Finding the most suitable location for a burger restaurant

Kagiso Mosomane

May, 2021

1. Introduction

According to statistics, 40% of new business ventures fail within their first year [1]. One of the reasons that have been linked to these failures is inadequate market research by the new venture, which relates to the business understanding their potential clients that they will be serving, the potential competition and gaps in the market where they are trying to enter.

Understanding the market can help evaluate the decision of whether to go ahead with a business or not as well as the best way to take advantage of market gaps.

1.1 Business Problem

A client has approached us to help them identify the best location for a burger restaurant in the Northern suburbs of Johannesburg, South Africa.

From research and discussions with the client, it is apparent that two important factors have to be met in order for a location to be considered suitable for a burger restaurant:

a) Youth driven Demographics:

Areas where there are teenagers and young adults would be suitable locations. This could be identified by high schools, colleges and clubs.

b) Middle to high income households

Middle to high income households neighborhoods are the most desirable as they are where the residents will afford to have or buy restaurant meals on a regular basis.

c) Low number of competitors in the area

There must be a low number of burger restaurants in the area. A high number of restaurants in general may give an indication that the restaurant scene in the area is vibrant, but low number of burger restaurants is what is desired (i.e., areas where the least common restaurants are burger restaurants).

The problem statement is then to determine the areas with the best demographics (high schools, colleges and clubs, as well as middle to high income households) that have the lowest number of burger restaurants.

2. Data Requirements

In order to determine the best location for the burger restaurant, clustering algorithm will be used to group suitable neighborhoods where burger restaurants are the least common.

The features of the data will be economic status of the neighborhood (middle to upper income), the number of schools in the neighborhood as well as the type of restaurants in the area, with a particular interest in the number of burger restaurants.

The following data sets will therefore be required:

1) Neighborhoods in Johannesburg, South Africa
2) Economic data of the neighborhoods (and determination of most of the residence being above the median for low income -R12800 per month)
3) High schools, colleges and clubs in the area
4) Restaurants in a neighborhood, ranked from most to least common

The first dataset listed above can be obtained from the city of Johannesburg website www.joburg.gov.za with particular interest in the suburbs of region A, which is the northern region. The demographic data (high schools, colleges and clubs.), and the restaurants can be obtained from Foursquare. The economic data of the neighborhoods and will be obtained from www.statssa.gov, which is a government run national statistics website.

3. Methodology and Analysis

A clustering algorithm(k-means clustering) was chosen to be used to classify the suburbs/neighborhoods into the most ideal. The features for the model were chosen as the number of restaurants in the vicinity of the suburb/neighborhood, the number of schools in the neighborhood as well as the economic distribution of the suburb.

The reason a clustering algorithm was used was to have a quick way of grouping suburbs with the most common characteristics. Analysis of the labels would then indicate which group of suburbs were the most suitable.

The outcome of the algorithm was to produce a list of labels for the suburbs. The labels themselves did not make sense on their own until the suburbs were sorted according to the most common type of venues per suburb.

4. Results and Discussion

The only area without a burger restaurant is Chartwell, as can be seen in figure 1, but it doesn't have a lot of restaurants in the area, so may not be ideal because it doesn't seem to have an active restaurant scene. The second most ideal place is Witkoppen, where burger joints are the least common place, and therefore it will have the least competition. In general, it looks like suburbs with cluster label zero are the suitable ones. Figure 2 shows the location of the suitable suburbs on a map, with those with cluster label zero being the red ones.

	longitude	latitude	Cluster Labels	Suburb	1st Most Common Venue	2nd Most Common Venue	3rd Most Common Venue	4th Most Common Venue	5th Most Common Venue
0	28.108545	-25.960780	3	Summerset	School	Bookstore	Breakfast Spot	Burger Joint	Coffee Shop
1	28.052286	-26.167513	2	Chartwell	Construction & Landscaping	Italian Restaurant	Pharmacy	Shoe Store	Snack Place
2	27.962085	-26.029844	0	Riverbend	School	Bookstore	Breakfast Spot	Burger Joint	Coffee Shop
3	28.008611	-26.007500	0	Witkoppen	Yoga Studio	School	Bookstore	Breakfast Spot	Burger Joint
4	28.049167	-26.030556	0	Paulshof	School	Bookstore	Breakfast Spot	Burger Joint	Coffee Shop
5	28.145213	-25.948278	1	Randjesfontein	School	Bookstore	Breakfast Spot	Burger Joint	Coffee Shop

Figure 1: Suburbs with venues sorted by commonality

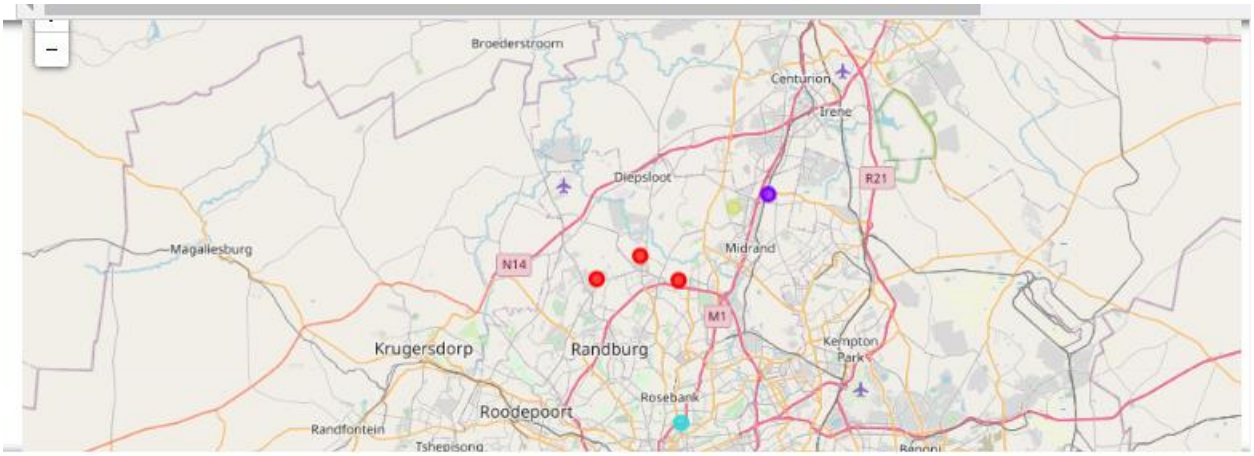

Figure 2: Map of suitable suburbs for burger restaurants

5. Conclusion

The purpose of the project was to identify the most suitable locations for a burger restaurant in the northern suburbs of Johannesburg. This was done using a clustering algorithm which identified the label which shows the most suitable suburbs for a burger restaurant.

In the end, a number of suburbs were classified with this label of suitability, but only one was identified as the most suitable due to competition of other burger restaurants in the area.

References

1) Bowler, A., Dawood, M.S. & Page, S. (2007). Entrepreneurship and Small business Management. Pretoria: Juta & Co. Ltd