A new restaurant in Copenhagen

In which region in Copenhagen would a new restaurant mostly survive?

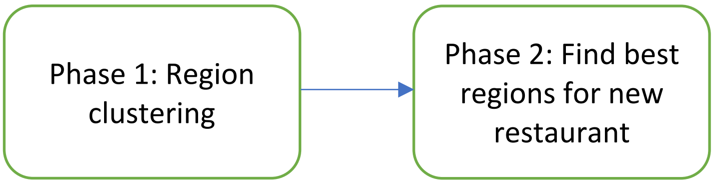
1. Introduction and Business Problem

A client wants to open a new restaurant in big Copenhagen area in Denmark. There are 51 regions in this area based on the postal codes. Before the client starts to think about the costs in different areas, he would like to firstly know which regions are more suitable for a new restaurant considering the competitions in a specific region. In another word, would a new restaurant generally survive the competition in the region?

There are too many things that could have an impact on the survival of a restaurant. For example, local policy, tax rate, rental, transport, public infrastructure, shops, schools, etc. However, with the help of Foursquare data, we could easily get a dataset of surrounding venues which basically covers all kinds of assets around a region center. The relations of all these venues may not be explicit, but the structure of these venues could largely reflect the economy conditions of the region.

Based on the venue dataset, we could group the 51 regions into clusters with similar economy conditions. Assume that the economy is stable, and all existing restaurants in each region are running in a good condition, we could then reasonably tell that a region with relatively less restaurants (compared with another region in the same cluster) could have more new restaurants. For example, assume that region A and B are in the same cluster, meaning these two regions have similar economic conditions (similar venue structures). If the restaurants in Region A takes 5% of all venues, and the number for region B is 2 %, we can say that the economy or competition in region B would allow more restaurants, as region A actually has proved that restaurants as 5% of all venues could survive in this region cluster.

There can be two phases to get the final conclusion. Phase 1: group the 51 regions into clusters and investigate which ones to choose for further selection. Phase 2: analyze each cluster and find the regions which is more suitable for opening new restaurant.


Phase 1: Region clustering
Phase 2: Find best regions for new restaurant

2. Data

2.1 Location data acquisition

The postal code data can be easily found from Wikipedia, together with the region name, the coordinates of the region centers can be fetched using Google map geocoding API. The python library *geopy.geocoder* can also help to get the coordinates, but some addresses are missing in this case, thus geocoding API is used here.

2.2 Venue data acquisition

As the coordinates data for all 51 regions in Copenhagen is available, the Foursquare API can be used in order to get the surrounding venues, with a radius of 500 meters and venue limits of 200. The venue categories are also extracted and stored for further analysis. The venue dataset should essentially contain the following fields: region name, postal code, region coordinate, venue name, venue category.

2.3 Feature selection

As described in the introduction part, there can be two phases to solve the problem. There could be different features that need consideration in these two phazes. For phase 1, the venue structures in all regions need to be compared with one another, and the rate of occurrence of each venue category in each region could be used as the feature to compare, in order to calculate the similarity of the regions. For phase 2, as the purpose is to analyze and find the best regions for new restaurant, the venues with category of restaurant or food related should be all considered. The occurrence rate of the restaurants in each region of the same cluster need to be calculated and used as the feature for comparison.