Medical Tourism: Clustering hospitals based on the neighborhood characteristics

COURSERA CAPSTONE

Battle of the Neighborhoods

Introduction

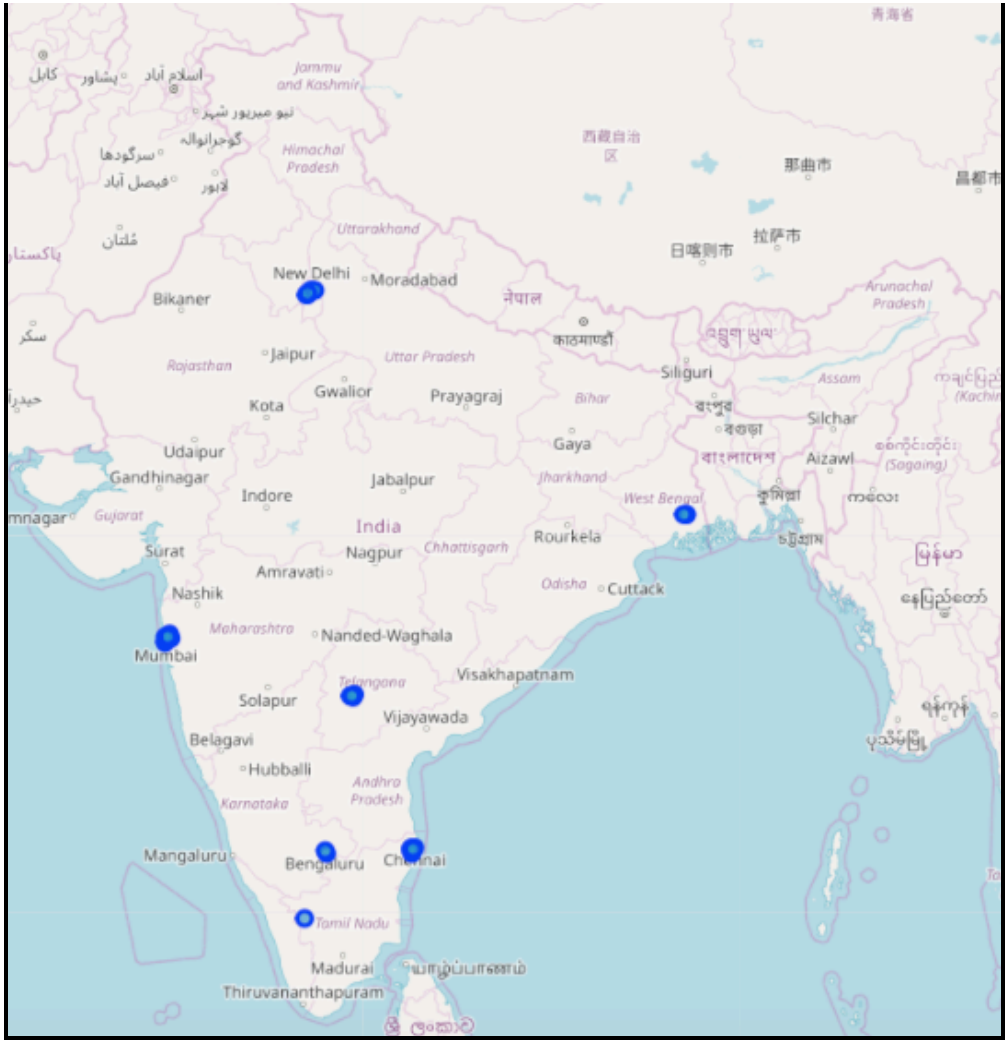
- Medical Tourism
  - Rising healthcare costs
  - Cheaper alternatives for medical treatment without compromise on the healthcare service quality
- Patient has to go to different countries for availing medical treatment alongwith carer or attendant
- Important for patient and carer to select hospital which may be present in the neighborhood that may more closely reflect their native place facilities.
- Study:
  - How patient can choose the hospital based on locality?
  - Solution: Cluster the hospital based on their neighborhood characteristics.

Data

- The following data is used:
  - Name of the Hospital : Source (https://www.treatmenttraveller.com/top-hospitals-in-India-2018)
  - Address of the Hospital: Source (https://www.treatmenttraveller.com/top-hospitals-in-India-2018)
  - Latitude and longitude of hospital locality: Source (Open Street Map)
  - Popular venues and its categoris in the hospital locality: Source (Foursquare API)

Methodology

- Area of study: India
- Hospital Name, Address and geocode data
  - Processed using *Beautifulsoup* and *geopy* packages
  - Create input dataset.
- Visualization of dataset is through folium package.
  - 32 hospitals/Localities



Methodology

- The foursquare API to get popular venues and its category for each hospital locality
  - Parameter: radius=10 km and venue limit =100
- 181 unique categories were found.
- 10 most popular categories for each hospital locality determined

Index	Hospital	1st Most Common Venue	2nd Most Common Venue
0	Apollo Hospital, Chennai, Tamil Nadu	Indian Restaurant	Hotel
1	Apollo Hospital, Hyderabad, Telangana	Indian Restaurant	Bakery

K-Means Clustering

- Hospitals are now clustered using K-mean algorithm on the basis of their locality shared characteristics and features
  - k=3
  - The distribution of hospitals across three clusters (Cluster 0, 1 and 2) are 13, 12 and 7.

Index	Hospital	Cluster_Label
0	Medanta Hospital, Gurugram, Haryana	0
1	Fortis Flt. Lt. Rajan Dhall Hospital, New Delhi, Delhi	1
2	Artemis Hospital, Gurugram, Haryana	2

Results

- The cluster centers for three clusters represent different locality characteristics:
  - Cluster 0: Popular Venues are food (Restaurant) and entertainment (Multiplexes).
  - Cluster 1: Popular Venues are food (Restaurant) and relaxation (Lounges).
  - Cluster 2: Popular venues are food (Restaurant), shopping (Malls) and alcohol beverages (Brewery).

Discussion

- The clustering analysis is successfully performed to categorize the localities of the hospitals.
- It has provided three different types of localities in India in which the hospitals are present.
- The categorization of localities may not be perfect as various factors like radius and socio-economic features could play an important role in determining locality characteristics.

Conclusion

- Aim to provide a more customized options for making better decisions regarding the choice of hospital for the potential patient.
- The study was able to categorize the hospitals based on its locality.
- This could enable the patient and its carer to choose hospitals based on the type of locality they would want to stay.
- This study could be replicated for all the hospitals around the globe.
- Further, more datasets and parameters could be incorporated to create more accurate categorization of the localities.