

# **MUMBAI NEIGHBORHOOD ANALYSIS**

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**PREDICTING LOCATIONS FOR NEW SHOPPING MALLS & THEATERS**

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# INTRODUCTION

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Mumbai is the financial capital and most densely populated city of India. Being a crowded city, people likely to spend most of their leisure time at malls for shopping and food and theaters for watching movies. Based on the current numbers of malls/ theaters, there is a market for new potential malls/theaters for Mumbai.

Helping investors find new potential areas for constructing and opening new shopping malls/theaters in the neighborhood of Mumbai.

This project can help investors to find the new potential areas based on the two main parameters -

- 1) number of malls/theaters in the neighborhood
- 2) the population density in the neighborhood



# DATA DESCRIPTION

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**Mumbai Neighborhood Details:** Mumbai area name along with their Latitude & Longitude details

**Mumbai Coordinates Details:** Mumbai's coordinates details to plot Mumbai's map

**Foursquare API:** Captured venue details through Foursquare API in a radius of 2.5 km from the coordinates of each area and considered venue details that area related to shopping malls/theaters

**K-Means Clustering:** Analyzed Mumbai's neighborhood using the K-Means clustering machine learning algorithm, computed the best K (number of clusters) for K-Means through Silhouette Score, and used Folium map to visualize clusters into Mumbai's map.

**Mumbai GeoJSON details:** Used GeoJson data in creating a Choropleth map to create boundaries for each area in Mumbai's map

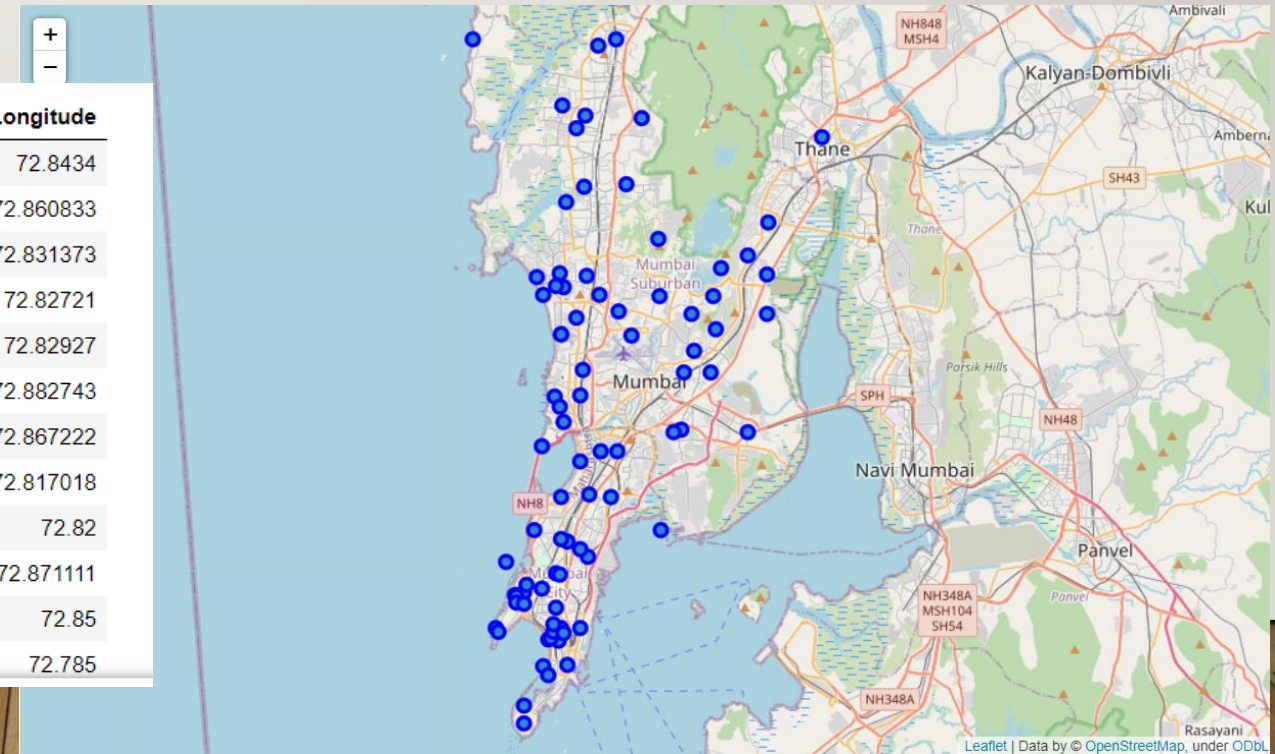
**Mumbai Area Wise Population Density:** Extracted area wise population density details and used Choropleth map to populate population density for each area



# METHODOLOGY (1/6)

- Extracted and prepared data for Mumbai neighborhood consisting Area, Location, Latitude and Longitude columns
- Plotted Mumbai's neighborhood through Folium Map

	Area	Location	Latitude	Longitude
1	Amboli	Andheri, Western Suburbs	19.1293	72.8434
2	Chakala, Andheri	Western Suburbs	19.111388	72.860833
3	D.N. Nagar	Andheri, Western Suburbs	19.124085	72.831373
4	Four Bungalows	Andheri, Western Suburbs	19.124714	72.82721
5	Lokhandwala	Andheri, Western Suburbs	19.130815	72.82927
6	Marol	Andheri, Western Suburbs	19.119219	72.882743
7	Sahar	Andheri, Western Suburbs	19.098889	72.867222
8	Seven Bungalows	Andheri, Western Suburbs	19.129052	72.817018
9	Versova	Andheri, Western Suburbs	19.12	72.82
10	Mira Road	Mira-Bhayandar, Western Suburbs	19.284167	72.871111
11	Bhayandar	Mira-Bhayandar, Western Suburbs	19.29	72.85
12	Uttan	Mira-Bhayandar, Western Suburbs	19.28	72.785



# METHODOLOGY (2/6)

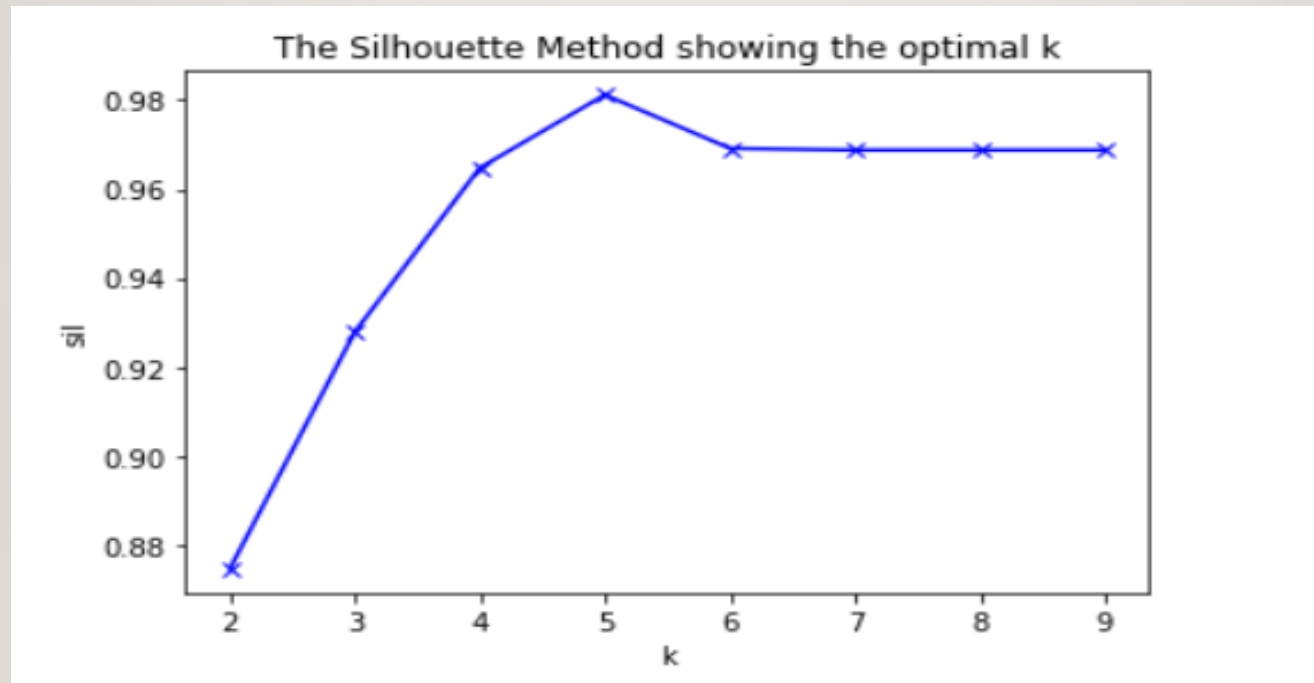
- Extracted venue details using Foursquare API in the range of 2.5 kms from each area's coordinates
- Selected venue categories related to Shopping mall and Theater and updated venue categories name consistently as 'Shopping Mall' and 'Theater'

Neighborhood	Neighborhood Latitude	Neighborhood Longitude	Venue	Venue Latitude	Venue Longitude	Venue Category
Amboli	19.1293	72.8434	PVR ICON	19.141531	72.830331	Theater
D.N. Nagar	19.124085	72.831373	Prithvi Theatre	19.106157	72.825810	Theater
D.N. Nagar	19.124085	72.831373	PVR ICON	19.141531	72.830331	Theater
Four Bungalows	19.124714	72.82721	Prithvi Theatre	19.106157	72.825810	Theater
Four Bungalows	19.124714	72.82721	PVR ICON	19.141531	72.830331	Theater
Lokhandwala	19.130815	72.82927	PVR ICON	19.141531	72.830331	Theater
Seven Bungalows	19.129052	72.817018	PVR ICON	19.141531	72.830331	Theater
Versova	19.12	72.82	Prithvi Theatre	19.106157	72.825810	Theater
Mira Road	19.284167	72.871111	Surya Shopping Center	19.272709	72.866619	Shopping Mall
Mira Road	19.284167	72.871111	Inox Cinemas - Thakur Mall - Dahisar	19.263130	72.874483	Theater
Bandstand Promenade	19.042718	72.819132	Le Rêve (Globus Cinema)	19.056014	72.833951	Theater

# METHODOLOGY (3/6)

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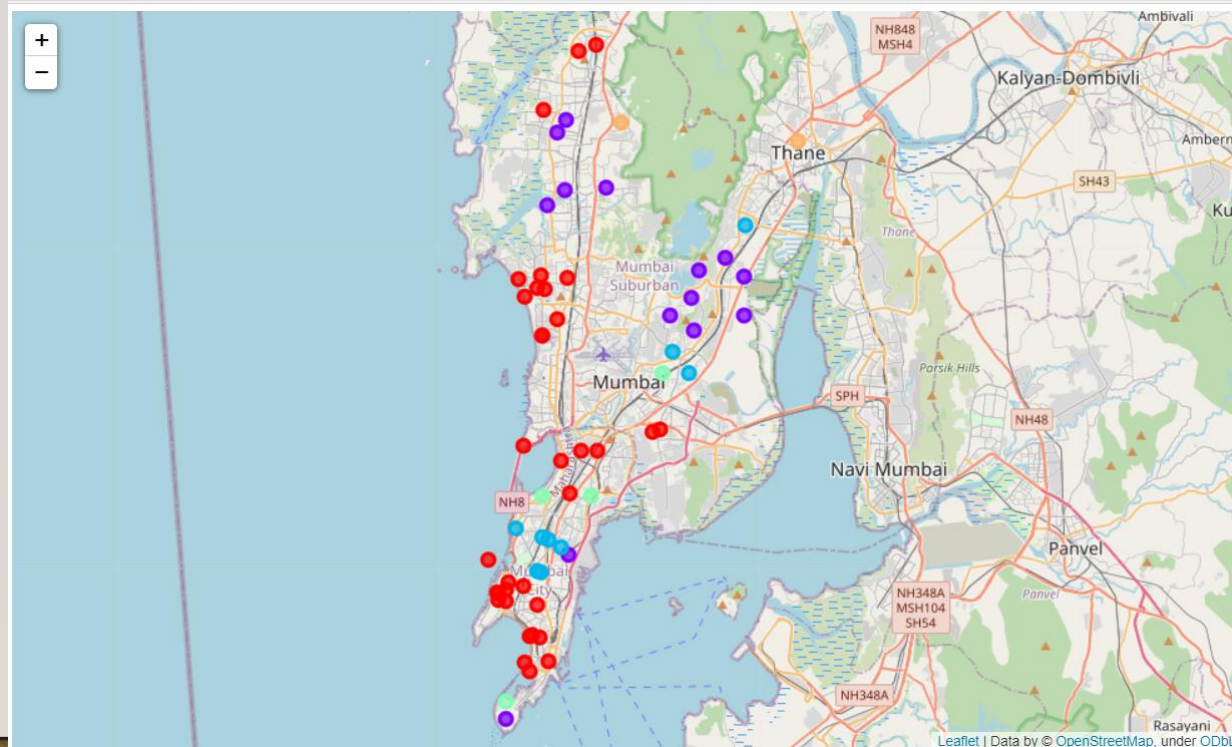
- Used K-Means machine learning algorithm and found the optimum value of K (clusters) using Silhouette matrix; Best K for K-Means algorithm=5





# METHODOLOGY (4/6)

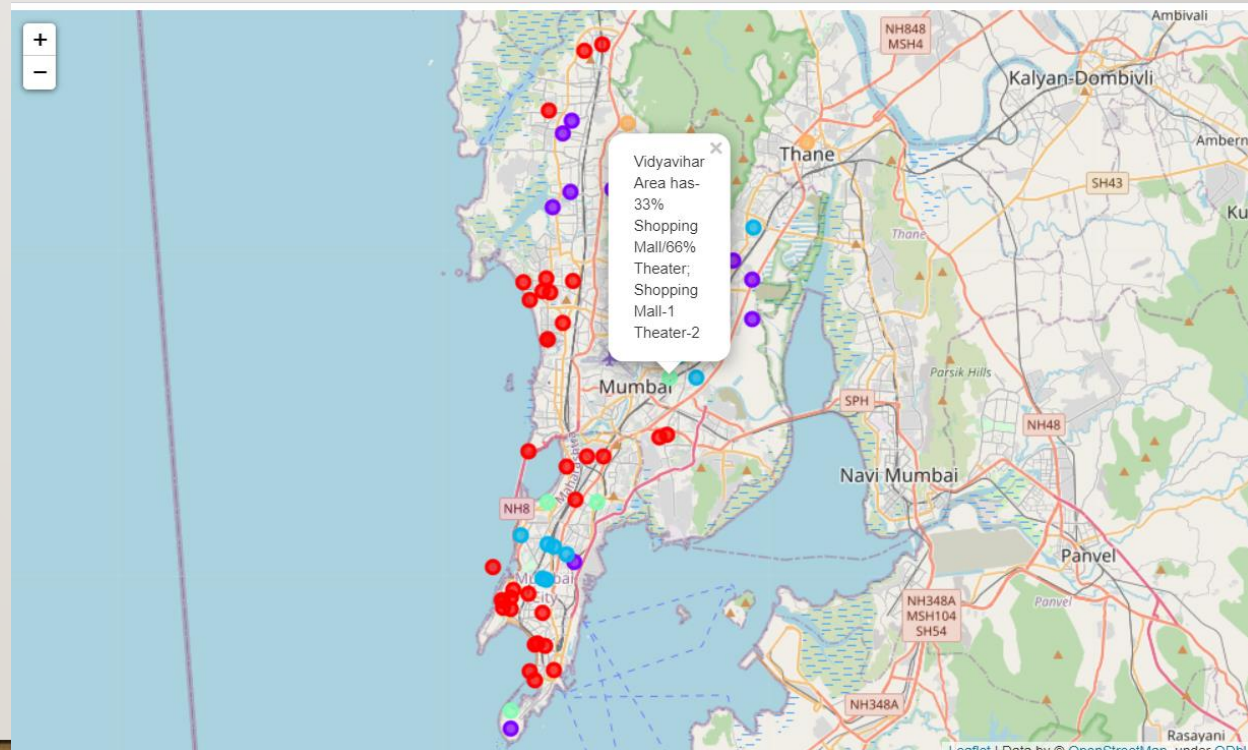
- Generated clusters through K-Means algorithm and plotted through Folium Map



# METHODOLOGY (5/6)

- Labeled the clusters based on the percentage value in each area along with number of shopping malls and theaters

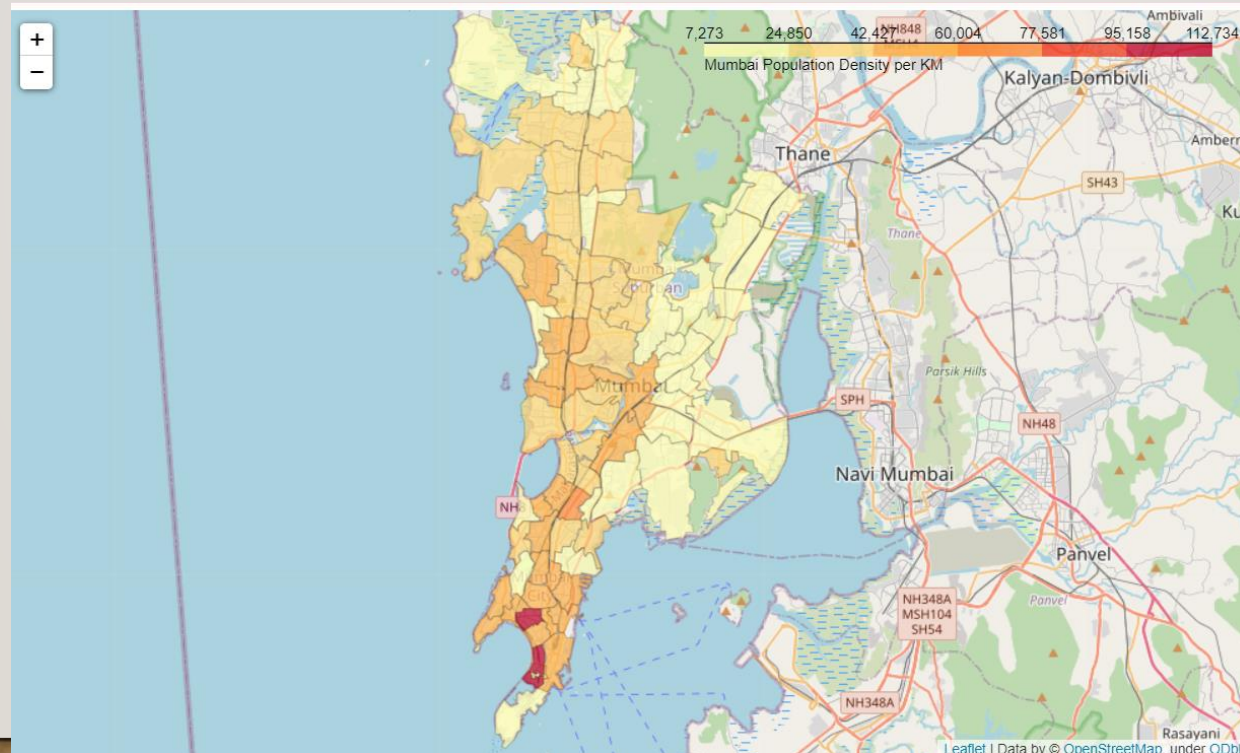
Cluster	Labels
0	Only Theater
1	Only Shopping Mall
2	66 % Shopping Mall / 33% Theater
3	33 % Shopping Mall / 66% Theater
4	75 % Shopping Mall / 25% Theater





# METHODOLOGY (6/6)

- Used Mumbai's GeoJSON data and Mumbai's are wise population density to build Choropleth map



# RESULT

- Combined the cluster map and population density Choropleth map to analyze the final result





# DISCUSSION

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- After analyzing the final result, we can observe that in the Andheri west areas (Four Bungalows, Seven Bungalows, Versova, Lokhandwala), there are only theaters but not shopping malls. Similarly, we can see that in the Chandivali and Powai areas, there are only shopping malls but not theaters. Also, population density can be considered for these areas to find the optimum locations to build new shopping malls/theaters.
- However, this analysis has some limitations. Firstly, I could only extract 100 venue details for each location because Foursquare API only provides 100 venues as free. Secondly, I could not find the complete data for population density for each area. Therefore, I updated density based on the nearby areas' density value.
- An optimum result through this analysis can be achieved, if the complete venue details and population density can be retrieved. Also, other parameters can be considered.





# CONCLUSION

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To conclude, due to people's love for visiting shopping malls/theaters in Mumbai, investors/builders can discover new potentials areas for building shopping malls/theaters within Mumbai through this analysis.

# REFERENCES

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- [1] [Mumbai Neighborhood Details](#)
- [2] [FourSquare API](#)
- [3] [Mumbai GeoJSON Details](#)
- [4] [Mumbai Area Wise Population Density](#)