The Battle of Neighbourhoods-Coursera Capstone

Delhi vs Mumbai

The Business Problem

The business problem in this study assumes that people who would be interested in this study are those who would like to create a projection of potential life and activities in these metro city neighborhoods if the subject moves to live in one of them. The decision to choose one over the other would depend on popular venues in the neighborhoods in each of these metro cities.

Mumbai and Delhi are the two most important metro cities in India. There has been a war for supremacy in terms of quality of life, jobs, education, entertainment and recreational facilities that these cities have to offer to its residents. I attempt to analyze the neighborhoods in each of these two cities and try to understand what is popular in them and what they have to offer to someone who is contemplating to make a choice on seeking a life in either of the metro cities of India.

Delhi

Delhi, India's capital territory, is a massive metropolitan area in the country's north. In Old Delhi, a neighborhood dating to the 1600s, stands the imposing Mughal-era Red Fort, a symbol of India, and the sprawling Jama Masjid mosque, whose courtyard accommodates 25,000 people. Nearby is Chandni Chowk, a vibrant bazaar filled with food carts, sweets shops and spice stalls.

Mumbai

Mumbai (formerly called Bombay) is a densely populated city on India’s west coast. A financial center, it's India's largest city. On the Mumbai Harbour waterfront stands the iconic Gateway of India stone arch, built by the British Raj in 1924. Offshore, nearby Elephanta Island holds ancient cave temples dedicated to the Hindu god Shiva. The city's also famous as the heart of the Bollywood film industry.

Data Used

For any “data science project” data is of paramount importance. For this study, we needed data about neighborhoods in each of these metro cities. The data published by the government on postal codes for all India would serve us well for this study. We will specifically download the CSV provided under https://data.gov.in/resources/all-india-pincode-directory-contact-details-along-latitude-and-longitude.

```
In [3]: df=pd.read_csv('all_india_PO_list_without_APS_offices_ver2_lat_long.csv')
        df.head()
```

Out[3]:

	officename	pincode	officeType	Deliverystatus	divisionname	regionname	circlename	Taluk	Districtname	statename	Telephone	Related Suboffice	Relate Headoffic
0	Achalapur B.O	504273	B.O	Delivery	Adilabad	Hyderabad	Andhra Pradesh	Asifabad	Adilabad	TELANGANA	NaN	Rechini S.O	Mancheri H.
1	Ada B.O	504293	B.O	Delivery	Adilabad	Hyderabad	Andhra Pradesh	Asifabad	Adilabad	TELANGANA	NaN	Asifabad S.O	Mancheri H.
2	Adegaon B.O	504307	B.O	Delivery	Adilabad	Hyderabad	Andhra Pradesh	Boath	Adilabad	TELANGANA	NaN	Echoda S.O	Adilaba H.
3	Adilabad Collectorate S.O	504001	S.O	Non-Delivery	Adilabad	Hyderabad	Andhra Pradesh	Adilabad	Adilabad	TELANGANA	08732-226703	NaN	Adilaba H.
4	Adilabad H.O	504001	H.O	Delivery	Adilabad	Hyderabad	Andhra Pradesh	Adilabad	Adilabad	TELANGANA	08732-226738	NaN	Na

Methodology

In this study, we will download the CSV, read it into a pandas Dataframe and curate it to remove the data related to all other cities, towns, and places which are not Mumbai or Delhi, since we are only interested in comparing these two biggest metro cities in India.

We shall then clean up the unnecessary columns in the CSV, which is not relevant or useful for our current study. Post office names (***office name***) will be used as the neighborhood names in each of the regions such as Mumbai or Delhi.

Neighborhood names with the same ***Pincode*** will be combined as a single row.

Foursquare API will be used to find the longitude and latitude of each of the neighborhoods in both Mumbai and Delhi. This will form the dataset we will use for this study.

The first few records of the dataset .

Mumbai

```
In [140]: df_mumb=df[df['regionname']=='Mumbai']

In [141]: df_mumb.head()
```

Out[141]:

	officename	pincode	officeType	Deliverystatus	divisionname	regionname	circlename	Taluk	Districtname	statename	Telephone	Related Suboffice
81395	Antop Hill S.O	400037	S.O	Delivery	Mumbai East	Mumbai	Maharashtra	Mumbai	Mumbai	MAHARASHTRA	022-24120290	NaN
81396	B P T Colony S.O	400037	S.O	Non-Delivery	Mumbai East	Mumbai	Maharashtra	Mumbai	Mumbai	MAHARASHTRA	022-4100525	NaN
81397	B.P.Lane S.O	400003	S.O	Non-Delivery	Mumbai East	Mumbai	Maharashtra	NaN	Mumbai	MAHARASHTRA	022-23421653	NaN
81398	BEST STaff Quarters S.O	400012	S.O	Non-Delivery	Mumbai East	Mumbai	Maharashtra	NaN	Mumbai	MAHARASHTRA	022-24180776	NaN
81399	C G S Colony S.O	400037	S.O	Non-Delivery	Mumbai East	Mumbai	Maharashtra	Mumbai	Mumbai	MAHARASHTRA	022-24097933	NaN

Delhi

```
In [192]: df_del=df[df['regionname']=='Delhi']
In [193]: df_del.head()
```

Out[193]:

	officename	pincode	officeType	Deliverystatus	divisionname	regionname	circlename	Taluk	Districtname	statename	Telephone	Related Suboffice	Relate Headoffic
32383	Anand Vihar S.O	110092	S.O	Non-Delivery	Delhi East	Delhi	Delhi	NaN	East Delhi	DELHI	011-22157472	NaN	Krishn Nagar H.(
32384	Azad Nagar S.O (East Delhi)	110051	S.O	Non-Delivery	Delhi East	Delhi	Delhi	NaN	East Delhi	DELHI	011-22093521	NaN	Krishn Nagar H.(
32385	Babarpur S.O (North East Delhi)	110032	S.O	Non-Delivery	Delhi East	Delhi	Delhi	NaN	North East Delhi	DELHI	011-22829634	NaN	Jhilmil H.(
32386	Badarpur Khadar B.O	110090	B.O	Delivery	Delhi East	Delhi	Delhi	East Delhi	East Delhi	DELHI	NaN	Karawal Nagar S.O	Jhilmil H.(
32387	Balbir Nagar S.O	110032	S.O	Non-Delivery	Delhi East	Delhi	Delhi	NaN	East Delhi	DELHI	011-22320223	NaN	Jhilmil H.(

We now see that there are the same *Pincode* values for different neighborhoods. The next step is to combine the rows having the same Pincode, we do this by changing the value of the neighborhood by building a comma-separated concatenation of neighborhood values for rows with the same Pincode.

The next step is to enhance the dataset with the required information. We would need the longitude and latitude values for the neighborhoods. We will use the *Nominatim* library from *geocoders.geopy* package to find the longitude and latitude for each of the neighborhoods and would eventually create a dataset having all the necessary columns for our analysis.

Dataframe after cleanup

```
In [223]: df_del.head()
```

Out[223]:

	pincode	regionname	Neighborhood	latitude	longitude
0	110092	Delhi	Anand Vihar S.O,IP Extension S.O,Laxmi Nagar S...	28.551696	77.417594
1	110051	Delhi	Azad Nagar S.O (East Delhi),Govind Pura S.O,Kr...	28.653165	77.286960
2	110032	Delhi	Babarpur S.O (North East Delhi),Balbir Nagar S...	28.676479	77.285673
3	110090	Delhi	Badarpur Khadar B.O,Karawal Nagar S.O,Shaheed ...	-8.016630	-34.926281
4	110053	Delhi	Bhajan Pura S.O,Brahampuri S.O,Garhi Mandu B.O...	28.691913	77.279820

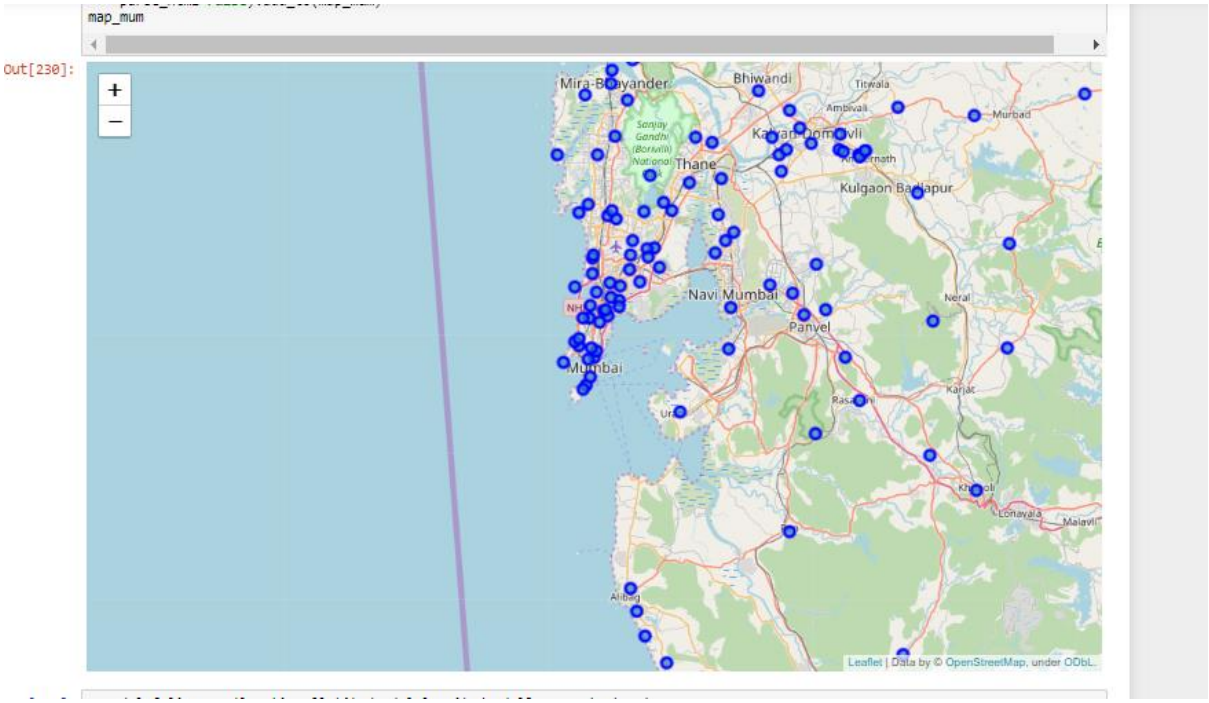
```
In [222]: df_mumb.head()
```

Out[222]:

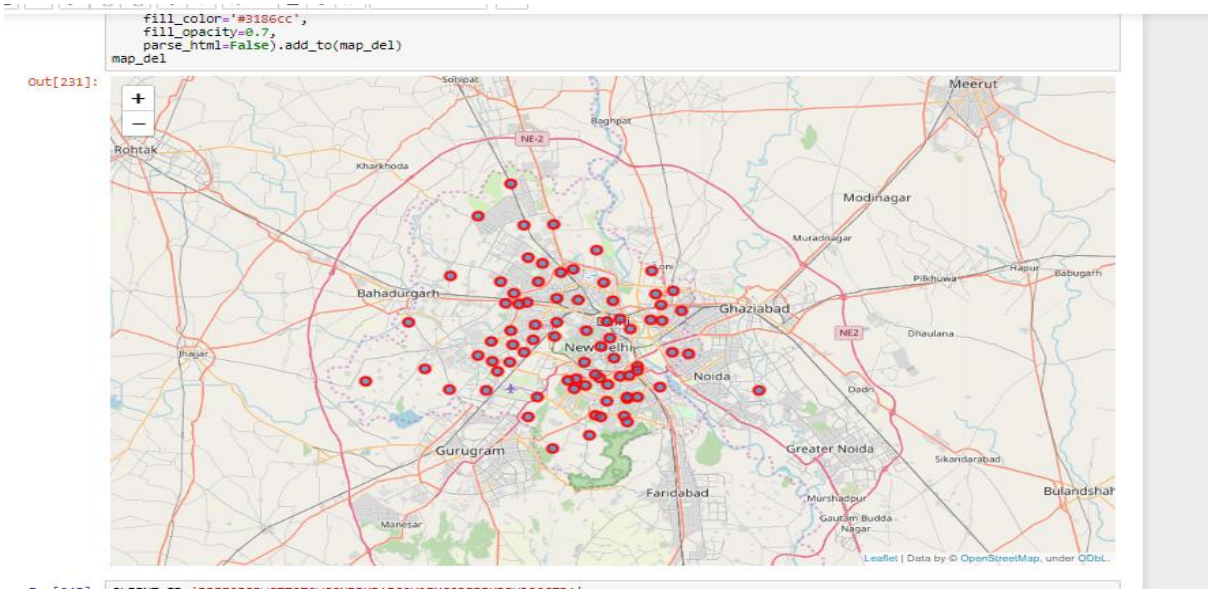
	pincode	regionname	Neighborhood	latitude	longitude
0	400037	Mumbai	Antop Hill S.O,B P T Colony S.O,C G S Colony S...	19.023074	72.867622
1	400003	Mumbai	B.P.Lane S.O,Mandvi S.O (Mumbai),Masjid S.O,Nu...	18.951606	72.834797
2	400012	Mumbai	BEST STaff Quarters S.O,Chamarbaug S.O,Haffkin...	18.996311	72.842493
3	400009	Mumbai	Chinchbunder H.O,Noor Baug S.O,Princess Dock S.O	18.959645	72.838526
4	400033	Mumbai	Cotton Exchange S.O,Kalachowki S.O,L B S N E c...	19.003996	72.853620

We now have the necessary information to visualize the neighborhoods for both the cities on a *folium* map.

Mumbai



Delhi



Analyzing the neighborhoods

Finding top venues near Mumbai neighborhoods

We will use the Foursquare API to find the top venues in the neighbourhoods of Mumbai. This will help us understand the nature of life Mumbai neighborhoods have to offer. We will iteratively make Foursquare API calls for each of the Mumbai neighborhoods in our dataset. Foursquare API returns the popular venues within 500m radius of this neighborhood.

Next, we will employ statistically and analytical methods to find the unique venues/venue categories in the Mumbai neighborhoods and we will build a Dataframe that calibrates each of the neighborhoods with the frequency of occurrence for each of the venue category.

We then create a dataset that lists the top 10 common venues against each of the neighbourhoods in Mumbai. We get a representation such as below for all the neighbourhoods in Mumbai.

)ut[280]:

	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	A I Staff Colony S.O,Santacruz P&t Colony S.O	Restaurant	Gym	Hotel	Coffee Shop	Pub	Recreation Center	Café	Salon / Barbershop	Lounge	Beer Garden
1	Adai B.O,Awre B.O,Chawk B.O,Chirmer B.O,Dighod...	Paper / Office Supplies Store	Zoo	Dog Run	Field	Fast Food Restaurant	Farmers Market	Farm	Falafel Restaurant	Electronics Store	Eastern European Restaurant
2	Adavale Budruk B.O,Borghar B.O,Chambhargani B....	Indian Restaurant	Zoo	Dog Run	Field	Fast Food Restaurant	Farmers Market	Farm	Falafel Restaurant	Electronics Store	Eastern European Restaurant
3	Additional Ambernath S.O	Indian Restaurant	Fast Food Restaurant	Chinese Restaurant	Zoo	Dog Run	Field	Farmers Market	Farm	Falafel Restaurant	Electronics Store
4	Adgaon B.O,Borlipanchatan S.O,Sarve B.O,Velas ...	Bus Station	Zoo	Cosmetics Shop	Fish Market	Field	Fast Food Restaurant	Farmers Market	Farm	Falafel Restaurant	Electronics Store

Cluster the neighbourhoods in Mumbai based on the similarity of top common venues

Given that we now have the required information regarding the top venues against each of the neighborhoods in Mumbai, let us now apply a clustering algorithm to group the neighborhoods based on the similarity in types of venues they have. By clustering, we also provide information to users on a common type of neighbourhoods in Mumbai. We will use the k-Means clustering approach to cluster the neighbourhoods. k will be selected as 5. This means that we will group the neighborhoods into 5 clusters. Each of the neighborhoods gets a Cluster Label assigned.

Clustering

In [295]:
```
mum_group_cluster=mum_grouped.drop('Neighborhood',1)
model1=KMeans(n_clusters=5,random_state=5).fit(mum_group_cluster)
model1.labels_
```

We will then use the dataset with cluster labels assigned to visualize the clusters in a *folium* map.

A piece of important information this map provides is that many neighborhoods in Mumbai are of similar nature concerning the venues they have around, indicated by the cluster marked in blue.

Let us now dig a little deeper into how the neighborhoods are clustered and what is the characteristic of the cluster that is very common across most neighborhoods in Mumbai.

Cluster 1

Cluster 1

```
In [316]: mum_merged.loc[mum_merged['Cluster_Label']==0,mum_merged.columns[[1]+list(range(5,mum_merged.shape[-1]))]]
```

Out[316]:

	regionname	Cluster_Label	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
2	Mumbai	0	Indian Restaurant	Hotel	Coffee Shop	Roof Deck	Lounge	Chinese Restaurant	Restaurant	Gym / Fitness Center	Eastern European Restaurant	Electronics Store
3	Mumbai	0	Harbor / Marina	Indian Restaurant	Furniture / Home Store	Café	Dog Run	Fast Food Restaurant	Farmers Market	Farm	Falafel Restaurant	Electronics Store
4	Mumbai	0	Pharmacy	Pool Hall	Record Shop	Auto Garage	Zoo	Diner	Farmers Market	Farm	Falafel Restaurant	Electronics Store
6	Mumbai	0	Historic Site	Soccer Field	Bus Station	Restaurant	Zoo	Doner Restaurant	Fast Food Restaurant	Farmers Market	Farm	Falafel Restaurant
7	Mumbai	0	Gym	Rest Area	Convention Center	Creperie	Cretan Restaurant	Field	Fast Food Restaurant	Farmers Market	Farm	Falafel Restaurant
8	Mumbai	0	Café	Bar	Pub	Coffee Shop	Restaurant	Bistro	Italian Restaurant	Bookstore	Hotel	Pizza Place

From this cluster we can conclude that this area has mix of all including eateries ,gym,historic site and many more. For people to have lots of variety of food café's and even for medical requirements pharmacy is also there. Also for people to exercise Gym facilty is also pretty common

Cluster 2

Cluster 2

```
In [317]: mum_merged.loc[mum_merged['Cluster_Label']==1,mum_merged.columns[[1]+list(range(5,mum_merged.shape[-1]))]]
```

Out[317]:

	regionname	Cluster_Label	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
95	Mumbai	1	ATM	Women's Store	Fish Market	Field	Fast Food Restaurant	Farmers Market	Farm	Falafel Restaurant	Electronics Store	Eastern European Restaurant
129	Mumbai	1	ATM	Fast Food Restaurant	Women's Store	Fish Market	Field	Farmers Market	Farm	Falafel Restaurant	Electronics Store	Eastern European Restaurant
160	Mumbai	1	ATM	Women's Store	Fish Market	Field	Fast Food Restaurant	Farmers Market	Farm	Falafel Restaurant	Electronics Store	Eastern European Restaurant
174	Mumbai	1	ATM	Women's Store	Fish Market	Field	Fast Food Restaurant	Farmers Market	Farm	Falafel Restaurant	Electronics Store	Eastern European Restaurant

If someone has withdraw cash from here, he will have no problem as there are lots of ATMs and for women there are lots of women store.

Cluster 3

Out[319]:

	regionname	Cluster_Label	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	Mumbai	2	Indian Restaurant	Smoke Shop	Zoo	Doner Restaurant	Fish Market	Field	Fast Food Restaurant	Farmers Market	Farm	Falafel Restaurant
1	Mumbai	2	Indian Restaurant	Middle Eastern Restaurant	Ice Cream Shop	Chinese Restaurant	Café	Restaurant	BBQ Joint	Indian Sweet Shop	Dessert Shop	Electronics Store
5	Mumbai	2	Indian Restaurant	Movie Theater	Hockey Arena	Optical Shop	Zoo	Dog Run	Fast Food Restaurant	Farmers Market	Farm	Falafel Restaurant
31	Mumbai	2	Indian Restaurant	Mattress Store	Bus Station	Ice Cream Shop	Café	Zoo	Donut Shop	Field	Fast Food Restaurant	Farmers Market
35	Mumbai	2	Indian Restaurant	Snack Place	Fast Food Restaurant	Golf Course	Food Truck	Ice Cream Shop	Dog Run	Farmers Market	Farm	Falafel Restaurant
38	Mumbai	2	Vegetarian / Vegan Restaurant	Electronics Store	Dance Studio	Indian Restaurant	Zoo	Dog Run	Field	Fast Food Restaurant	Farmers Market	Farm
40	Mumbai	2	Indian Restaurant	Juice Bar	Gym / Fitness Center	Coffee Shop	Donut Shop	Restaurant	Electronics Store	Bed & Breakfast	Bakery	Men's Store
43	Mumbai	2	Indian Restaurant	Department Store	Multiplex	Chinese Restaurant	Lake	Hotel	Restaurant	Mughlai Restaurant	Eastern European Restaurant	Donut Shop

For those who love Indian cuisine , they lots of Indian restaurant including a veg restaurant ,Middle east restaurant and many more. Movie goer can always find it easy going to a theatre here. There's departmental store to help cosnumers buy wide variety of goods

Cluster 4

CLuster 4

321]:
```
mum_merged.loc[mum_merged['Cluster_Label']==3,mum_merged.columns[[1]+list(range(5,mum_merged.shape[-1]))]]
```

321]:

	regionname	Cluster_Label	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
145	Mumbai	3	Mobile Phone Shop	Fishing Store	Fish Market	Field	Fast Food Restaurant	Farmers Market	Farm	Falafel Restaurant	Electronics Store	Eastern European Restaurant
175	Mumbai	3	Mobile Phone Shop	Fishing Store	Fish Market	Field	Fast Food Restaurant	Farmers Market	Farm	Falafel Restaurant	Electronics Store	Eastern European Restaurant
199	Mumbai	3	Shopping Mall	Train Station	Mobile Phone Shop	Zoo	Doner Restaurant	Field	Fast Food Restaurant	Farmers Market	Farm	Falafel Restaurant
204	Mumbai	3	Train Station	Zoo	Dog Run	Field	Fast Food Restaurant	Farmers Market	Farm	Falafel Restaurant	Electronics Store	Eastern European Restaurant

If people want mobile ,they'll easily get here. For those who want to commute vie train wont find any difficulty here .There is a fishing store and zoo nearby

Cluster 5

Out[322]:

	regionname	Cluster_Label	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
165	Mumbai	4	Gym Pool	Zoo	Dog Run	Field	Fast Food Restaurant	Farmers Market	Farm	Falafel Restaurant	Electronics Store	Eastern European Restaurant

For those gym lovers and animal lovers this is place they'll easy access to their favourite places

Finding top venues near Delhi neighbourhoods

We will use the Foursquare API to find the top venues in the neighborhoods of Delhi. This will help us in understanding the nature of life Delhi neighborhoods have to offer. We will iteratively make Foursquare API call for each of the Delhi neighborhoods in our dataset.

Foursquare API returns the following response as the popular venues close to 500m radius of this neighborhood.

Next, we will employ statistically and analytical methods to find the unique venues/venue categories in the Delhi neighbourhoods and will build a Dataframe that calibrates each of the neighbourhoods with the frequency of occurrence of each of the venue category

From our analysis, we see that there are 14 unique venue categories in Delhi neighbourhoods. ATMs, Arts and Crafts stores, Burger Joints, Cafes, Gardens, Gyms, Multiplexes, Museums, Pizza places, Indian restaurants, Shopping malls, Water Parks, Gardens and Hotels being some of them.

We then create a dataset that lists the top 10 common venues against each of the neighborhoods in Delhi. We get a representation such as below for all the neighborhoods in Delhi.

Out[290]:

	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	505 A B Workshop S.O,A F Palam S.O,Aps Colony ...	Restaurant	Gay Bar	Bakery	Latin American Restaurant	Arepa Restaurant	Bar	Vegetarian / Vegan Restaurant	Fast Food Restaurant	Steakhouse	Burger Joint
1	A F Rajokari S.O,Rajokari B.O	ATM	Fast Food Restaurant	Fried Chicken Joint	French Restaurant	Food Truck	Food Stand	Food Court	Food & Drink Shop	Food	Fondue Restaurant
2	A.G.C.R. S.O,Ajmeri Gate Extn. S.O,Darya Ganj ...	Indian Restaurant	Hotel	Restaurant	Hostel	History Museum	Cricket Ground	Stadium	Road	Historic Site	Asian Restaurant
3	A.K.Market S.O,Multani Dhanda S.O,Pahar Ganj S...	Hotel	Pizza Place	Motel	Fast Food Restaurant	Restaurant	Coffee Shop	Arts & Crafts Store	Miscellaneous Shop	Hostel	Food Truck
4	Abul Fazal Enclave-I S.O,Jamia Nagar S.O,New F...	Indian Restaurant	Athletics & Sports	Coffee Shop	Gym / Fitness Center	Boat or Ferry	Hotel Pool	Farmers Market	Food Truck	Food Stand	Food Court

Cluster the neighborhoods in Delhi based on the similarity of top common venues

Given that we also have the required information regarding the top venues against each of the neighborhoods in Delhi, let us now apply a clustering algorithm to group the neighborhoods based on the similarity in types of venues they have. By clustering, we also provide information to users on a common type of neighborhood in Delhi. We will use the k-Means clustering approach to cluster the neighbourhoods. k will be selected as 5. This means that we will group the neighborhoods into 5 clusters. Each of the neighborhoods gets a Cluster Label assigned.

In [23]:
```
del_grouped_cluster=del_grouped.drop('Neighborhood',1)
model2=KMeans(n_clusters=5,random_state=5).fit(del_grouped_cluster)
model2.labels_
```

We will then use the dataset with cluster labels assigned to visualize the clusters in the *folium* map.

A piece of important information this map provides is that the neighborhoods in Delhi are of diverse nature concerning the venues they have around, indicated by the clusters marked in different colors. Also, we did see earlier that we did not have too many venue categories for the neighbourhoods that were returned for the neighbourhoods in Delhi.

Cluster 1

Cluster 1

```
In [336]: del_merge.loc[del_merge['Cluster_label']==0,del_merge.columns[[1]+list(range(5,del_merge.shape[-1]))]]
```

6]:

	regionname	Cluster_label	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	C
1	Delhi	0	Pizza Place	Accessories Store	Gym	Bakery	Fast Food Restaurant	French Restaurant	Food Truck	Food Stand	Food Court	Food & Drink Shop	
2	Delhi	0	Light Rail Station	Park	Vegetarian / Vegan Restaurant	Wings Joint	Fast Food Restaurant	French Restaurant	Food Truck	Food Stand	Food Court	Food & Drink Shop	
3	Delhi	0	Burger Joint	Bakery	Market	Snack Place	Gym / Fitness Center	Brazilian Restaurant	Supermarket	Pizza Place	Plaza	BBQ Joint	
4	Delhi	0	ATM	Clothing Store	IT Services	Mobile Phone Shop	Electronics Store	Park	Ice Cream Shop	American Restaurant	Flea Market	Frozen Yogurt Shop	
5	Delhi	0	Indian Restaurant	Snack Place	Gym / Fitness Center	Market	Bakery	Food Truck	Food Stand	Food Court	Food & Drink Shop	Food	

This is area has wide variety of places that people find common from eateries to ATM, clothing store etc

Cluster 2

Cluster 2

```
In [337]: del_merge.loc[del_merge['Cluster_label']==1,del_merge.columns[[1]+list(range(5,del_merge.shape[-1]))]]
```

Out[337]:

	regionname	Cluster_label	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
20	Delhi	1	Electronics Store	Bank	Wings Joint	Fish & Chips Shop	Fried Chicken Joint	French Restaurant	Food Truck	Food Stand	Food Court	Food & Drink Shop
31	Delhi	1	Electronics Store	Pizza Place	Bank	Fish & Chips Shop	Fried Chicken Joint	French Restaurant	Food Truck	Food Stand	Food Court	Food & Drink Shop

For those who are looking to buy electronic Appliances this is the place to be. Along with that people who want to visit the bank or wants have a bite of the pizza place wont have a problem here

Cluster 3

Cluster 3

```
In [338]: del_merge.loc[del_merge['Cluster_label']==2,del_merge.columns[[1]+list(range(5,del_merge.shape[-1]))]]
```

Out[338]:

	regionname	Cluster_label	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	Cluster_Label
6	Delhi	2	ATM	Motorcycle Shop	Cultural Center	Fish & Chips Shop	Fried Chicken Joint	French Restaurant	Food Truck	Food Stand	Food Court	Food & Drink Shop	2
12	Delhi	2	ATM	Light Rail Station	Electronics Store	Fried Chicken Joint	French Restaurant	Food Truck	Food Stand	Food Court	Food & Drink Shop	Food	2
21	Delhi	2	ATM	Fast Food Restaurant	Fried Chicken Joint	French Restaurant	Food Truck	Food Stand	Food Court	Food & Drink Shop	Food	Fondue Restaurant	2
24	Delhi	2	ATM	Fast Food Restaurant	Fried Chicken Joint	French Restaurant	Food Truck	Food Stand	Food Court	Food & Drink Shop	Food	Fondue Restaurant	2
28	Delhi	2	ATM	Fast Food Restaurant	Fried Chicken Joint	French Restaurant	Food Truck	Food Stand	Food Court	Food & Drink Shop	Food	Fondue Restaurant	2
56	Delhi	2	ATM	Trail	Athletics & Sports	Indian Restaurant	Advertising Agency	Fruit & Vegetable Store	Fried Chicken Joint	French Restaurant	Food Truck	Food Stand	2

If someone has withdraw cash from here, he will have no problem as there are lots of ATMs and there are a lot of fast food restaurant, Motorcycle shop etc.

Cluster 4

Cluster 4

```
In [339]: del_merge.loc[del_merge['Cluster_label']==3,del_merge.columns[[1]+list(range(5,del_merge.shape[-1]))]]
```

Out[339]:

	regionname	Cluster_label	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
49	Delhi	3	Fast Food Restaurant	Hotel	Chinese Restaurant	Seafood Restaurant	Wings Joint	Farmers Market	Food Truck	Food Stand	Food Court	Food & Drink Shop
75	Delhi	3	Fast Food Restaurant	Indian Restaurant	Coffee Shop	Café	Dessert Shop	Fish & Chips Shop	French Restaurant	Food Truck	Food Stand	Food Court
79	Delhi	3	Fast Food Restaurant	Train Station	Café	Electronics Store	Flea Market	Food	Candy Store	Vegetarian / Vegan Restaurant	Coffee Shop	Food & Drink Shop
86	Delhi	3	Fast Food Restaurant	Chinese Restaurant	Nature Preserve	Market	Fish & Chips Shop	French Restaurant	Food Truck	Food Stand	Food Court	Food & Drink Shop

This is place for the foodies as there are a lot of places to eat here.

Cluster 5

```
In [340]: del_merge.loc[del_merge['Cluster_label']==4,del_merge.columns[[1]+list(range(5,del_merge.shape[-1]))]]
```

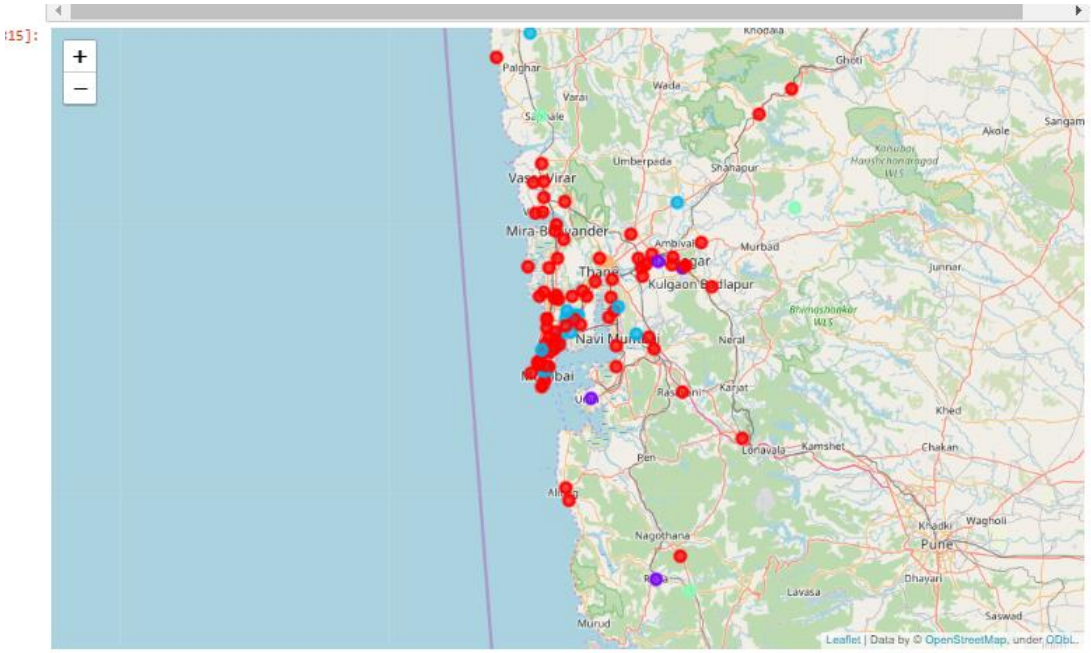
Out[340]:

	regionname	Cluster_label	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	Delhi	4	Clothing Store	Wings Joint	Farmers Market	French Restaurant	Food Truck	Food Stand	Food Court	Food & Drink Shop	Food	Fondue Restaurant
19	Delhi	4	Clothing Store	Asian Restaurant	Wings Joint	Fast Food Restaurant	Fried Chicken Joint	French Restaurant	Food Truck	Food Stand	Food Court	Food & Drink Shop

This is the place for those who want to buy clothing’s or wish to have Asian Food.

Maps of Mumbai And Delhi After Clustering

Mumbai



Delhi