

Capstone Project: Analysis of Indian Cities

- Radhika

A: Introduction:

India, a country in South Asia, is the second-most populous country and the most populous democracy in the world, with the population of about **135.26 crores (2018)**. It has a population density of about **454.94 inhabitants per square kilometer**.


With 29 states and 7 union territories, India is a place with enormous growth. In a diverse country like this, there is audience for almost everything, may it be art, science, sports, culture, technology or even farming. Along with the interesting history and mythology, the variety in the attire, nature, language speaks about the quality and versatility of life in the country.



AI: Description and Discussion of the Background:

Many students travel across the country for education, jobs, and to settle down. The main concern, whenever you move to a new city, is a house to stay in. Obviously, you will want to search for a good neighborhood, and this project, will give an idea as to how to select and what to choose, based on your requirements. The majority of the population in India is middle class.

Buying a real estate in a country as populated as India can be a real problem, especially when you have just started earning. Hence, rented apartments seem to be the new trend among the generation. The young generation does not prefer stability, and the short rent agreements allow you to move frequently. This analysis will also help the investors/ businessmen to decide where there is more scope.



The main cities in India are also the centers for the migrants, always looking for jobs. Hence, there can never be shortage of employees. Depending on the stream of the business/startup (tech, sports centers, education hubs, restaurants, and transportation), the choice of a city differs.

- Pune is called as the education hub of India.
- Mumbai is the city of dreams, the city that never sleeps.
- Surat is called as the city of mirrors and mirages, a huge production centre.
- Delhi, the capital of the country, is rich in everything, the historical places, the culture, and has tremendous scope for the government jobs.
- The cities have mixed and intertwined structure. Comparing the nearby venues and the average rent values in each city, different categories of groups of cities can be made .

A2: Data Description:

To consider the above idea, I collected the data as mentioned below:

1. I used **Foursquare API** to get the most common venues in the top 5 cities.
2. I collected the average housing rent values of 106 cities from the link: <https://www.makaan.com/price-trends>
3. I used the **geopy** library to get the coordinates of each of the 106 cities and folium library to plot them on the map.

B: Data and Methodology:

As a database, I used GitHub repository in my study. The main data consists of the columns: City, 1bk_avg_rent, 2bhk_avg_rent, 3bhk_avg_rent, latitude, longitude information.

As a database, I used GitHub repository in my study. The main data consists of the columns: ***City, 1bk_avg_rent, 2bhk_avg_rent, 3bhk_avg_rent, latitude, longitude*** information and plotted them on the map, as shown below.



Results:

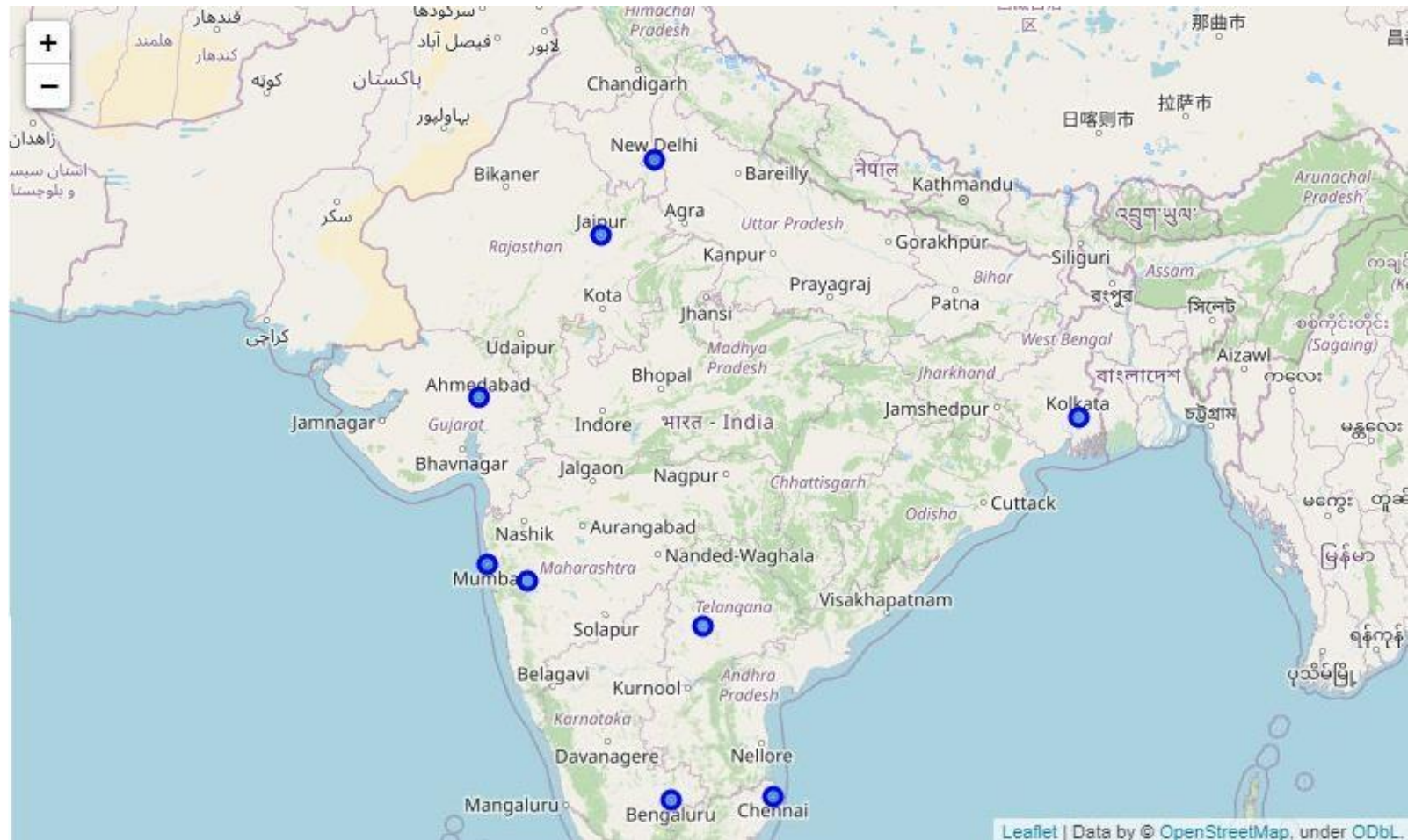
The following results were displayed by the code which is attached in the GitHub link for the notebook.

The screenshots of some of the results are inserted in the following slides.

I then made a different dataframe for the **top 10** cities.

| | City | 1bhk_avg_rent | 2bhk_avg_rent | 3bhk_avg_rent | latitude | longitude |
|---|-----------|---------------|---------------|---------------|-----------|-----------|
| 0 | Ahmedabad | 11631.58 | 19566.09 | 31308.69 | 23.021624 | 72.579707 |
| 1 | Bangalore | 12691.02 | 19688.55 | 41341.30 | 12.979120 | 77.591300 |
| 2 | Chennai | 9469.39 | 15760.46 | 36254.73 | 13.080172 | 80.283833 |
| 3 | Delhi | 12425.47 | 19357.13 | 47127.06 | 28.651718 | 77.221939 |
| 4 | Hyderabad | 9524.62 | 13331.54 | 23103.28 | 17.388786 | 78.461065 |
| 5 | Kolkata | 7213.54 | 10584.40 | 23261.11 | 22.545412 | 88.356775 |
| 6 | Mumbai | 13623.06 | 34893.94 | 67617.86 | 18.938771 | 72.835335 |
| 7 | Pune | 9954.02 | 18325.97 | 33399.49 | 18.521428 | 73.854454 |
| 8 | Jaipur | 7624.14 | 13463.92 | 22586.96 | 26.916194 | 75.820349 |
| 9 | Surat | 14250.00 | 12750.00 | 24269.23 | 45.938300 | 3.255300 |

I then plotted them on map too.



I utilized **Foursquare API** to explore the venues of **top 5** countries.
I set the radius 500m and the limit 100 for each.
The venues of the following cities were returned by Foursquare API:

I. Ahmedabad:

| | name | categories | lat | lng |
|---|------------------------|-------------------------------|-----------|-----------|
| 0 | Lucky Tea | Tea Room | 23.027829 | 72.581394 |
| 1 | Manek Chowk Khau Gali | Snack Place | 23.023505 | 72.588539 |
| 2 | Manek Chowk | Fast Food Restaurant | 23.023626 | 72.588553 |
| 3 | Agashiye | Indian Restaurant | 23.027104 | 72.581614 |
| 4 | House of MG | Hotel | 23.027186 | 72.581621 |
| 5 | Hotel Patang | Indian Restaurant | 23.026421 | 72.572185 |
| 6 | Sidi Saiyyed's Jali | Historic Site | 23.027022 | 72.581175 |
| 7 | Jama Masjid | Historic Site | 23.024323 | 72.587042 |
| 8 | Hotel Neelkanth Patang | Restaurant | 23.026472 | 72.572237 |
| 9 | The Green House | Vegetarian / Vegan Restaurant | 23.027270 | 72.581461 |

2. Bangalore:

| | name | categories | lat | lng |
|---|-----------------------------|--------------------|-----------|-----------|
| 0 | Cubbon Park | Park | 12.977042 | 77.595277 |
| 1 | Vidhana Soudha | Capitol Building | 12.979027 | 77.591881 |
| 2 | JW Marriott Hotel Bengaluru | Hotel | 12.972362 | 77.595051 |
| 3 | M. Chinnaswamy Stadium | Cricket Ground | 12.978144 | 77.599223 |
| 4 | Taj West End | Hotel | 12.984572 | 77.584893 |
| 5 | Infinitea | Tea Room | 12.987157 | 77.594835 |
| 6 | J W Kitchen | Asian Restaurant | 12.972410 | 77.594592 |
| 7 | Toscana | Italian Restaurant | 12.971980 | 77.596066 |
| 8 | Spice Terrace | Lounge | 12.972254 | 77.595200 |
| 9 | UB City | Shopping Mall | 12.971709 | 77.595905 |

3. Delhi:

| | name | categories | lat | lng |
|---|---|-------------------------------|-----------|-----------|
| 0 | Amritsari Lassi Wala | Snack Place | 28.657325 | 77.224138 |
| 1 | Kake Di Hatti काके दी हट्टी | Indian Restaurant | 28.658050 | 77.223377 |
| 2 | bloomrooms @ New Delhi Railway Station | Hotel | 28.645537 | 77.217701 |
| 3 | Spice Market | Food & Drink Shop | 28.657287 | 77.222595 |
| 4 | Giani's Di Hatti Rabri Faluda | Dessert Shop | 28.657889 | 77.223296 |
| 5 | The Prime Balaji Deluxe @ New Delhi Railway St... | Hotel | 28.645247 | 77.217433 |
| 6 | Chawri Bazaar चावड़ी बाजार | Hardware Store | 28.649771 | 77.227364 |
| 7 | The Indian Grill Restaurant | Restaurant | 28.646141 | 77.215133 |
| 8 | Giani Kulfi | Dessert Shop | 28.657847 | 77.223231 |
| 9 | Nai Sarak नई सड़क | Paper / Office Supplies Store | 28.652839 | 77.228708 |

4. Mumbai:

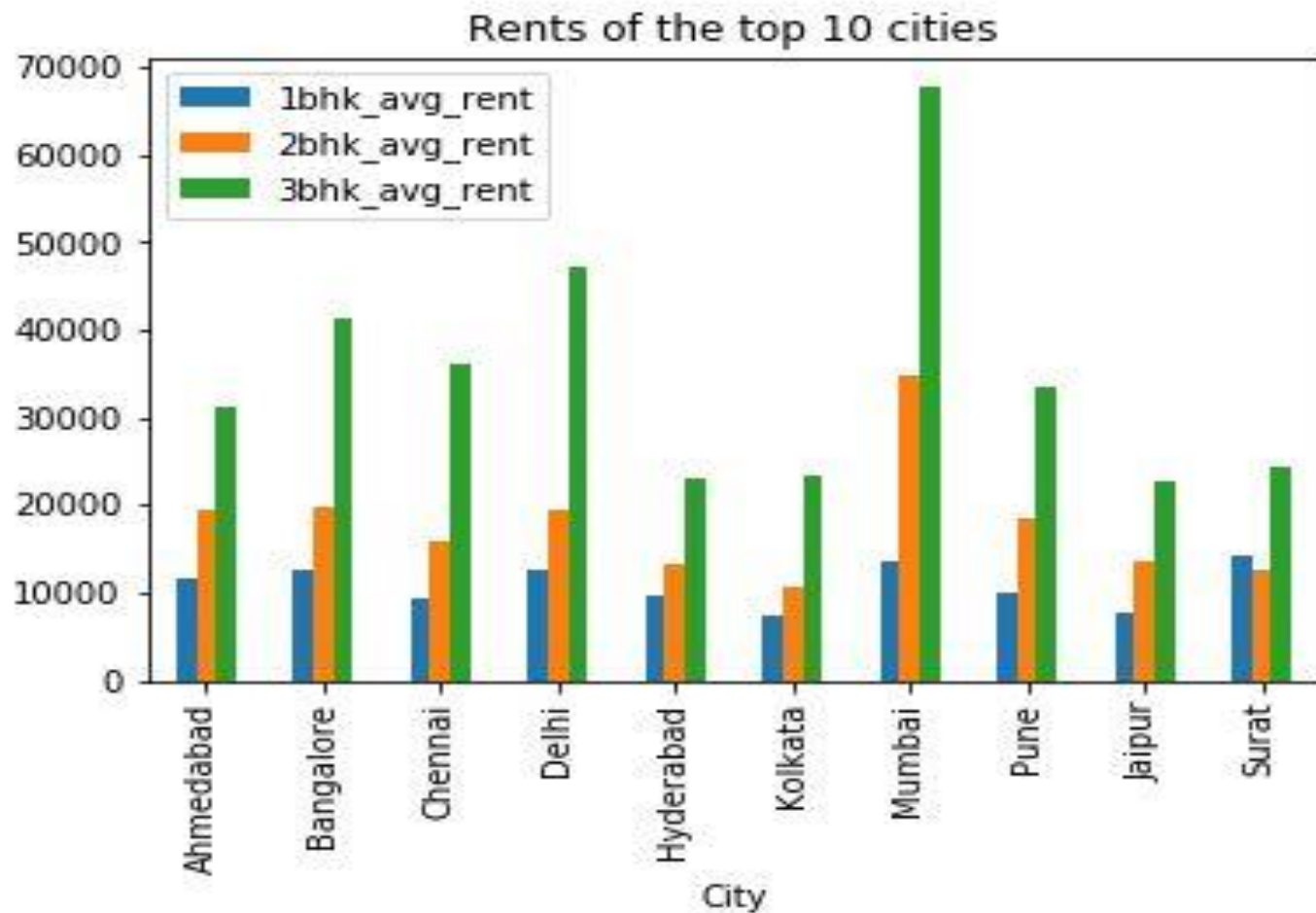
| | name | categories | lat | lng |
|---|---|-------------------------------|-----------|-----------|
| 0 | Amritsari Lassi Wala | Snack Place | 28.657325 | 77.224138 |
| 1 | Kake Di Hatti काके दी हट्टी | Indian Restaurant | 28.658050 | 77.223377 |
| 2 | bloomrooms @ New Delhi Railway Station | Hotel | 28.645537 | 77.217701 |
| 3 | Spice Market | Food & Drink Shop | 28.657287 | 77.222595 |
| 4 | Giani's Di Hatti Rabri Faluda | Dessert Shop | 28.657889 | 77.223296 |
| 5 | The Prime Balaji Deluxe @ New Delhi Railway St... | Hotel | 28.645247 | 77.217433 |
| 6 | Chawri Bazaar चावडी बाजार | Hardware Store | 28.649771 | 77.227364 |
| 7 | The Indian Grill Restaurant | Restaurant | 28.646141 | 77.215133 |
| 8 | Giani Kulfi | Dessert Shop | 28.657847 | 77.223231 |
| 9 | Nai Sarak नई सड़क | Paper / Office Supplies Store | 28.652839 | 77.228708 |

5. Pune:

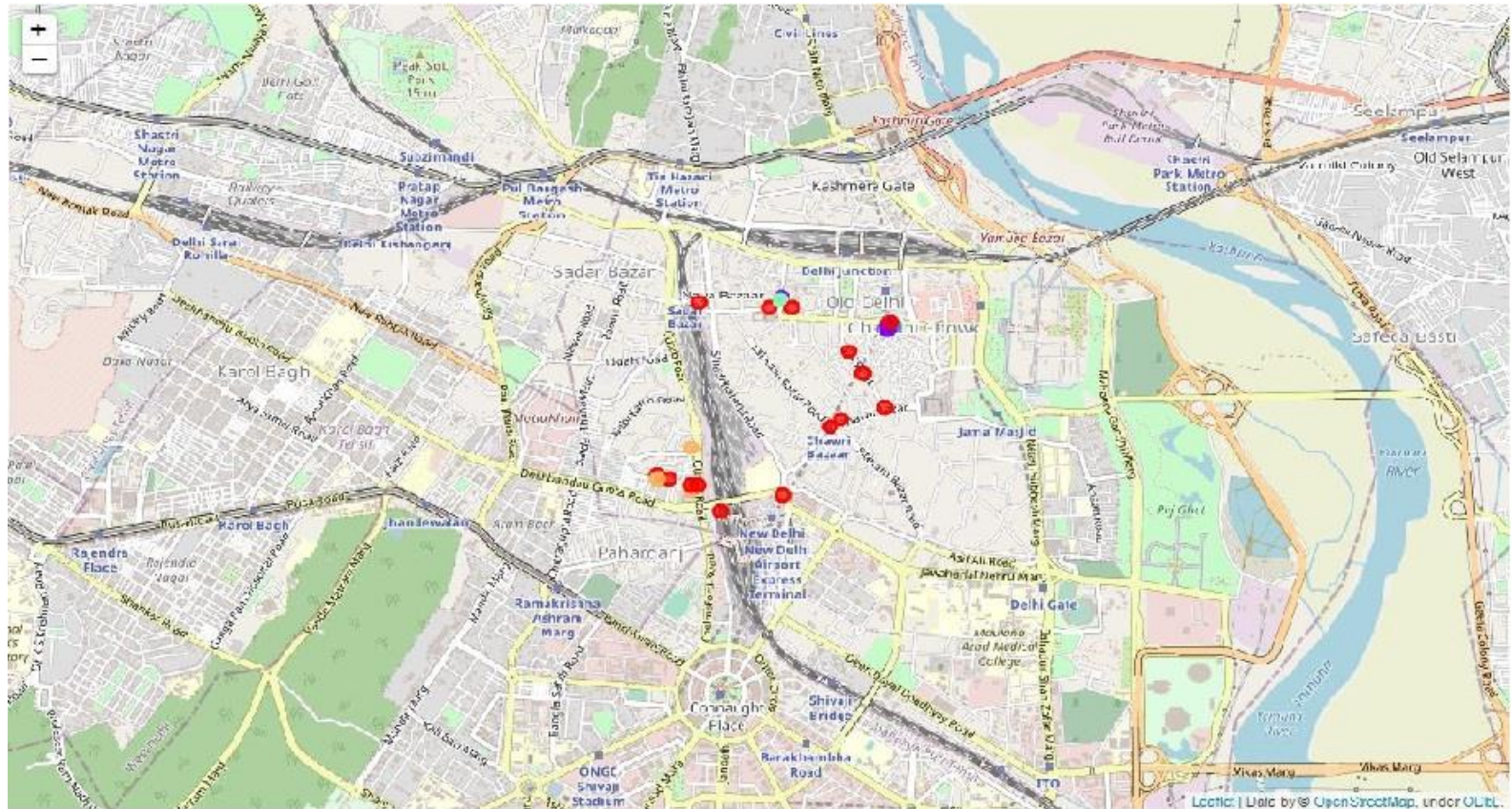
| count | items | referralId | categories | id | address | cc | city | country | crossStreet | ... | formattedAddress | labeledLatLngs |
|-------|--|--------------------------------|-------------------|--------------------------|---|----|------|---------|-------------------------|-----|---|--|
| 0 | [[{"summary": "This spot is popular", "type": "..."}]] | e-0-4f579db56b740547b24e5d3a-0 | Historic Site | 4f579db56b740547b24e5d3a | Corner of Kasba Ganpati Mandir, | IN | Pune | India | off Shivaji Road, | ... | [Corner of Kasba Ganpati Mandir, (off Shivaji ... | [{"label": "display", "lat": 18.51871967405886, "lon": 73.8567405886, "type": "display"}]] |
| 1 | [[{"summary": "This spot is popular", "type": "..."}]] | e-0-50f6c177e4b0e9762504f426-1 | Tea Room | 50f6c177e4b0e9762504f426 | Shanivar Peth | IN | Pune | India | near Omkareshwar Temple | ... | [Shanivar Peth (near Omkareshwar Temple), Pune... | [{"label": "display", "lat": 18.51924829541048, "lon": 73.8567405886, "type": "display"}]] |
| 2 | [[{"summary": "This spot is popular", "type": "..."}]] | e-0-4cb161a1562d224b6fc91e88-2 | Juice Bar | 4cb161a1562d224b6fc91e88 | Vasanthrao Deshmukh Path, Shivaji Nagar | IN | Pune | India | NaN | ... | [Vasanthrao Deshmukh Path, Shivaji Nagar, Pune... | [{"label": "display", "lat": 18.52355342051691, "lon": 73.8567405886, "type": "display"}]] |
| 3 | [[{"summary": "This spot is popular", "type": "..."}]] | e-0-4b9cf1e3f964a520fe8336e3-3 | Coffee Shop | 4b9cf1e3f964a520fe8336e3 | Jangli Maharaj Road | IN | Pune | India | NaN | ... | [Jangli Maharaj Road, Pune, Mahārāshtra, India] | [{"label": "display", "lat": 18.5231306426117, "lon": 73.8567405886, "type": "display"}]] |
| 4 | [[{"summary": "This spot is popular", "type": "..."}]] | e-0-4feebcafe4b0da11fdb582b-4 | Donut Shop | 4feebcafe4b0da11fdb582b | Near Sambhaji Park, JM Road | IN | Pune | India | NaN | ... | [Near Sambhaji Park, JM Road, Pune 411004, Mah... | [{"label": "display", "lat": 18.51933511140425, "lon": 73.8567405886, "type": "display"}]] |
| 5 | [[{"summary": "This spot is popular", "type": "..."}]] | e-0-4c41785da5c5ef3bb73eb06f-5 | Indian Restaurant | 4c41785da5c5ef3bb73eb06f | Above Vishal Megamart | IN | Pune | India | Laxmi Road | ... | [Above Vishal Megamart (Laxmi Road), Pune, Mah... | [{"label": "display", "lat": 18.51433226555955, "lon": 73.8567405886, "type": "display"}]] |
| | [[{"summary": "..."}]] | e-0- | | 585 | | | | | Near | | [585, Gangadhar | |

* We can increase the number of venues with more latitude longitude information.

Understanding the trend of rents is important. Usually, the most common rented apartments are 2bhk. The multiple bar chart of the rents of the top 10 cities is as below:



Using one hot encoding to the venues data gotten from Foursquare enables you to make clusters. I have done one for **Delhi**.





Observations and Discussion:

All these cities have adaptable neighborhoods, covering almost all the necessities.

Being a resident of Pune, I personally would recommend the city to the investors, as there are a lot of opportunities here. The rents data will help the common man who wants to move here.

There are other factors like weather, financial and job opportunities, education, family needs, which differ from person to person, hence the audience has to prioritize their needs and may choose this project to decide the city they want to move in.



Conclusion:

What comes to your mind when you hear the name 'India'?

Definitely culture, world heritage, food, etc.

India is one of the fastest growing economies.

The above analyzed 5 cities are the safest cities to live in, having the best quality of life. I have tried to tell you the which are the best cities to live in according to various factors.

I used the methods taught in the series of courses.

THANK YOU!