Determining Likely Areas for Ice Cream Parlors in Salt Lake City

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1. Introduction

1.1 Background

Salt Lake City is a growing metropolitan area. With a booming tech industry and major companies like Adobe, Microsoft, Facebook, and Vivint Solar building sites in northern Utah, population is increasing at a rapid rate in the Beehive State. With this growth comes many business opportunities for food services, such as dessert venues, in the major population center of Salt Lake City. Opening a restaurant of any sort is risky business, since many do not survive the first six months. Knowing prime locations to open venues is helpful in making an informed decision that may contribute to success. Specifically, we will be examining areas of Salt Lake City to determine areas where someone interested in opening an ice cream parlor will most likely find success.

1.2 Problem

There are a few factors we can look at in determining what neighborhoods are good places to establish an ice cream venue. The number and type of restaurants in an area will give a clue as to which neighborhoods are already saturated by food services. Moving to a neighborhood that already has several ice cream parlors means that the area's market will likely be filled and unable to sustain another. The number of complementary businesses like stadiums, theatres, business districts, malls, and transportation hubs in a neighborhood also tends to have a positive correlation with the number of people who are likely to visit a dessert venue, since it is popular to get dessert after visiting these types of places. Restaurants that serve meals need to be considered separately, since they can be considered as competitors (since they often serve desserts as well as main courses) but potentially as complementary businesses too (since people may visit an ice cream parlor for dessert after a meal). Population is another statistic that can be noted. All of these aspects will be taken into account in comparing and pointing out which zip codes are likely good areas for an ice cream parlor.

1.3 Interest

Parties that may be interested in this information include individuals interested in establishing a new ice cream parlor or frozen treat franchise owners looking to open a new location in the Salt Lake City area.

2. Data acquisition and cleaning

2.1 Data sources

Foursquare analysis can be used to examine which neighborhoods have ice cream parlors, restaurants and complementary businesses.
http://www.heartandcoeur.com/heart_travel/area/utah_801.php has a table of zip codes for the Salt Lake City, Utah area with neighborhoods listed. https://www.zip-codes.com/city/ut-salt-lake-city.asp has information about the population of these zip codes. In the case that attempts to pull latitude and longitude from geocoder does not work, http://saltlakecity.areaconnect.com/zip2.htm?city=Salt has that information that can be used to compile a .csv file of the geographical coordinates of each zip code.

2.2 Data compilation and cleaning

A table was be compiled that identifies the number of various businesses in each zip code. It was quickly determined that venues presented by Foursquare had some overlap and that it would be beneficial to lump them together into larger categories. Venues were grouped by attractions (complementary businesses like museums, arenas, sites that attract tourism, etc.), businesses and shops (to indicate the location of business districts), restaurants, competitors (various dessert venues), and travel hubs. These data were compiled into a table along with populations for each zip code. Not every zip code in Salt Lake City registered as having a venue in Foursquare. Those that did not were removed from analysis.

3. Exploratory Data Analysis

3.1 Mapping of Neighborhood Locations

To get a feel of the exact area being covered, the geographical coordinates of each zip code was plotted on a map using folium (see Figure 1).

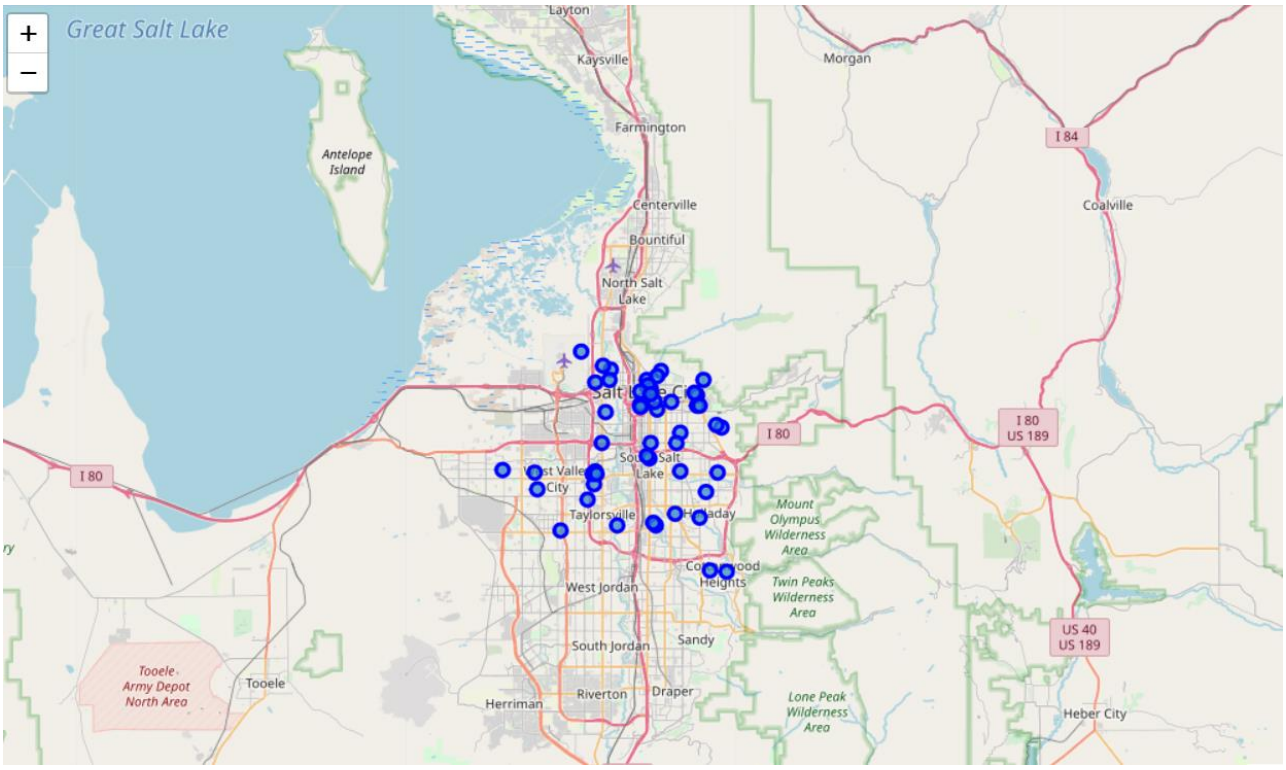

Figure 1. Map of zip codes in Salt Lake City.

Next, the fraction of what categories of businesses existed at each zip code was calculated. This provided a feel for what types of venues were most prominent in Salt Lake City and provided a basis for grouping neighborhoods.

3.2 Clustering zip codes

K means clustering techniques were used to group neighborhoods based on the types of venues appeared there most frequently. This provides an easy means to display which areas had characteristics that would be desirable for an ice cream venue (a high number of complementary businesses and a lower number of competitors). After these clusters were calculated the zip codes were again mapped, this time colored by which cluster they fell into (see Figure 2).

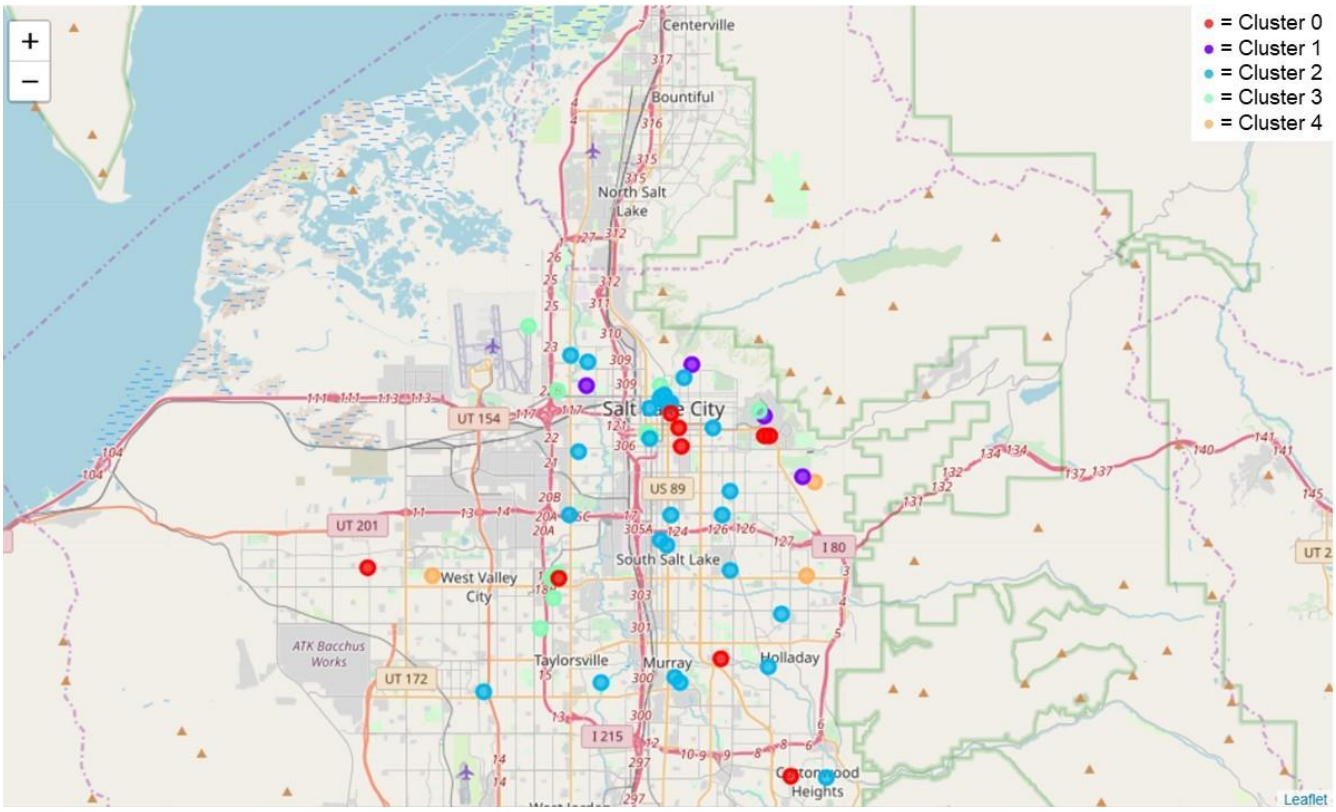

Figure 2. Zip codes displayed on a map, colored according to cluster classification.

4. Results

4.1 Neighborhood Cluster Characteristics

To provide a better idea of the general characteristics of these neighborhood clusters, the average percent of each venue category was calculated (see Table 1). These were organized in a stacked bar chart to provide a better visualization of what neighborhood clusters were likely good locations based on their existing establishments (see Figure 3).

Table 1. Percentage of venue categories organized by cluster.

	Cluster Labels	Attraction	Business	Dessert	Misc	Restaurant	Shopping	Travel
0	0	0.034292	0.038049	0.009019	0.082508	0.732708	0.077947	0.025477
1	1	0.750000	0.000000	0.000000	0.000000	0.062500	0.000000	0.187500
2	2	0.134435	0.043564	0.041533	0.052598	0.389717	0.306135	0.032018
3	3	0.100627	0.031633	0.010989	0.022378	0.408198	0.082768	0.343408
4	4	0.166667	0.638889	0.000000	0.000000	0.000000	0.194444	0.000000

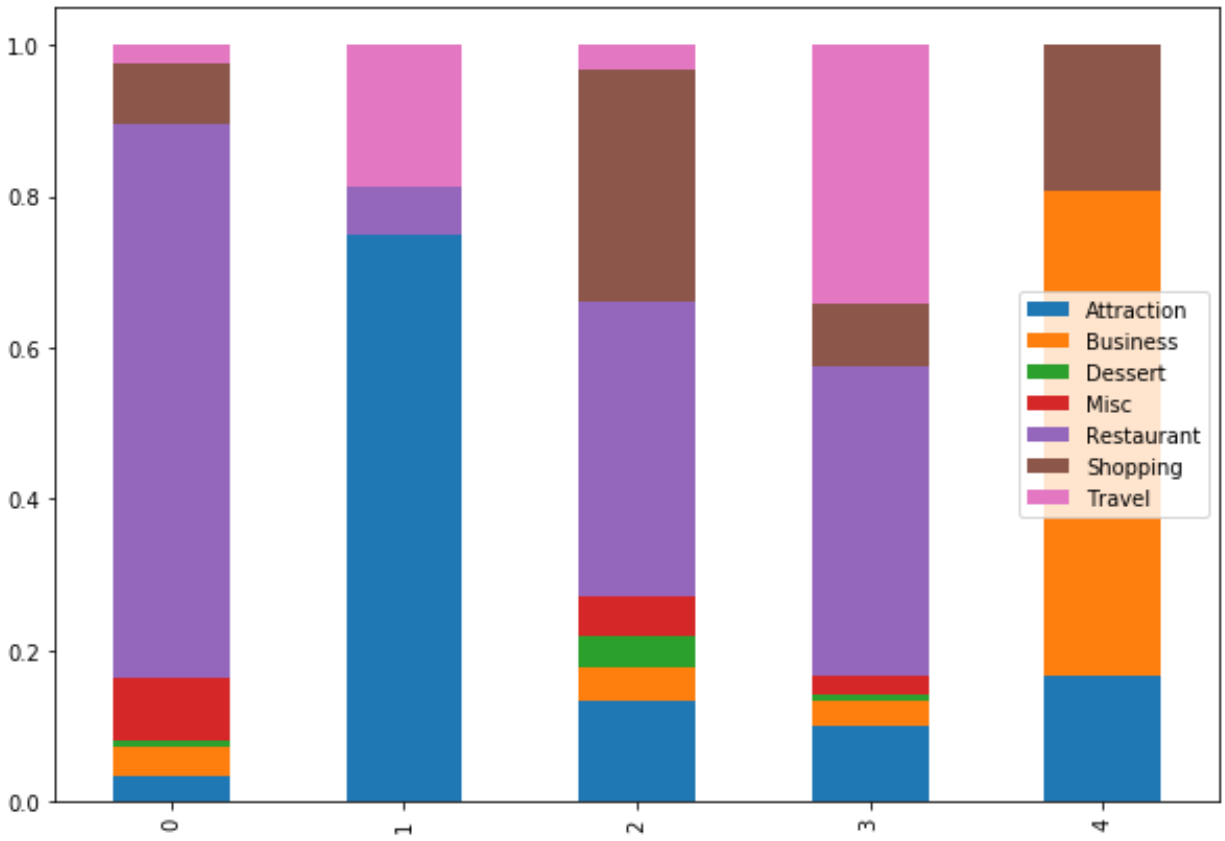

Figure 3. Stacked bar chart of the average percentage for each category in each zip code cluster

4.2 Discussion

As shown in Figure 3, neighborhoods in clusters 1 and 4 provided the highest percent of complementary businesses and attractions. With virtually no dessert places in the neighborhoods within these clusters, it may be that these areas are untapped markets worth further investigation. Clusters 0, 2 and 3 provided a high percent of competitors, both in the form of dessert venues

and restaurants. These neighborhoods are areas that have shown that food-based businesses can survive and do well but will likely provide stiff competition that may render it difficult to establish a new venue.

The neighborhoods in cluster 1 are mostly located in the northern and eastern parts of Salt Lake City, while the neighborhoods in cluster 4 are located on the far east and west portions of the city, including the suburb of West Valley. There are areas that have seen major growth and development in recent years, which may provide a growing clientele in upcoming years. Zip codes included in these clusters are listed in Table 2.

Table 2. Zip codes in neighborhood clusters 1 and 4.

	Zip Code	Cluster Labels
0	84103	1
1	84112	1
2	84153	1
3	84158	1
4	84108	4
5	84109	4
6	84170	4

5. Conclusions

The neighborhoods that were included in clusters 1 and 4 show promise as untapped markets for a new ice cream venue. They have a high number of complementary businesses, such as stadiums, theatres, business districts, malls, and transportation hubs with few, if any, established dessert places. Continuing growth in the area will likely provide a growing clientele to visit a new establishment in future years.

Future research may include looking at the parking situations, zoning, traffic levels, and the cost of renting or buying a location to house a dessert establishment. These factors will help make a final decision about the viability of establishing a new venue in these areas.