INDIAN FOOD FOR CONTAINMENT ZONES

Anand Pisharody

Introduction

COVID-19 pandemic has transformed the world in a manner which was imaginable only in the movies (we cannot speak of it as unimaginable since a movie depicted such an outbreak only a few years ago). Not all countries have been affected to a similar degree, however. While the disease originated in China and was limited to China for a long period, the world's largest country by population is not among the worst affected countries today. The US, Brazil and India have seen the largest number of cases to date.

Faced with the outbreak of the pandemic, India tried to tackle it through a series of total national lockdowns beginning at the end of March. The effectiveness of the lockdowns is questionable at best, given the number of fresh cases each day has hit the 35000 mark recently and the total number of cases in the country exceeded 1 million. In India, too, the effect of COVID-19 has varied from place to place. Maharashtra, and especially Mumbai, the commercial capital of India, have been the worst hit of all places in India. As the country moved from a total national lockdown to lockdown of hotspots/containment zones, Mumbai remains the city which has taken the worst hit. As per a report published on 'https://www.scribd.com/document/468160449/Mumbai-Containment-Zones#download', there were 741 containment zones in the city. The people living in the containment zones have major restrictions on movement. In such a situation, especially in a city like Mumbai, where millions of young professionals come and stay and have no access to a domestic help they would be otherwise used to, getting food delivered from nearby restaurants is a go to solution. This is especially applicable to people who are working full-time from home.

Problem

The project aims to map the localities of Mumbai based on the number of containment zones in each locality. Then, the number of pure Indian-style Restaurants (as against other food outlets) available in the locality will be mapped onto these localities. The logic of finding only Indian-style restaurants is that when people are ordering food on a continuous basis, day-after-day, they would prefer food that their appetite is more used to. The map will thus show the localities by the number of containment zones they have and how rich they are in terms of access to Indian-style food.

Target Audience

The target audience includes people in the containment zones. But, the map will also help future migrants to the city to find places where they will get better access to Indian-style food. Also people who wish to open Indian-style food outlets in Mumbai can use the map to know the competition in each locality.

Data

The data used will include the following.

1. Data from the link 'https://www.scribd.com/document/468160449/Mumbai-Containment-Zones#download'.
2. Restaurants data for Mumbai from Foursquare API.
3. List of Pincodes in Mumbai from 'https://finkode.com/mh/mumbai.html'.
4. Latitudes and Longitudes of the localities. This will be obtained from Geocode.

Method

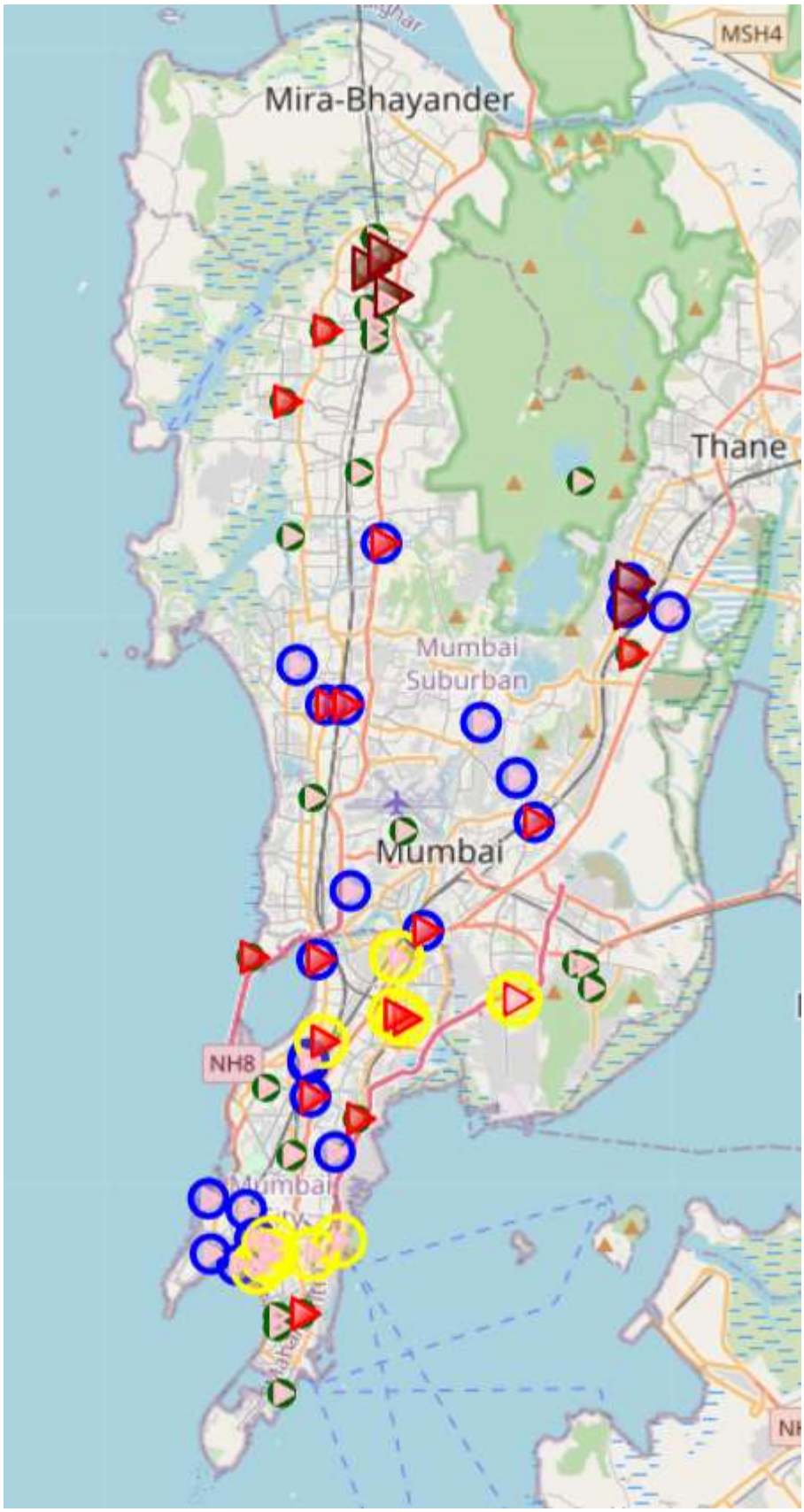
The method would include clustering of localities based on containment zones and based on number of Indian-style restaurants and superimposing the two on each other for the localities. The clustering technique used will be the K-Means clustering. Map from Folium will be utilized.

A step-by-step account of the methodology involved is given in this section.

1. The list of localities and the pincodes are available at 'https://finkode.com/mh/mumbai.html'. The same can be extracted and converted into a pandas dataframe using the Python Web-Scraping and BeautifulSoup packages.
2. The Geocoder package, next, converts the geographical locations that we get in step 1 to latitudes and longitudes.
3. The geographical locations are then visualized once to check if the locations are in line with the actual locations. The Folium package is used for this purpose.
4. The COVID-affected localities of Mumbai from 'https://www.scribd.com/document/468160449/Mumbai-Containment-Zones#download' were converted into suitable format to be uploaded to a dataframe and joined with the original dataframe based on the pincodes.
5. The pincodes with at least one containment zone were filtered out.
6. Using the Foursquare API, the data about Restaurants and other venues in and around the said pincodes were mapped to the dataframe.
7. All outlets like 'Bengali Restaurant', 'South Indian Restaurant', 'North Indian Restaurant', etc. which mainly serve Indian Food were grouped under the head 'Indian Restaurant.'
8. Clustering using K-Means were done twice on the locations, once based on number of containment zones and once base on number of Indian Restaurants.
9. The clusters were marked onto the Folium map for Mumbai with the different clusters (under each type of clustering) represented by the size and colour of the markers.

Results

The resulting map has been given below.


MSH4
Mira-Bhayander
Thane
Mumbai
Suburban
Mumbai
NH8
Mumbai

Clusters based on number of Indian Restaurants are represented by the circular markers where

1. Green represents Cluster 0 with lowest number of restaurants.
2. Blue represents Cluster 1 with number of restaurants in the medium range.
3. Yellow represents Cluster 2 with highest number of restaurants.

Clusters based on number of containment zones are represented by the circular markers where

1. Pink represents Cluster 0 with lowest number of containment zones.
2. Light Red represents Cluster 1 with number of containment zones in the medium range.
3. Dark Red represents Cluster 2 with highest number of containment zones.

Discussion

The map above shows that none of the high-risk zones have high number of Indian Restaurants. Thus, people in those areas will find it most difficult to access good Indian Food at the time they are in the containment zones.

Another interesting aspect is the distribution of clusters. The localities with high number of Indian Restaurants are largely towards the southern half of Mumbai while the high-risk zones are mainly concentrated toward the northern regions. This seems to have something to do with the distribution of wealth in Mumbai, with Southern Mumbai often quoted as being the swankier half. Thus, they seem to have more options in terms of eateries while having fewer localities of high-risk. In the swankier localities, perhaps, social distancing would be easier to follow. Although the higher concentration of localities with any case of containment zones in the southern half of Mumbai may be against this conclusion.

Conclusion

In this project, it was endeavored to help people living in containment zones in Mumbai at the time of COVID-19's spread find options to have good Indian food delivered at their home from the Indian Restaurants in their localities. The map showed that while all the high-risk zones are in the Northern half Mumbai, the higher number of options in terms of Indian eateries are available in the southern half of Mumbai. Also, there is higher concentration of localities with at least one COVID containment zones in the southern Mumbai. This may have to do with higher number of possible checks in this localities because of availability of better medical facilities because southern Mumbai is generally the wealthier half of Mumbai.