Comparing two locations for locating good residential area in a New unknown City

The Problem to be solved

- IT professional, Transferred to Pune
- exploring suitable residential area
- Looking for an area in the city with great modern amenities around & also closer to the office
- Target Audience: Self, family members and other colleagues, who are also transferred to Pune
- Shortlisted two areas based on feedback from friends & reading on the web, fastest developed areas – Aundh & Kothrud
- Prefers to take decision comparing number and types of venues available in the locality

Data Aquizition and Visualization

Geopy.geocoders

- Location coordinates for all three localities (Hinjewadi, Aundh & Kothrud) were retrieved with geopy.gecoders
- These coordinates were used for …
  1. calculating distance to office from Aundh and Kothrud
  2. as an input in API calls to Foursquare

```
address = 'Hinjawadi, Pune'

geolocator = Nominatim(user_agent="lionsuneel@gmail.com")
location = geolocator.geocode(address)
hin_latitude = location.latitude
hin_longitude = location.longitude
hin_coord = (hin_latitude, hin_longitude)
print('The geograpical coordinate of Hinjawadi, Pune are {}, {}.'.format(hin_latitude, hin_longitude))
```

```
The geograpical coordinate of Hinjawadi, Pune are 18.59406345, 73.74204911007135.
```

```
address = 'Kothrud, Pune'

geolocator = Nominatim(user_agent="lionsuneel@gmail.com")
location = geolocator.geocode(address)
kot_latitude = location.latitude
kot_longitude = location.longitude
kot_coord = (kot_latitude, kot_longitude)
print('The geograpical coordinate of Kothrud, Pune are {}, {}.'.format(kot_latitude, kot_longitude))
```

```
The geograpical coordinate of Kothrud, Pune are 18.5038889, 73.807673.
```

```
address = 'Aundh, Pune'

geolocator = Nominatim(user_agent="lionsuneel@gmail.com")
location = geolocator.geocode(address)
aun_latitude = location.latitude
aun_longitude = location.longitude
aun_coord = (aun_latitude, aun_longitude)
print('The geograpical coordinate of Aundh, Pune are {}, {}.'.format(aun_latitude, aun_longitude))
```

```
The geograpical coordinate of Aundh, Pune are 18.5618834, 73.8101957.
```

Data Aquizition and Visualization

Foursquare

- A local search-and-discovery app
- Uses location-specific data
- to find the best restaurants, bars, shops, entertainment, parks and nightlife in any area
- API calls would be placed on 'Foursquare' to explore venues within 4 kms of desired locations
- This request returns a list of recommended venues near the current location

Data Aquizition and Visualization

Foursquare

- The API calls were placed in loop
- fetching 100 venues on each call in order to fetch all the venues
- The ‘json’ files retrieved through calls were normalized first
- then converted into dataframes
- Only the desired features like name of the venue, categories and their lat-longs were fetched from the entire data

```
df.head()
```

	id	name	categories	lat	lng
0	0	Hidden Place - The Hangout	Pub	18.509107	73.812280
1	1	Cafe Coffee Day	Café	18.500140	73.814254
2	2	Barometer	Café	18.498824	73.819240
3	3	Endurance Fitness Club	Gym / Fitness Center	18.499235	73.821117
4	4	CCD	Café	18.507830	73.808498

Data Aquizition and Visualization

Foursquare

- The number and types of categories are used to compare the two localities

```
Total 100 venues fetched within a total radius of 4.0 Km from Aundh Location
Total 24 venues fetched within a total radius of 4.0 Km from Aundh Location

Total 124 venues fetched in Aundh
```

- Aundh

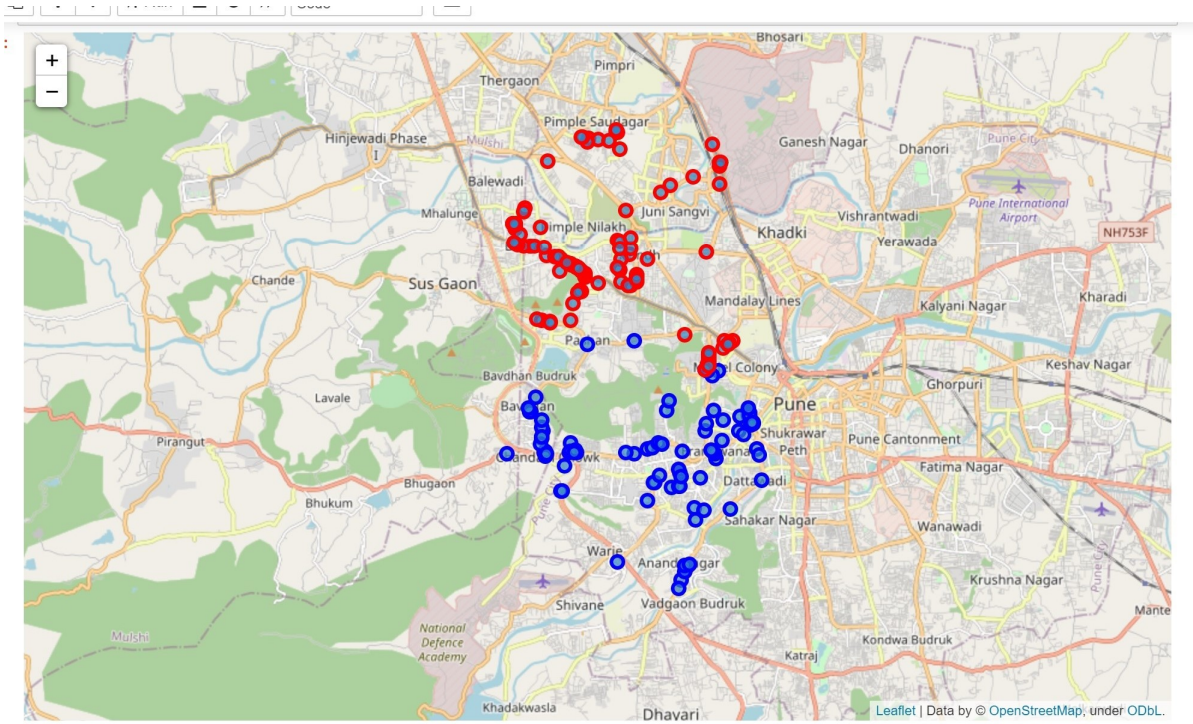
```
Total 96 venues fetched within a total radius of 4.0 Km for Kothrud Location

Total 96 venues fetched in Kothrud
```

- Kothrud

Data Aquizition and Visualization

folium

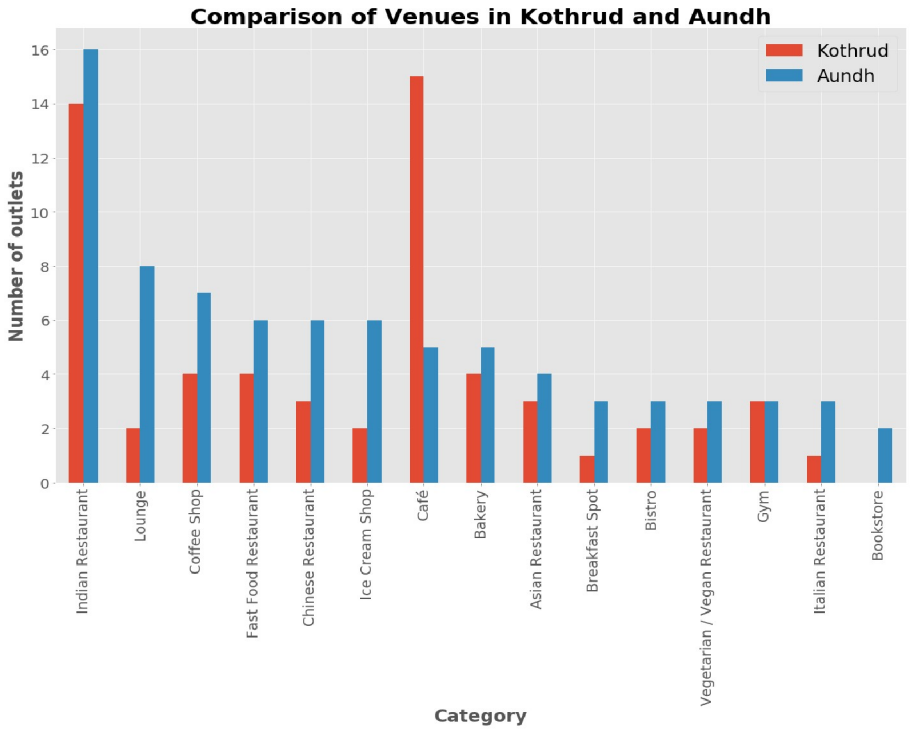
- The fetched venues were then plotted on a map
- to visualize the distribution and population of venues in the two localities



Data Aquizition and Visualization

matplotlib

- Top-15 types of venues are visualized for their numbers in each category



Data Aquizition and Visualization

Geopy.distance

- Used to calculate geodesic distance between two location coordinates
- The geodesic distance is the shortest distance on the surface of an ellipsoidal model of the earth
- Another method, 'Great-circle distance' uses a spherical model of the earth, using the mean earth radius. However this method results in an error of up to about 0.5%.

```
Distance from Hinjawadi to Kothrud:  12.149941753959334 km
AND
Distance from Hinjawadi to Aundh:  8.02677846599389 km
```

Results

- From the plot on the map, it is evident that the venues are more densely packed around Aundh than those around Kothrud
- Also it is observed from map that the Aundh Location is nearer to Hinjewadi compared to Kothrud Location
- Total number of venues fetched in Aundh within a radius of 4 kms are more in numbers (124 venues) in comparison with those fetched in Kothrud (96 venues)
- The bar graph for top-15 venues also show that most of the types of venues are more in numbers in Aundh than those in Kothrud.
- The geodesic distance from the office to Aundh is lesser (8.0 kms) in comparison to Kothrud (12.1 kms)

Conclusion

‘Aundh’ area is the preferred choice over ‘Kothrud’ area because –

- **More number of densely placed Venues**
- **Most of the categories of venues are more in number than those in Kothrud area**
- **The travel distance to the office would be shorter leading to shorter travel time and lesser fuel consumption**