



# Battle of Two Neighbourhood's

Coursera Capstone Project



# Battle of Two Neighbourhood's

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The 2 cities in consideration are :-

1. Mumbai
2. Delhi

# 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

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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.







# Libraries Used

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Importing all the necessary Libraries

```
import numpy as np
import pandas as pd
from sklearn.cluster import KMeans
from geopy.geocoders import Nominatim
import matplotlib.cm as cm
import matplotlib.colors as colors
import folium
from geopy.extra.rate_limiter import RateLimiter
import requests
```

# Dataframe

```
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

# Mumbai Dataframe

```
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 Dataframe

```
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 Headoffice
32383	Anand Vihar S.O	110092	S.O	Non-Delivery	Delhi East	Delhi	Delhi	NaN	East Delhi	DELHI	011-22157472	NaN	Krishn Nagar H.O
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.O
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.O
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.O
32387	Balbir Nagar S.O	110032	S.O	Non-Delivery	Delhi East	Delhi	Delhi	NaN	East Delhi	DELHI	011-22320223	NaN	Jhilmil H.O

# Final Dataframe after removing and adding Necessary Columns

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

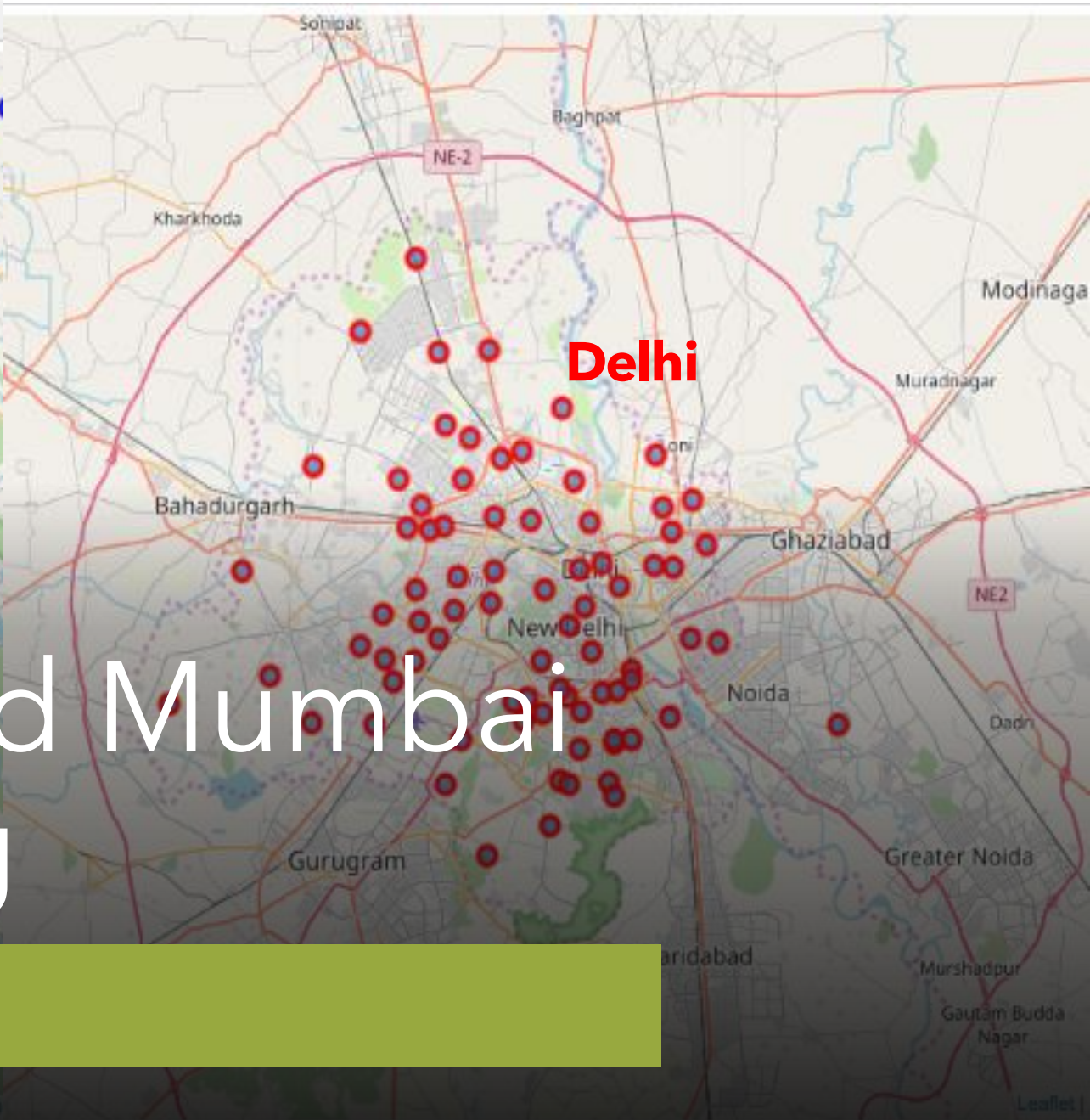
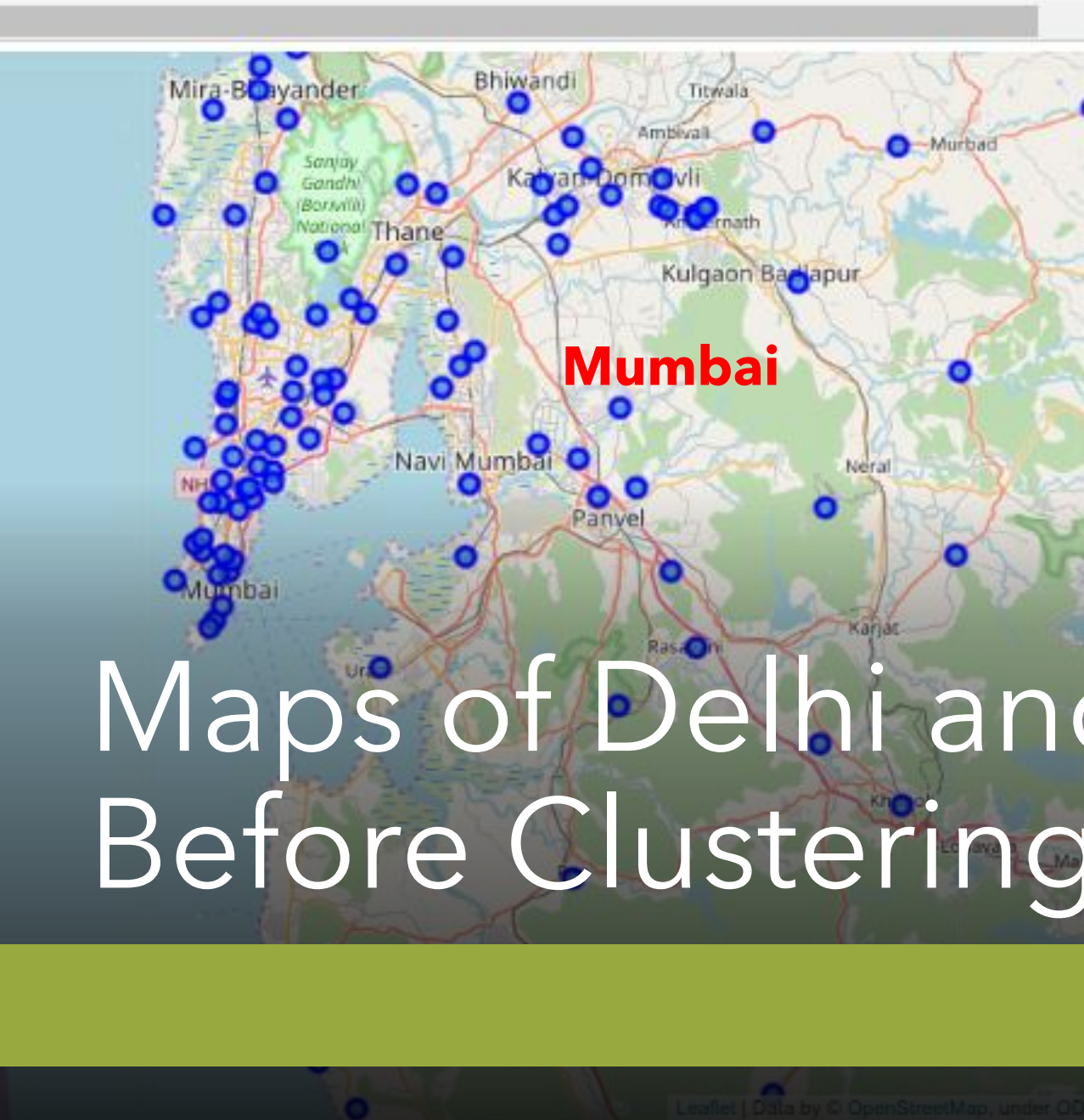
```
Out[223]:
```

	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()
```

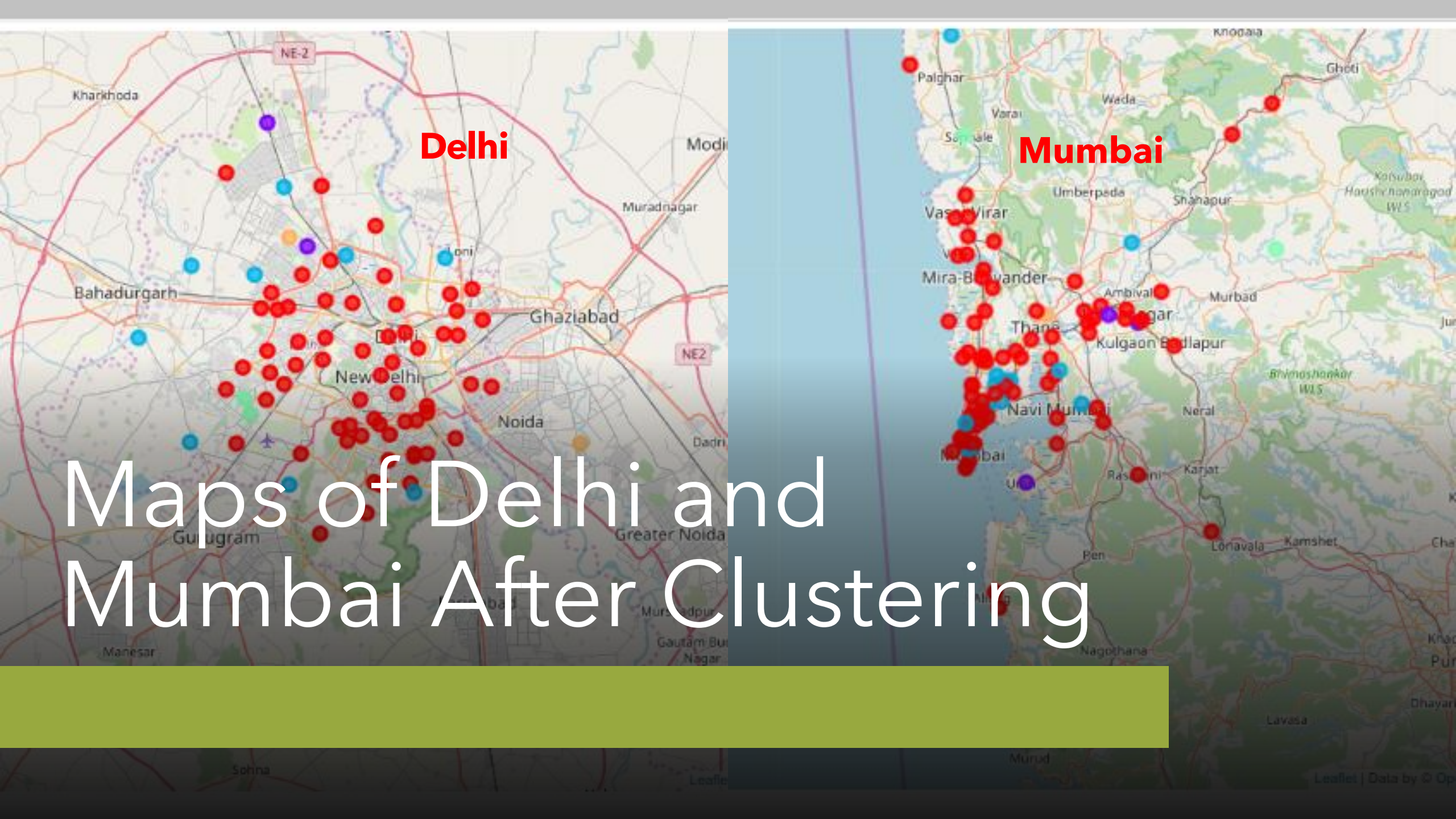
```
Out[222]:
```

	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



# Maps of Delhi and Mumbai Before Clustering





# CLUSTERS OF MUMBAI

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

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

# CLUSTERS OF MUMBAI

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

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

Cluster 4

```
321): mun_merged.loc[mun_merged['Cluster_Label']==3,mun_merged.columns[[1]+list(range(5,mun_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
189	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



# CLUSTERS OF DELHI

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
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

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

Cluster 3

# CLUSTERS OF DELHI

```
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

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

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