

An aerial photograph of a city at night, likely Tokyo, showing a dense concentration of buildings of various heights. The city is brightly lit with a variety of colors from building windows and streetlights. A prominent feature is a multi-level highway or elevated road system that cuts through the city, with streaks of light from moving vehicles visible. The overall atmosphere is vibrant and energetic.

BANGALORE CITY

A brief Introduction about the city

Bangalore, officially known as Bengaluru is the capital of the Indian state of Karnataka. It has a population of about 10 million and a metropolitan population of about 8.52 million, making it the third most populous city and fifth most populous urban agglomeration in India. Bangalore is widely regarded as the "Silicon Valley of India" (or "IT capital of India") because of its role as the nation's leading information technology (IT) exporter. Bangalore's hyperactive economic scenario makes it one of the major economic centers in India, and at the same time it's a heaven for those who want to start their own business. With extensive business opportunities and economic stability, anyone with a valuable business idea can setup a highly profitable business here. Bengaluru is now the 7th Biggest Investment destination in Asia.

DISCUSSION

Forbes considers Bangalore as one of “The Next Decade’s Fastest-Growing Cities”, which means the faster it grows the faster small businesses will grow. The facts are good enough to motivate anyone in setting up a business, however it is also important to know what works best here.

My analysis would be helpful for people

- 1. Those who have a land in a particular neighborhood and wish to determine what kind of small scale business to set up in that area.**
- 2. Those who wish to visit a neighborhood with certain venue categories.**
- 3. Those who wish to buy a property in different neighborhoods based on certain locality requirements.**

(This is a rough estimate)

Data Description

- Retrieved Bangalore's Neighborhood data alongwith latitude and longitude from Kaggle website.
- Used foursquare API to retrieve data about venues in different Neighborhoods.

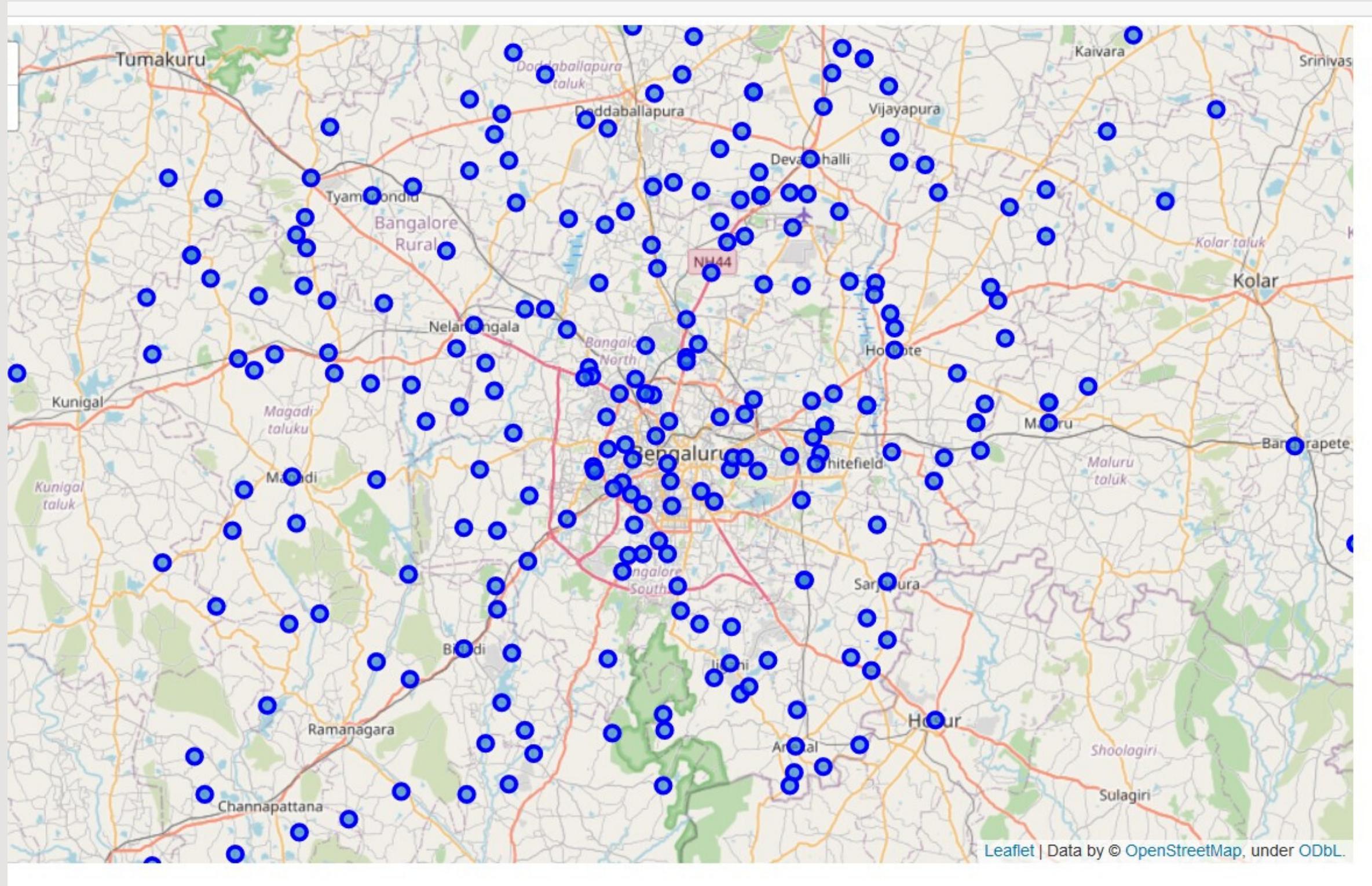
Methodology

1. The master data had information about the Neighborhoods and their latitude and longitude values.

	Unnamed: 0	Neighborhood	Latitude	Longitude
0	0	Agram	45.813177	15.977048
1	1	Amruthahalli	13.066513	77.596624
2	2	Attur	11.663711	78.533551
3	3	Banaswadi	13.014162	77.651854
4	4	Bellandur	58.235358	26.683116
...
347	347	Virupakshipura	13.024075	76.469658
348	348	Vishwanathapura	13.273529	77.649099
349	349	Yadamaranahalli	12.427249	77.379083
350	350	Yadavanahalli	12.789855	77.751454
351	351	Yeliyur	12.509896	76.828661

352 rows × 4 columns

2. Used folium library to visualize the map of Bangalore and its neighborhoods with proper pop up labels.



3. I utilized the Foursquare API to explore the neighborhoods and designed the limit as 100 venues and the radius 500 meter for each neighborhood from their given latitude and longitude information.

Here are the top 10 elements of the list with Neighborhood Latitude, Neighborhood Longitude, Venue, Venue Latitude, Venue Longitude, Venue Category informations from Forsquare API.

	Neighborhood	Neighborhood Latitude	Neighborhood Longitude	Venue	Venue Latitude	Venue Longitude	Venue Category
0	Agram	45.813177	15.977048	Amélie	45.813842	15.979011	Dessert Shop
1	Agram	45.813177	15.977048	Corner bar	45.812930	15.979440	Bar
2	Agram	45.813177	15.977048	Trg bana Josipa Jelačića	45.813032	15.976868	Plaza
3	Agram	45.813177	15.977048	Tržnica Dolac	45.814070	15.977261	Farmers Market
4	Agram	45.813177	15.977048	Cremme Zagreb	45.814987	15.976296	Dessert Shop
5	Agram	45.813177	15.977048	Gajbica	45.813531	15.979550	Bistro
6	Agram	45.813177	15.977048	La Štruk	45.814824	15.976828	Pie Shop
7	Agram	45.813177	15.977048	Submarine BBQ	45.812223	15.974713	Burger Joint
8	Agram	45.813177	15.977048	Capuciner Grill & Steak	45.815103	15.978144	Steakhouse
9	Agram	45.813177	15.977048	Vinodol	45.811666	15.975643	Mediterranean Restaurant

4. Found out the frequency of top 5 venue categories in different neighborhoods. Here is a small part of it.

We notice that the frequency of restaurants and fast food chains is a lot in 'Basaveshwaranagar' and 'Banaswadi' areas.

----Banaswadi----		
	venue	freq
0	Vegetarian / Vegan Restaurant	0.33
1	Indian Restaurant	0.17
2	Convenience Store	0.17
3	BBQ Joint	0.17
4	Bakery	0.17

----Bangalore City----		
	venue	freq
0	Bakery	0.5
1	Coffee Shop	0.5
2	ATM	0.0
3	Mobile Phone Shop	0.0
4	Modern European Restaurant	0.0

----Basaveshwaranagar----		
	venue	freq
0	Indian Restaurant	0.23
1	Fast Food Restaurant	0.15
2	Asian Restaurant	0.08
3	Snack Place	0.08
4	Market	0.08

----Begur----		
	venue	freq
0	Café	0.19
1	Supermarket	0.12
2	Comedy Club	0.06
3	Mini Golf	0.06
4	Bar	0.06

----Bellandur----		
	venue	freq
0	Restaurant	1.0
1	ATM	0.0
2	Museum	0.0
3	Miscellaneous Shop	0.0
4	Mobile Phone Shop	0.0

----Bhattarahalli----		
	venue	freq
0	Ice Cream Shop	0.33
1	Hotel	0.33
2	Café	0.33
3	ATM	0.00
4	Museum	0.00

5. I then made dummies of the Venue Category and grouped on the basis of the Neighborhoods to find the mean of each category in each neighborhood. Shows 102 Neighborhoods and 174 Categories.

	Neighborhood	ATM	Accessories Store	American Restaurant	Andhra Restaurant	Arcade	Art Museum	Arts & Entertainment	Asian Restaurant	Athletics & Sports	...	Travel & Transport	Tunnel	Turkish Coffeehouse	U R
0	Achitnagar	0.0	0.0	0.0	0.0	0.0	0.000000	0.0	0.000000	0.00	...	0.0	0.000000	0.0	0
1	Adugodi	0.0	0.0	0.0	0.0	0.0	0.000000	0.0	0.000000	0.25	...	0.0	0.000000	0.0	0
2	Agram	0.0	0.0	0.0	0.0	0.0	0.011111	0.0	0.022222	0.00	...	0.0	0.011111	0.0	0
3	Akkur	0.0	0.0	0.0	0.0	0.0	0.000000	0.0	0.000000	0.00	...	0.0	0.000000	0.0	0
4	Alahalli	0.0	0.0	0.0	0.0	0.0	0.000000	0.0	0.000000	0.00	...	0.0	0.000000	0.0	0
...
97	Virgonagar	0.0	0.0	0.0	0.0	0.0	0.000000	0.0	0.000000	0.00	...	0.0	0.000000	0.0	0
98	Whitefield	0.0	0.0	0.0	0.0	0.0	0.000000	0.0	0.000000	0.00	...	0.0	0.000000	0.0	0
99	Yelachenahalli	0.0	0.0	0.0	0.0	0.0	0.000000	0.0	0.000000	0.00	...	0.0	0.000000	0.0	0
100	Yelahanka	0.2	0.0	0.0	0.0	0.0	0.000000	0.0	0.000000	0.00	...	0.0	0.000000	0.0	0
101	Yeliyur	0.0	0.0	0.0	0.0	0.0	0.000000	0.0	0.000000	0.00	...	0.0	0.000000	0.0	0

102 rows × 175 columns

6. Then I created top 10 venue category per Neighborhood. Below is the head of the table for the same.

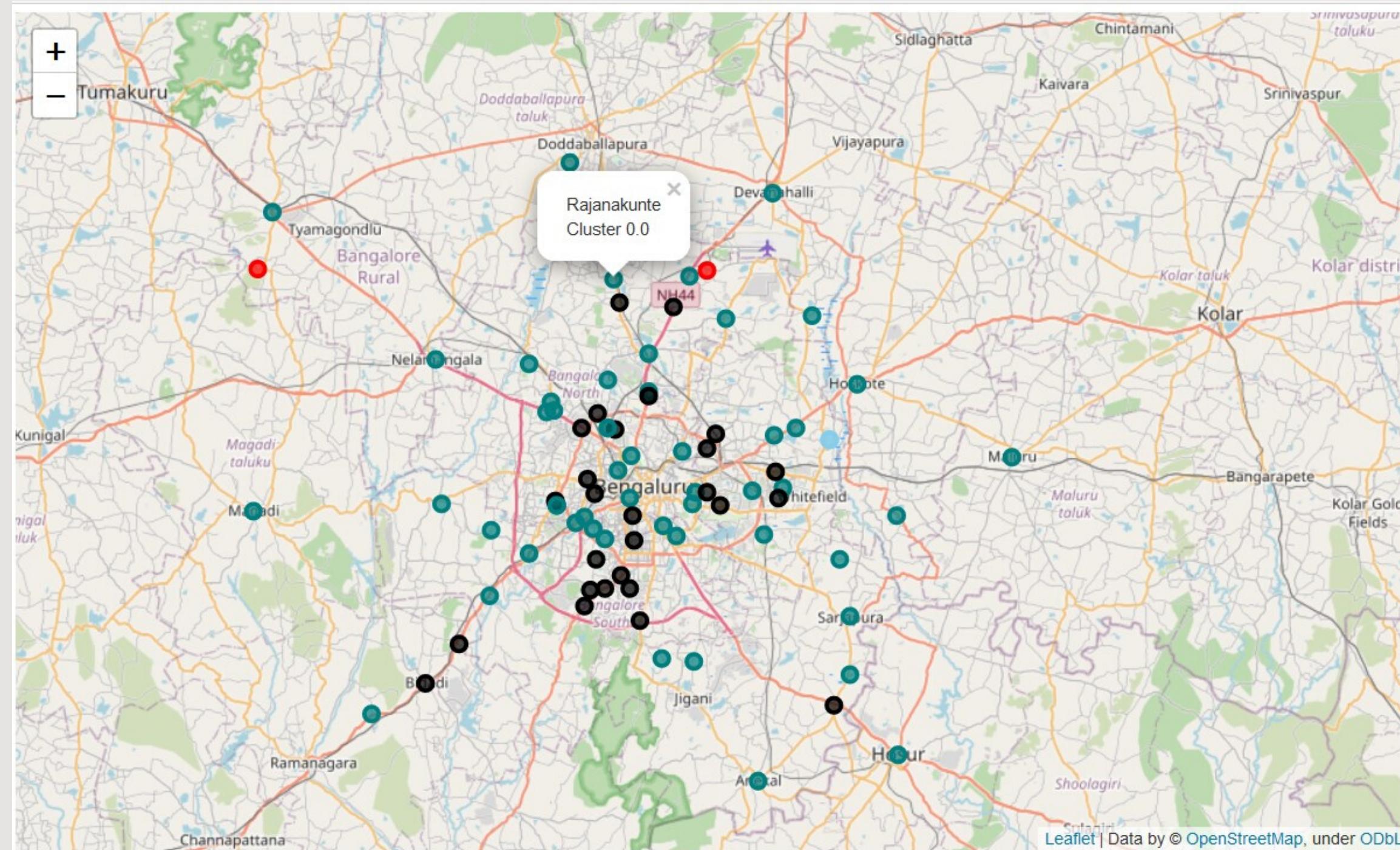
	Neighborhood	1st Most Common Venue	2nd Most Common Venue	3rd Most Common Venue	4th Most Common Venue	5th Most Common Venue	6th Most Common Venue	7th Most Common Venue	8th Most Common Venue	9th Most Common Venue	10th Most Common Venue
0	Achitnagar	Food Truck	Burger Joint	Restaurant	Yoga Studio	Diner	Farm	Electronics Store	Eastern European Restaurant	Dry Cleaner	Donut Shop
1	Adugodi	Restaurant	Playground	Athletics & Sports	Café	Yoga Studio	Farm	Electronics Store	Eastern European Restaurant	Dry Cleaner	Donut Shop
2	Agram	Bar	Plaza	Mediterranean Restaurant	Bistro	Dessert Shop	Café	Pedestrian Plaza	Theater	Historic Site	Coffee Shop
3	Akkur	Supermarket	Pet Store	Chinese Restaurant	Discount Store	Sandwich Place	Bar	Diner	Farm	Electronics Store	Eastern European Restaurant
4	Alahalli	Food & Drink Shop	Diner	Fast Food Restaurant	Farmers Market	Farm	Electronics Store	Eastern European Restaurant	Dry Cleaner	Donut Shop	Discount Store

This table might be helpful in figuring out which neighborhood is suitable for buying a house or property based on the proximity to various venue categories.

7. After applying K-Means Algorithm with 5 clusters, each neighborhood was divided into a cluster based on similar venue category.

Neighborhood	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	10th Most Common Venue
Agram	45.813177	15.977048	0.0	Bar	Plaza	Mediterranean Restaurant	Bistro	Dessert Shop	Café	Pedestrian Plaza	Theater	Historic Site	Cof Sh
Amruthahalli	13.066513	77.596624	0.0	ATM	Indian Restaurant	Convenience Store	Juice Bar	Shoe Store	Department Store	Discount Store	Farmers Market	Farm	Elec Sto
Banaswadi	13.014162	77.651854	2.0	Vegetarian / Vegan Restaurant	BBQ Joint	Bakery	Indian Restaurant	Convenience Store	Fast Food Restaurant	Farmers Market	Farm	Electronics Store	Eas Eur Res
Bellandur	58.235358	26.683116	3.0	Restaurant	Yoga Studio	Dhaba	Farmers Market	Farm	Electronics Store	Eastern European Restaurant	Dry Cleaner	Donut Shop	Disc Sto
Bhattarahalli	13.025800	77.714279	0.0	Ice Cream Shop	Café	Hotel	Farmers Market	Farm	Electronics Store	Eastern European Restaurant	Dry Cleaner	Donut Shop	Disc Sto

8. Here is a map of Bangalore city visualised using Folium. Different neighborhoods are marked by popup label markers. Each label has neighborhood name and cluster number. Similar cluster has similar colour.



Result

Data Analysis plays a major role in our day to day life. In a city's scenario, it helps city managers, investors, businessmen and others to invest in the best option suitable for them.

This analysis is a small part of what goes into setting up a business, buying a property or something as menial as visiting a particular neighborhood based on various factors.

Hope my little efforts come handy to a few of you.

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