1	1	1
13	Sutton Place	4	4	4	4	4	4
14	Tribeca	1	1	1	1	1	1
15	Turtle Bay	3	3	3	3	3	3
16	Upper West Side	4	4	4	4	4	4
17	Washington Heights	1	1	1	1	1	1
18	West Village	1	1	1	1	1	1

Display the cluster for each neighborhood with the number of Indian restaurants:

	Neighborhood	Neighborhood Latitude	Neighborhood Longitude	Venue	Venue Latitude	Venue Longitude	Venue Category	Borough	Latitude	Longitude	Cluster Labels	1st Most Common Venue	2nd Most Common Venue	3rd Most Common Venue	4th Most Common Venue	5th Most Common Venue
16	Upper West Side	4	4	4	4	4	4	Manhattan	40.787658	-73.977059	1	Italian Restaurant	Wine Bar	Bar	Vegetarian / Vegan Restaurant	Mediterranean Restaurant
13	Sutton Place	4	4	4	4	4	4	Manhattan	40.760280	-73.963556	1	Gym / Fitness Center	Italian Restaurant	Furniture / Home Store	Indian Restaurant	Juice Bar
15	Turtle Bay	3	3	3	3	3	3	Manhattan	40.752042	-73.967708	1	Italian Restaurant	Coffee Shop	Sushi Restaurant	Steakhouse	Ramen Restaurant
6	Greenwich Village	3	3	3	3	3	3	Manhattan	40.726933	-73.999914	2	Italian Restaurant	Clothing Store	Sushi Restaurant	French Restaurant	Café
8	Manhattan Valley	3	3	3	3	3	3	Manhattan	40.797307	-73.964286	0	Indian Restaurant	Coffee Shop	Pizza Place	Yoga Studio	Mexican Restaurant
0	Carnegie Hill	2	2	2	2	2	2	Manhattan	40.782683	-73.953256	1	Coffee Shop	Pizza Place	Café	Yoga Studio	Bookstore
5	Gramercy	2	2	2	2	2	2	Manhattan	40.737210	-73.981376	1	Bar	Cocktail Bar	American Restaurant	Italian Restaurant	Bagel Shop
7	Hamilton Heights	2	2	2	2	2	2	Manhattan	40.823604	-73.949688	0	Deli / Bodega	Café	Mexican Restaurant	Pizza Place	Chinese Restaurant
10	Midtown	2	2	2	2	2	2	Manhattan	40.754691	-73.981669	1	Hotel	Coffee Shop	Cocktail Bar	Clothing Store	Theater
12	Noho	1	1	1	1	1	1	Manhattan	40.723259	-73.988434	2	Italian Restaurant	Cocktail Bar	French Restaurant	Mexican Restaurant	Boutique
17	Washington Heights	1	1	1	1	1	1	Manhattan	40.851903	-73.936900	0	Café	Mobile Phone Shop	Bakery	Spanish Restaurant	Deli / Bodega
14	Tribeca	1	1	1	1	1	1	Manhattan	40.721522	-74.010683	2	Italian Restaurant	Spa	Café	Park	American Restaurant

Let's see on which cluster we have the maximum number of indian restaurants:

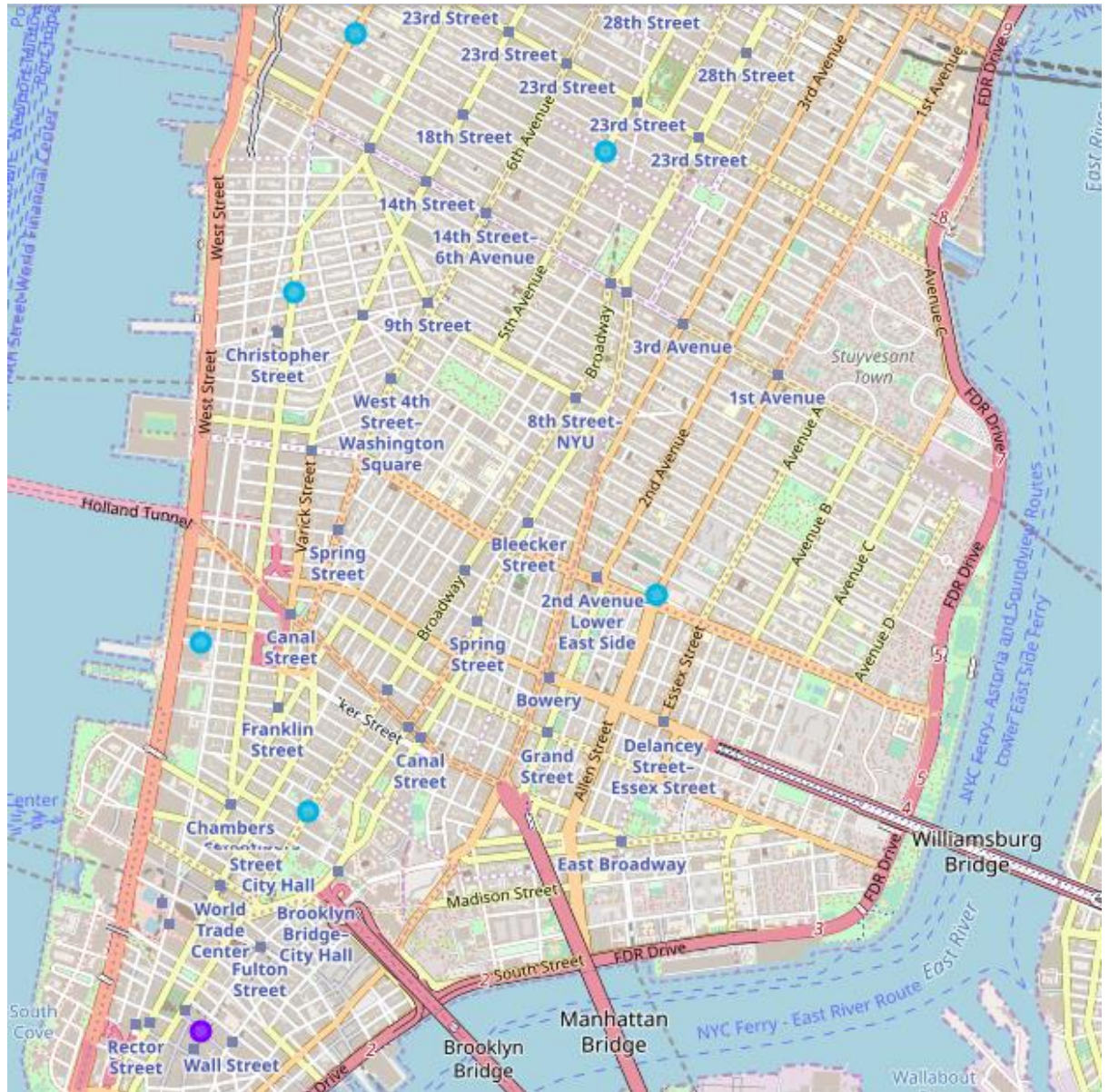
	Cluster Labels	Neighborhood	Neighborhood Latitude	Neighborhood Longitude	Venue	Venue Latitude	Venue Longitude	Venue Category	Borough	Latitude	Longitude
0	0	4	4	4	4	4	4	4	4	4	4
1	1	7	7	7	7	7	7	7	7	7	7
2	2	7	7	7	7	7	7	7	7	7	7
3	4	1	1	1	1	1	1	1	1	1	1

The cluster with the maximum number of indian restaurant are 1 or 2 : (7 indian restaurants for both)

Let's focus on these 2 clusters only and find Neighborhoods corresponding to these clusters , but with few indian restaurants, only select the neighborhood with only 1 Indian restaurant :

	Neighborhood	Neighborhood Latitude	Neighborhood Longitude	Venue	Venue Latitude	Venue Longitude	Venue Category	Borough	Latitude	Longitude	Cluster Labels	1st Most Common Venue	2nd Most Common Venue	3rd Most Common Venue	4th Most Common Venue	5th Most Common Venue
1	Chelsea	1	1	1	1	1	1	Manhattan	40.744035	-74.003116	2	Coffee Shop	Italian Restaurant	Ice Cream Shop	Nightclub	Bakery
2	Civic Center	1	1	1	1	1	1	Manhattan	40.715229	-74.005415	2	Gym / Fitness Center	French Restaurant	Hotel	Sandwich Place	Coffee Shop
3	Financial District	1	1	1	1	1	1	Manhattan	40.707107	-74.010665	1	Coffee Shop	Steakhouse	Wine Shop	American Restaurant	Hotel
4	Flatiron	1	1	1	1	1	1	Manhattan	40.739673	-73.990947	2	Gym	Yoga Studio	American Restaurant	Japanese Restaurant	Gym / Fitness Center
12	Noho	1	1	1	1	1	1	Manhattan	40.723259	-73.988434	2	Italian Restaurant	Cocktail Bar	French Restaurant	Mexican Restaurant	Boutique
14	Tribeca	1	1	1	1	1	1	Manhattan	40.721522	-74.010683	2	Italian Restaurant	Spa	Café	Park	American Restaurant
18	West Village	1	1	1	1	1	1	Manhattan	40.734434	-74.006180	2	Italian Restaurant	New American Restaurant	Cosmetics Shop	American Restaurant	Jazz Club

Let's vizualise these selected neighborhood on the maps



## 5 - RESULTS AND DISCUSSION

So we have found 7 potential neighborhoods for opening an indian restaurants in Manahattan. Their cluster are similar to the one where there are many Indian restaurants.And they have great potential because only 1 indian restaurant is opened in each of these neighborhood.

We can pursue a deeper analysis to find and select which of these neighborhood are the more attractives by using foursquare to get more informations about them such as : Review of the areas, attractivity( tourism) etc...



## **6 - CONCLUSION**

The goal of the project was to find the best place for opening an indian restaurant in Manhattan by using Data Science algorithm (K-means Cluster).

Finally we have use K-Means algorithm and foursqaure API to find the best clusters (1 or 2) containing a large number of indian restaurant. and found 7 Neighborhood similar as thes clusters, but with just on Indian Restaurant, for avoiding competition.

So these areas has a great potential because there are similiar to areas with a large number of Indian restaurant, the top venues are: Bar, Hotel, Italian restaurant etc..