



THE BATTLE OF NEIGHBORHOODS

MUMBAI

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INTRODUCTION

- Mumbai is the financial capital of India and is one of the most densely populated cities in the world
- The multi-cultural nature of the city brings with it numerous cuisines from all over the globe
- Business owners and entrepreneurs might be looking to start a new restaurant in Mumbai
- The task is to identify neighborhoods that have the potential of being good locations for starting a new restaurant



Data Collection

- The following data was collected for this project:
 - Neighborhood data of Mumbai from https://en.wikipedia.org/wiki/List_of_neighborhoods_in_Mumbai
 - Geographical coordinates of Mumbai and all neighborhoods in Mumbai using GeoPy and Geocoder libraries in python
 - Venue data for all neighborhoods in Mumbai using Foursquare API
- The data was then cleaned to produce the final datasets shown in the upcoming slides

Dataset for Mumbai Neighborhoods

	Neighborhood	Location	Latitude	Longitude
0	Amboli	Andheri,Western Suburbs	19.129300	72.843400
1	Chakala, Andheri	Western Suburbs	19.111388	72.860833
2	D.N. Nagar	Andheri,Western Suburbs	19.124085	72.831373
3	Four Bungalows	Andheri,Western Suburbs	19.124714	72.827210
4	Lokhandwala	Andheri,Western Suburbs	19.130815	72.829270
5	Marol	Andheri,Western Suburbs	19.119219	72.882743
6	Sahar	Andheri,Western Suburbs	19.098889	72.867222
7	Seven Bungalows	Andheri,Western Suburbs	19.129052	72.817018
8	Versova	Andheri,Western Suburbs	19.120000	72.820000
9	Mira Road	Mira-Bhayandar,Western Suburbs	19.284167	72.871111

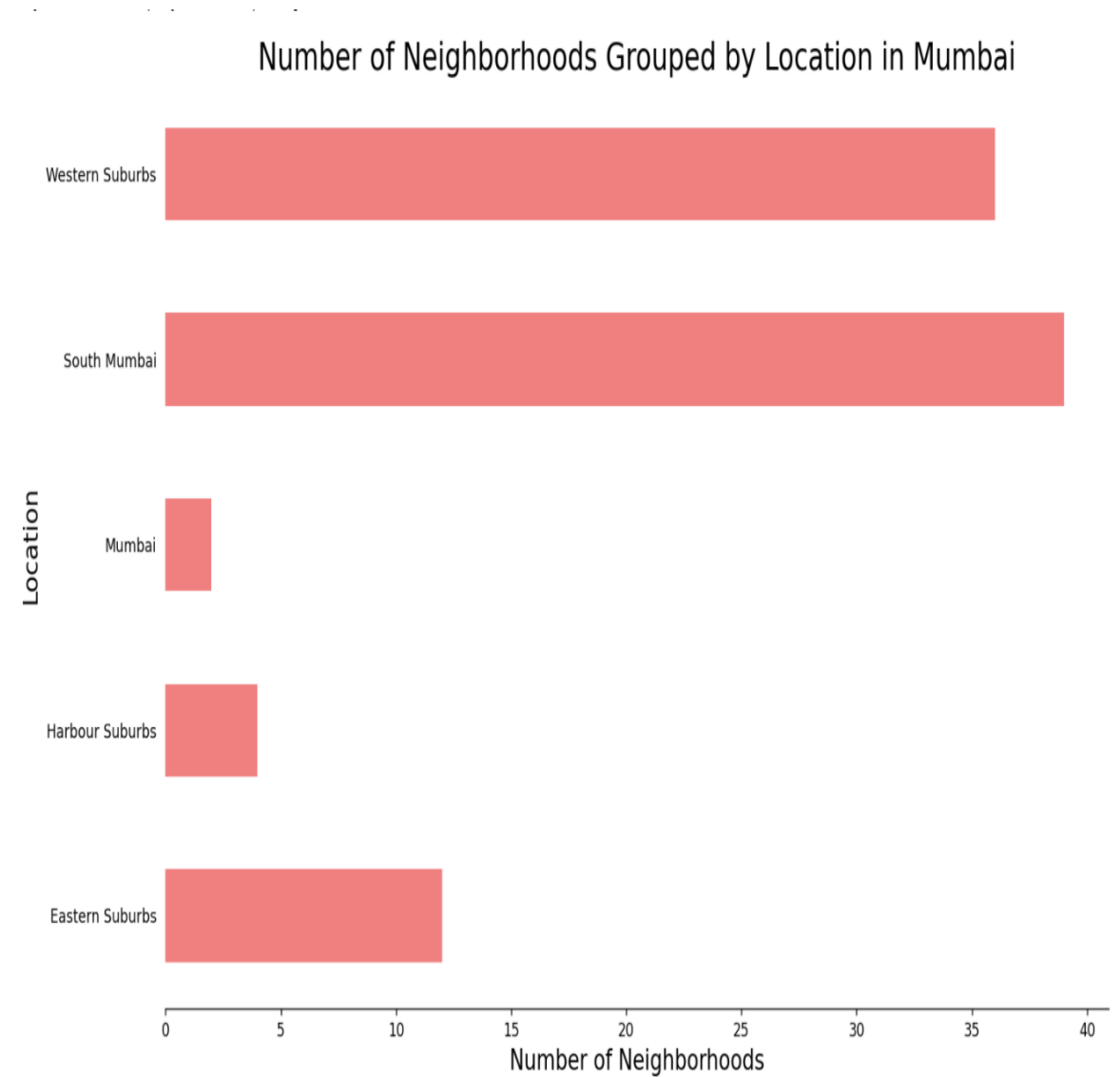
Dataset for Top 10 most common venues

	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	Amboli	Indian Restaurant	Asian Restaurant	Bar	Sandwich Place	Coffee Shop	Pizza Place	Athletics & Sports	Metro Station	Chinese Restaurant	Mughlai Restaurant
1	Chakala, Andheri	Hotel	Indian Restaurant	Café	Restaurant	Vegetarian / Vegan Restaurant	Pizza Place	Asian Restaurant	Multiplex	Burger Joint	Spa
2	D.N. Nagar	Indian Restaurant	Pizza Place	Bar	Pub	Coffee Shop	Vegetarian / Vegan Restaurant	Snack Place	Falafel Restaurant	Sports Club	Department Store
3	Four Bungalows	Pub	Chinese Restaurant	Indian Restaurant	Seafood Restaurant	Ice Cream Shop	Gym / Fitness Center	Vegetarian / Vegan Restaurant	Bar	Lounge	Pizza Place
4	Lokhandwala	Indian Restaurant	Café	Coffee Shop	Chinese Restaurant	Fast Food Restaurant	Bar	Gym / Fitness Center	Pub	Lounge	Italian Restaurant
...
88	Parel	Indian Restaurant	Coffee Shop	Maharashtrian Restaurant	Cafeteria	Sporting Goods Shop	Restaurant	Plaza	Playground	Chinese Restaurant	Bar
89	Gowalia Tank	Indian Restaurant	Fast Food Restaurant	Bakery	Café	Coffee Shop	Sandwich Place	Snack Place	Dessert Shop	Vegetarian / Vegan Restaurant	Pizza Place
90	Dava Bazaar	Train Station	Indian Restaurant	Café	Fish Market	Asian Restaurant	Beer Garden	Multiplex	Coffee Shop	Hotel	Falafel Restaurant
91	Dharavi	Indian Restaurant	Café	Coffee Shop	Music Venue	Sandwich Place	Seafood Restaurant	Shoe Store	Fast Food Restaurant	Lake	Juice Bar
92	Thane	Performing Arts Venue	Snack Place	Pizza Place	Fast Food Restaurant	Café	Department Store	Farmers Market	Falafel Restaurant	Event Space	Electronics Store

METHODOLOGY

DATA VISUALIZATION

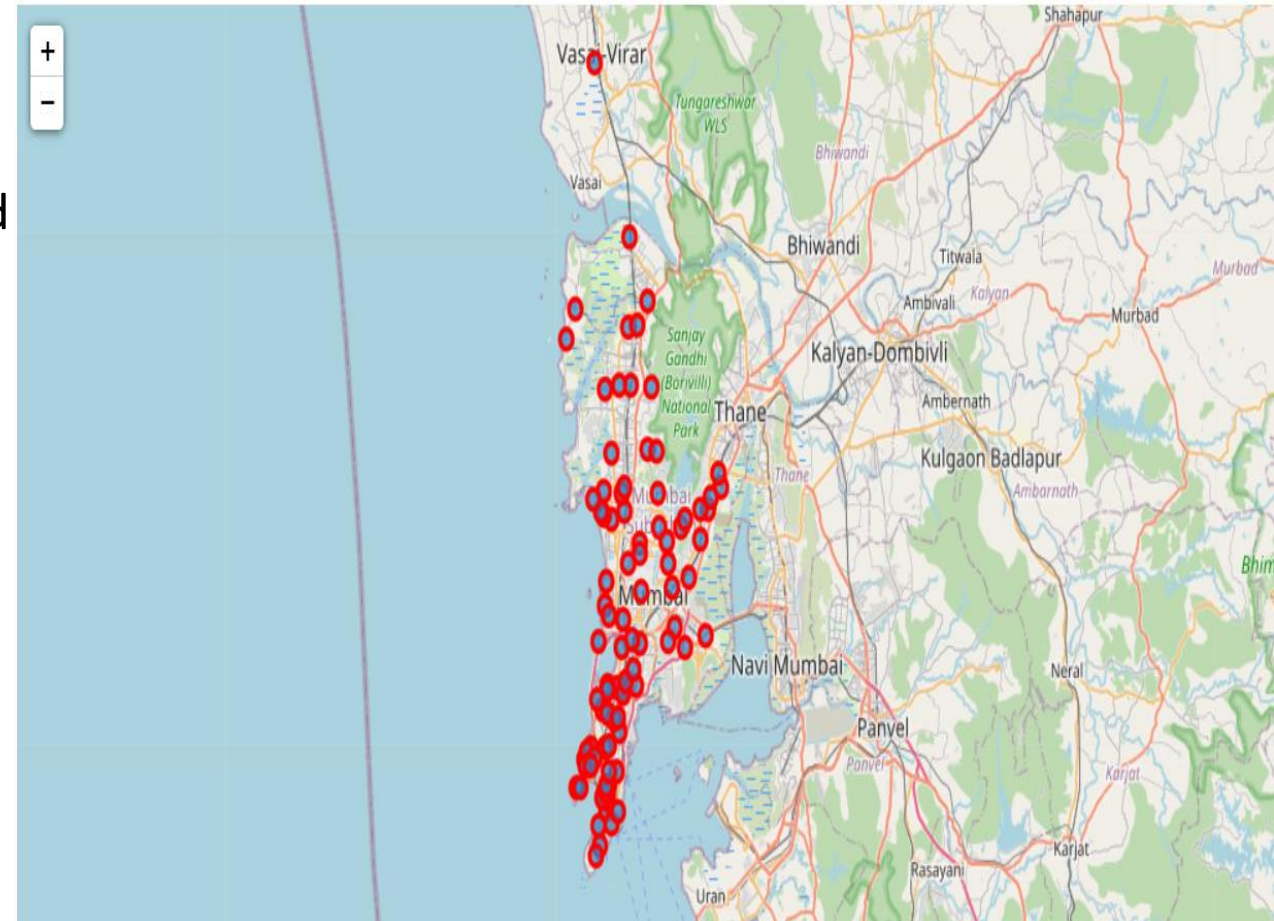
- Mumbai neighborhoods data was plotted for providing a better understanding
- The graph alongside depicts the number of neighborhoods in each location of Mumbai
- All neighborhoods on the outskirts of the city have been grouped as “Mumbai”
- Western Suburbs and South Mumbai contain the highest number of neighborhoods



METHODOLOGY - CONTINUED

DATA VISUALIZATION

- The Folium library in python was used to visualize the spread of all neighborhoods across Mumbai



METHODOLOGY - CONTINUED

One Hot Encoding

- One-hot Encoding was used to encode venue categories to numeric values with 1 if a venue belongs to a category and 0 if a venue does not belong to a category for all neighborhoods
- The average is then taken for all venue categories in a neighborhood to produce the dataframe shown

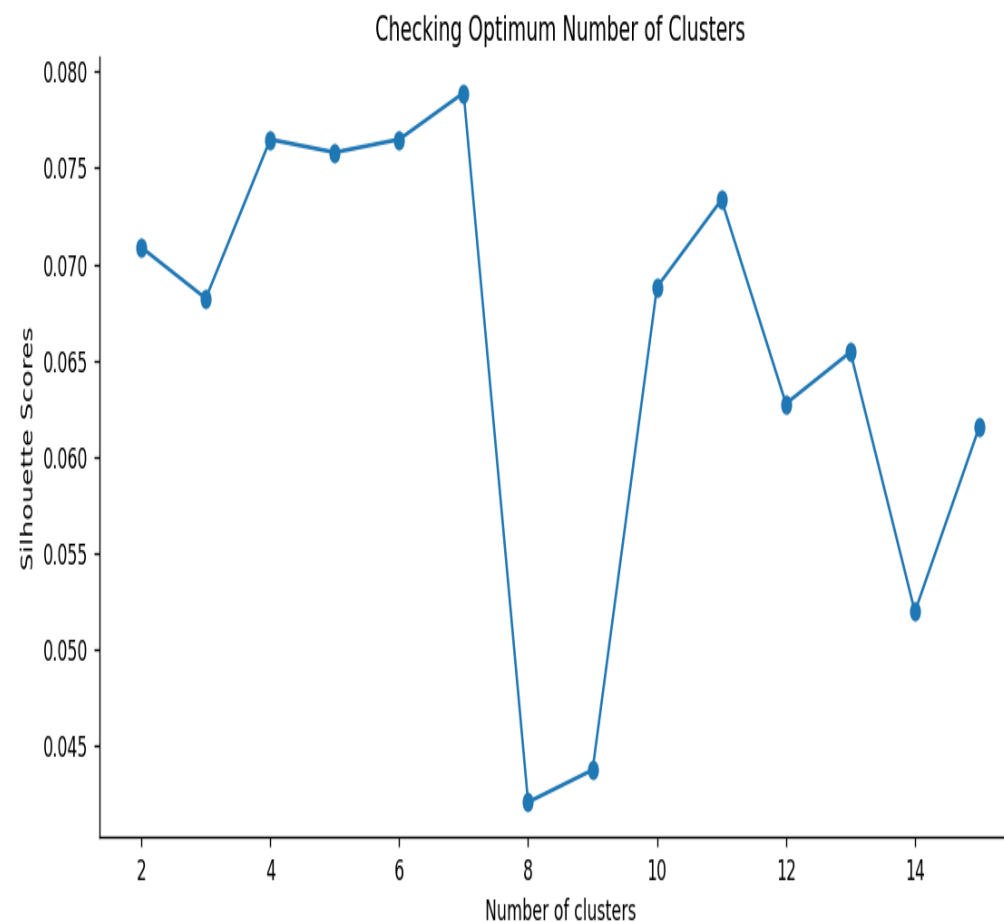
	Neighborhood	Accessories Store	Airport Lounge	Airport Terminal	American Restaurant	Antique Shop	Aquarium	Arcade	Art Gallery	Arts & Crafts Store	...	Trail	Train	Train Station	Vegetarian / Vegan Restaurant	Waterfront	V
0	Amboli	0.000000	0.0	0.00	0.0	0.0	0.0	0.0	0.0	0.000000	...	0.0	0.0	0.0	0.000000	0.0	C
1	Chakala, Andheri	0.000000	0.0	0.00	0.0	0.0	0.0	0.0	0.0	0.000000	...	0.0	0.0	0.0	0.058824	0.0	C
2	D.N. Nagar	0.023256	0.0	0.00	0.0	0.0	0.0	0.0	0.0	0.000000	...	0.0	0.0	0.0	0.046512	0.0	C
3	Four Bungalows	0.019608	0.0	0.00	0.0	0.0	0.0	0.0	0.0	0.000000	...	0.0	0.0	0.0	0.039216	0.0	C
4	Lokhandwala	0.000000	0.0	0.00	0.0	0.0	0.0	0.0	0.0	0.000000	...	0.0	0.0	0.0	0.011628	0.0	C
5	Marol	0.000000	0.0	0.00	0.0	0.0	0.0	0.0	0.0	0.000000	...	0.0	0.0	0.0	0.000000	0.0	C
6	Sahar	0.000000	0.0	0.05	0.0	0.0	0.0	0.0	0.0	0.000000	...	0.0	0.0	0.0	0.000000	0.0	C
7	Seven Bungalows	0.019231	0.0	0.00	0.0	0.0	0.0	0.0	0.0	0.000000	...	0.0	0.0	0.0	0.038462	0.0	C
8	Versova	0.000000	0.0	0.00	0.0	0.0	0.0	0.0	0.0	0.027778	...	0.0	0.0	0.0	0.000000	0.0	C
9	Mira Road	0.000000	0.0	0.00	0.0	0.0	0.0	0.0	0.0	0.000000	...	0.0	0.0	0.0	0.000000	0.0	C

10 rows x 213 columns

METHODOLOGY - CONTINUED

Unsupervised Learning Model

- KMeans clustering was used to cluster neighborhoods in Mumbai based on venue categories
- The plot shows a maximum Silhouette Score for 5 clusters and thus the `n_clusters` parameter in KMeans clustering was set to 5



RESULTS

- Each neighborhood received a cluster label based on clustering by the KMeans algorithm
- The Cluster Label column along with the Location, Latitude, and Longitude columns were added to the top 10 most common venues dataframe to provide the final results
- This dataframe is shown on the next slide

RESULTS - CONTINUED

	Neighborhood	Location	Latitude	Longitude	Cluster Labels	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
0	Amboli	Western Suburbs	19.1293	72.8464	2	Indian Restaurant	Asian Restaurant	Bar	Sandwich Place	Coffee Shop	Pizza Place	Athletics & Sports	Metro Station	Ch Re
1	Chakala, Andheri	Western Suburbs	19.1084	72.8623	1	Hotel	Indian Restaurant	Café	Restaurant	Vegetarian / Vegan Restaurant	Pizza Place	Asian Restaurant	Multiplex	Bu Joi
2	D.N. Nagar	Western Suburbs	19.1241	72.8325	2	Indian Restaurant	Pizza Place	Bar	Pub	Coffee Shop	Vegetarian / Vegan Restaurant	Snack Place	Falafel Restaurant	Sp Cl
3	Four Bungalows	Western Suburbs	19.1264	72.8242	2	Pub	Chinese Restaurant	Indian Restaurant	Seafood Restaurant	Ice Cream Shop	Gym / Fitness Center	Vegetarian / Vegan Restaurant	Bar	Lo
4	Lokhandwala	Western Suburbs	19.1432	72.8249	2	Indian Restaurant	Café	Coffee Shop	Chinese Restaurant	Fast Food Restaurant	Bar	Gym / Fitness Center	Pub	Lo
...
88	Parel	South Mumbai	18.9957	72.84	1	Indian Restaurant	Coffee Shop	Maharashtrian Restaurant	Cafeteria	Sporting Goods Shop	Restaurant	Plaza	Playground	Ch Re
89	Gowalia Tank	South Mumbai	18.9645	72.8112	2	Indian Restaurant	Fast Food Restaurant	Bakery	Café	Coffee Shop	Sandwich Place	Snack Place	Dessert Shop	Ve / V Re
90	Dava Bazaar	South Mumbai	19.1314	72.927	0	Train Station	Indian Restaurant	Café	Fish Market	Asian Restaurant	Beer Garden	Multiplex	Coffee Shop	Ho
91	Dharavi	Mumbai	19.0467	72.8546	2	Indian Restaurant	Café	Coffee Shop	Music Venue	Sandwich Place	Seafood Restaurant	Shoe Store	Fast Food Restaurant	La
92	Thane	Mumbai	19.1409	72.8826	2	Performing Arts Venue	Snack Place	Pizza Place	Fast Food Restaurant	Café	Department Store	Farmers Market	Falafel Restaurant	Ev Sp

RESULTS – CONTINUED – CLUSTER 1

	Neighborhood	Location	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
36	Bhandup	Eastern Suburbs	Train Station	Fast Food Restaurant	Indian Restaurant	Asian Restaurant	Bakery	Zoo	Dhaba	Fish & Chips Shop	Field	Farmers Market
40	Kanjurmarg	Eastern Suburbs	Train Station	Multiplex	Hotel	Gym	Chinese Restaurant	Asian Restaurant	Gift Shop	Zoo	Donut Shop	Dim Sum Restaurant
42	Nahur	Eastern Suburbs	Coffee Shop	Train Station	Bus Station	Restaurant	Pub	Indian Restaurant	Fast Food Restaurant	Pizza Place	Convention Center	Community Center
50	Mankhurd	Harbour Suburbs	Coffee Shop	Train Station	Sports Bar	Bus Station	Zoo	Dhaba	Field	Fast Food Restaurant	Farmers Market	Falafel Restaurant
59	Cotton Green	South Mumbai	Plaza	Fast Food Restaurant	Pizza Place	Snack Place	Vegetarian / Vegan Restaurant	Train Station	Zoo	Donut Shop	Dhaba	Dim Sum Restaurant
90	Dava Bazaar	South Mumbai	Train Station	Indian Restaurant	Café	Fish Market	Asian Restaurant	Beer Garden	Multiplex	Coffee Shop	Hotel	Falafel Restaurant

RESULTS – CONTINUED – CLUSTER 2

	Neighborhood	Location	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	Chakala, Andheri	Western Suburbs	Hotel	Indian Restaurant	Café	Restaurant	Vegetarian / Vegan Restaurant	Pizza Place	Asian Restaurant	Multiplex	Burger Joint	Spa
5	Marol	Western Suburbs	Indian Restaurant	Chinese Restaurant	Restaurant	Diner	Hotel	Coffee Shop	Farmers Market	Ice Cream Shop	Dance Studio	Electronics Store
6	Sahar	Western Suburbs	Hotel	Indian Restaurant	Café	Bakery	Asian Restaurant	Airport Terminal	Hotel Pool	Pizza Place	Italian Restaurant	Coffee Shop
9	Mira Road	Western Suburbs	Indian Restaurant	Mexican Restaurant	Fast Food Restaurant	Garden	Movie Theater	General College & University	Restaurant	Bar	Shopping Mall	Coffee Shop
20	Jogeshwari West	Western Suburbs	Indian Restaurant	Dessert Shop	Chinese Restaurant	Gym	Café	Men's Store	Mughlai Restaurant	Ice Cream Shop	Seafood Restaurant	Clothing Store
21	Juhu	Western Suburbs	Indian Restaurant	Movie Theater	Coffee Shop	Fast Food Restaurant	Vegetarian / Vegan Restaurant	Café	Convention Center	Plaza	Breakfast Spot	Restaurant
23	Poisar	Western Suburbs	Indian Restaurant	Gym / Fitness Center	Train Station	Men's Store	Mexican Restaurant	Fast Food Restaurant	Mobile Phone Shop	Food	Electronics Store	Snack Place
29	Sunder Nagar	Western Suburbs	Indian Restaurant	Coffee Shop	Movie Theater	Fast Food Restaurant	Café	Pizza Place	Breakfast Spot	Bakery	Restaurant	Train Station

RESULTS – CONTINUED – CLUSTER 3

	Neighborhood	Location	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	Amboli	Western Suburbs	Indian Restaurant	Asian Restaurant	Bar	Sandwich Place	Coffee Shop	Pizza Place	Athletics & Sports	Metro Station	Chinese Restaurant	Mughlai Restaurant
2	D.N. Nagar	Western Suburbs	Indian Restaurant	Pizza Place	Bar	Pub	Coffee Shop	Vegetarian / Vegan Restaurant	Snack Place	Falafel Restaurant	Sports Club	Department Store
3	Four Bungalows	Western Suburbs	Pub	Chinese Restaurant	Indian Restaurant	Seafood Restaurant	Ice Cream Shop	Gym / Fitness Center	Vegetarian / Vegan Restaurant	Bar	Lounge	Pizza Place
4	Lokhandwala	Western Suburbs	Indian Restaurant	Café	Coffee Shop	Chinese Restaurant	Fast Food Restaurant	Bar	Gym / Fitness Center	Pub	Lounge	Italian Restaurant
7	Seven Bungalows	Western Suburbs	Bar	Pub	Café	Seafood Restaurant	Pizza Place	Chinese Restaurant	Vegetarian / Vegan Restaurant	Indian Restaurant	Ice Cream Shop	Coffee Shop
8	Versova	Western Suburbs	Ice Cream Shop	Café	Beach	Restaurant	Coffee Shop	Chinese Restaurant	Sandwich Place	Clothing Store	Dim Sum Restaurant	Pub
10	Bhayandar	Western Suburbs	Ice Cream Shop	Soccer Field	Diner	Lake	Restaurant	Pizza Place	Food Truck	Train Station	Bakery	Indian Restaurant
12	Bandstand Promenade	Western Suburbs	Coffee Shop	Performing Arts Venue	Scenic Lookout	Café	Tea Room	Deli / Bodega	Indian Restaurant	Food Truck	Lounge	Fast Food Restaurant

RESULTS – CONTINUED – CLUSTER 4

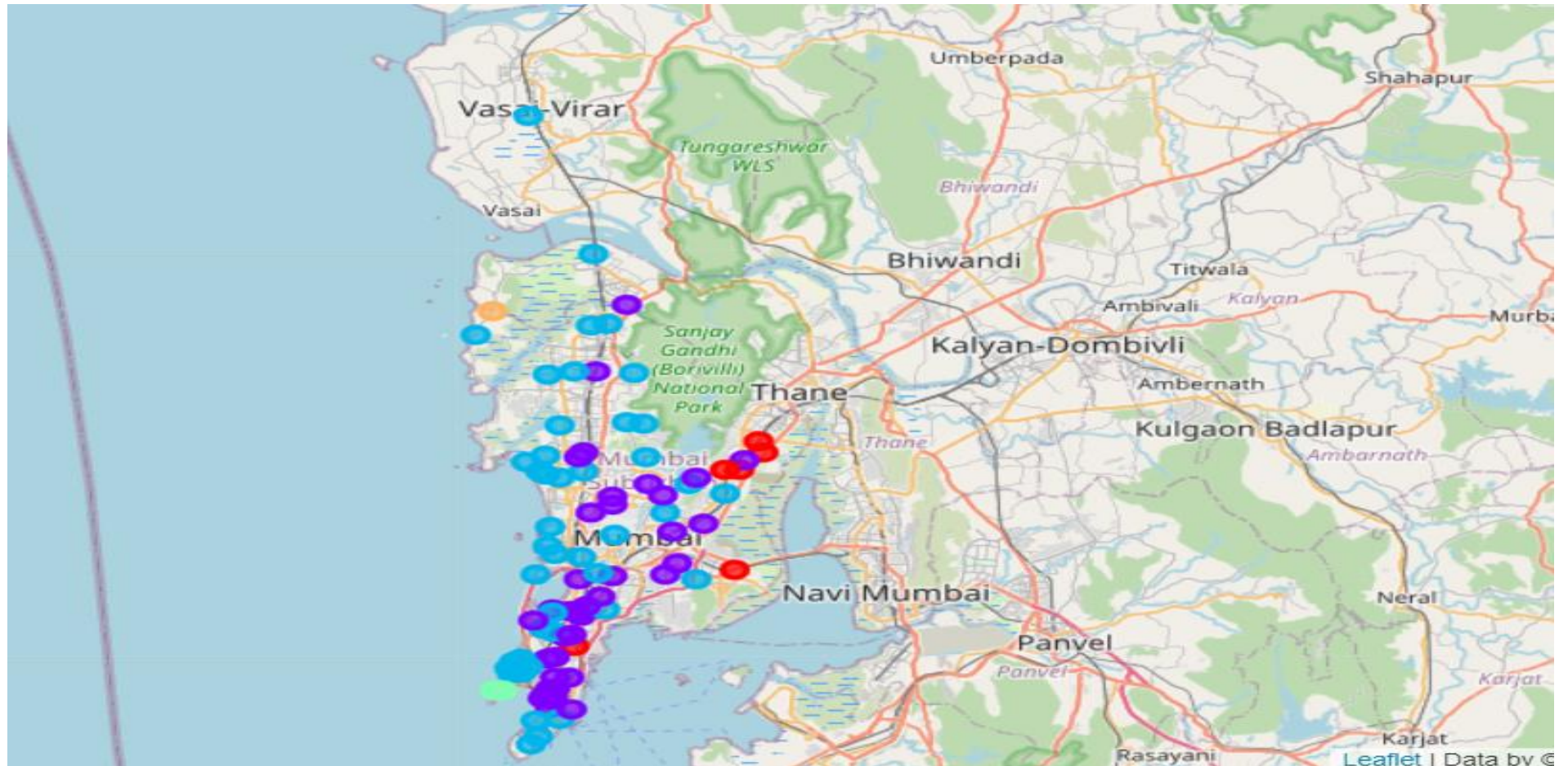
	Neighborhood	Location	1st Most Common Venue	2nd Most Common Venue	3rd Most Common Venue	4th Most Common Venue	5th Most Common Venue	6th Most Common Venue	7th Most Common Venue	8th Most Common Venue	9th Most Common Venue	10th Most Common Venue
70	Malabar Hill	South Mumbai	Coffee Shop	Park	Indian Restaurant	Lighthouse	Dessert Shop	Zoo	Dhaba	Field	Fast Food Restaurant	Farmers Market
77	Walkeshwar	South Mumbai	Park	Indian Restaurant	Food & Drink Shop	Restaurant	Lighthouse	Food Truck	Dessert Shop	Coffee Shop	Event Space	Dhaba

CLUSTER 5

	Neighborhood	Location	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
11	Uttan	Western Suburbs	Skate Park	Whisky Bar	Convenience Store	Indian Restaurant	Beach	Restaurant	Zoo	Dhaba	Fast Food Restaurant	Farmers Market

RESULTS - CONTINUED

- Visualization of neighborhood clusters was done using Folium in python
- Different clusters correspond to different colors



DISCUSSION

- By analyzing the clusters, it is evident that neighborhoods in cluster 1, 4, and 5 are well suited for a new restaurant since they contain a high degree of other venues like train station, bus station, fish market, gym and smoke shop.
- Comparing clusters 2 and 3, we find that neighborhoods in cluster 3 contain a much higher degree of food joints.
- Neighborhoods in cluster 2 contain many other venues like soccer field, flea market, smoke shop, gym, train station, dance studio and music store.
- Thus, the most optimal neighborhoods for starting a restaurant are in cluster 5.

CONCLUSION

- In this project, the neighborhoods in Mumbai, India have been successfully analyzed for determining which would be the best neighborhoods for opening a new restaurant.
- Based on the analysis carried out, neighborhoods in cluster 5 are recommended as locations for the new restaurant.
- The stakeholders and investors can further tune this by considering various other factors like transport, legal requirements, and costs associated which were out of the scope for this project and thus were not considered.

THANK YOU!