**Venue Analysis of Malmö City**

Luqman Jamil

April 28, 2019

1. **Introduction**

A businessman is interested to open a warehouse in Malmö city. Warehouse will store mainly rice, beans and spices. They are interested to know the market of their business. It includes all the restaurants except fast food as they mainly don’t consume rice, beans and spices. The main focus is on Indian restaurants as they will be interested in buying all the products we sell. Other restaurants will be our market for different products of which main product is different kind of rice.

The problem is if the location is not optimal specially in terms of logistics and numbers of restaurants it will be expensive and not so feasible.

The goal is to find out the areas where large number of restaurants exits that can be our potential customers and find the nearest and suitable place. The place should be affordable and well connected with the city. That can be only decided if our market is good

1. **Data**

Based on definition of our problem, factors that will influence our decision are:

* number of existing restaurants in the neighborhood (any type of restaurant)
* number of Indian restaurants in the neighborhood, if any

We decided to use regularly spaced grid of locations, centered around city center, to define our neighborhoods.

Following data sources will be needed to extract/generate the required information:

* centers of candidate areas will be generated algorithmically and approximate addresses of centers of those areas will be obtained using Google Maps API reverse geocoding
* number of restaurants and their type and location in every neighborhood will be obtained using Foursquare API
* coordinate of Malmo center will be obtained using Google Maps API geocoding.

The neighborhood/ Brough data of Malmo city is not available on internet. We had to make create neighborhoods in order to do analysis by the method discussed above.

1. **Methodology**

In this project we will direct our efforts on detecting areas of Berlin that have low restaurant density, particularly those with low number of Italian restaurants. We will limit our analysis to area ~6km around city center.

In first step we have collected the required data: location and type (category) of every restaurant within 6km from City center We have also identified Indian restaurants (according to Foursquare categorization).

Second step in our analysis will be calculation and exploration of 'restaurant density' across different areas of Malmo - we will use heatmaps to identify a few promising areas close to center with low number of restaurants in general (and no Italian restaurants in vicinity) and focus our attention on those areas.

In third and final step we will focus on most promising areas and within those create clusters of locations that meet some basic requirements established in discussion with stakeholders: we will take into consideration locations with more than two restaurants in radius of 250 meters, and we want locations with Indian restaurants in radius of 400 meters. We will present map of all such locations but also create clusters (using k-means clustering) of those locations to identify general zones / neighborhoods / addresses which should be a starting point for final 'street level' exploration and search for optimal venue location by stakeholders.

1. **Results and Discussion**

Our analysis shows that although there is a great number of restaurants in Malmo (~300 in our initial area of interest which was 12x12km around Rosengård), there are pockets of low restaurant density away from city center. Highest concentration of restaurants was detected in centrum, so we focused our attention to centrum area , which offer a combination of popularity among tourists, closeness to city center, strong socio-economic dynamics and a number of pockets of high restaurant density.

After directing our attention to this more narrow area of interest we first created a dense grid of location candidates (spaced 100m appart); those locations were then filtered so that those with more than two restaurants in radius of 250m and those with an Indian restaurant closer than 400m were removed.

Those location candidates were then clustered to create zones of interest which contain greatest number of location candidates. Addresses of centers of those zones were also generated using reverse geocoding to be used as markers/starting points for more detailed local analysis based on other factors.

Result of all zones containing largest number of potential restaurant customers locations based on number of and distance to existing venues - both restaurants in general and Indian restaurants particularly. This, of course, imply that those zones are actually optimal locations for a new customers! Purpose of this analysis was to only provide info on areas close to center but crowded with existing restaurants (particularly Indian) - it is entirely possible that there is a very good reason for large number of restaurants in any of those areas, reasons which would make them suitable for a new business regardless of competition in the area. Recommended zones should therefore be considered only as a starting point for more detailed analysis which could eventually result in location which has not only no nearby competition but also other factors taken into account and all other relevant conditions met.

1. **Conclusion**

Purpose of this project was to identify Malmo areas close to center with high number of restaurants (particularly Indian restaurants) in order to aid stakeholders in narrowing down the search for optimal location for a new warehouse. By calculating restaurant density distribution from Foursquare data we have first identified general boroughs that justify further analysis , and then generated extensive collection of locations which satisfy some basic requirements regarding existing nearby restaurants. Clustering of those locations was then performed in order to create major zones of interest (containing greatest number of potential locations) and addresses of those zone centers were created to be used as starting points for final exploration by stakeholders.

Final decision on optimal restaurant location will be made by stakeholders based on specific characteristics of neighborhoods and locations in every recommended zone, taking into consideration additional factors like attractiveness of each location proximity to major roads, real estate availability, prices, social and economic dynamics of every neighborhood etc.

1. **Future Directions**

In this project we explored the third largest city of Sweden. In order to better know if city is better as compared to other cities like Stockholm and Gothenburg which are largest and second largest city respectively. We need to analyze and compare the results. In this project it can’t be done as project will be lengthy. After city is selected then it can be decided which area is best for the warehouse.