Buffalo Wings Restaurant Capstone

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1. Introduction

1a. Background:

Buffalo, NY is the second largest city in New York. Millions of people travel to Niagara Falls yearly to experience the scenery of the falls. Tourists can experience the falls up close in a take a boat ride. Niagara Falls provides a tourist attraction which is beneficial for businesses like restaurants and hotels since many will travel from across different states in the US to experience the falls.

In addition, Buffalo is a city of sports; it is home to the Buffalo Bills and Sabres. Sports fanatics are drawn to the city to watch these sports games whether it be in a stadium or a restaurant. This provides competition for businesses to offer wings, pizza, and drinks to appeal to the sports crowd. Buffalo Wings are known to have originated in Buffalo and are a popular food among sports fans. The first wings were believed to have been from a family owned restaurant known as Anchor Bar. Thus, this provides competition for nearby restaurants to provide food such as wings that will draw in consumers.

1b. Problem:

There are many factors that need to be taken into consideration when determining where the best location is to open up a wing restaurant in Buffalo. Data that would be contributing to determine where to place a Buffalo wings restaurant is proximity to Niagara Falls. The proximity to Niagara Falls is an important location to consider because it is such a high tourist spot. In addition, proximity to other nearby restaurants or restaurants that are similar is another factor that needs to be considered. If someone wants to watch sports and grab quick food like wings they are likely to think of where other wing locations are and go there. Therefore, opening up a business that is nearby other similar businesses is a factor that needs to be considered. Thus, examining areas with high population densities and looking at venues under the list of postal codes obtained will help in deciding where to open up a Buffalo Wings restaurant.

1c. Interest:

Tourists who are in Buffalo to see Niagara Falls would be interested in a nearby location to grab food and drinks that is quick and convenient and allows for them to experience traditional Buffalo wings. Furthermore, Buffalo is home to the Buffalo Bills and Buffalo Sabres, therefore, sports fanatics would be drawn to a place where they can have food and drinks and be able to watch the sports games.

2. Description of Data & How It Will Be Used

2a. K-Means Clustering:

Using an online html dataset from Mongabay which contains postal codes of Buffalo- Niagara Falls Metro Area, allows for clustering the dataset, wrangling the dataset, and reading the dataset into a pandas dataframe(Mongabay). The venue information obtained from Foursquare API will allow neighborhoods to be clustered based on similar venues in order to see where the best location would be for the Buffalo Wings restaurant. K-Means clustering is a method that is used to cluster like groups together. In this case, the venues were clustered under a common zip code.

2b. LatLong.net:

This was used to obtain the coordinates of the zipcodes from Mongabay (LatLong.net).

2b. Foursquare API:

Location data is an important factor to look at and is helpful in describing factors such as geographical locations. Given the location, we are then able to see if there are restaurants nearby. For determining where to open the Buffalo Wings restaurant, FourSquare API will be used to search for the latitudes and longitudes of the postal codes obtained from the K-Means clustering portion (Foursquare). This is done in order to obtain information about nearby venues and the category of venues. If there was more than one town it was listed under the shared postal code so that each postal code appeared once. This provided the output of 110 different zip codes that needed to be examined to obtain the venues nearby. Therefore, 110 is determined to be the limit of venues.

2c. Folium Markers Map:

Folium was used to create a map that has markers to indicate the population density of each neighborhood. If there are more restaurants that provide wings nearby, then that might be a good location to open up a business since consumers are familiar with the older established restaurants and are likely to go in that vicinity. Data was obtained from statistical atlas (Statistical Atlas). This website provided the population density for each subdivision. I then found the subdivisions latitudes and longitudes on Google Maps and used the population density obtained from statistical atlas to create a csv file. Once the file was made a map was created with a marker to indicate the population density in each subdivision.

2d. Google Maps:

This was used to determine how far the selected postal code for the restaurant is from Niagara Falls and Buffalo Bills stadium. (Google Maps)

3. Methodology

The 3 main concepts that were used to assess where to open a Buffalo Wings Restaurant. Foursquare API was an essential tool in order to obtain the venue information for each zip code. I created a CSV file of the postal codes that were obtained from Mongabay which allowed the postal codes of Buffalo- Niagara Falls Metro Area to be interpreted. This was a helpful dataset to use for this assignment because Niagara Falls is a hotspot for tourism.

```
[ ]  buff_coordinates.head()
```

	Zipcode	Latitude	Longitude
0	14001	43.02336	-78.49944
1	14004	42.89995	-78.46411
2	14006	42.64108	-79.05541
3	14008	43.32711	-78.64915
4	14010	42.71599	-78.83124

Table 1. This table shows a preview of the first 5 coordinates that were obtained from creating a csv file of latitude and longitudes of Buffalo zip codes.

Once the CSV file was created from the latitudes and longitudes obtained from latlong.net, it could then be used to obtain venue information from foursquare API. Since Foursquare API provided a list of the same zip code listed multiple times with their corresponding venues, the venues were clustered under a common postal code. K-Means Clustering allowed grouping venues under a common zip code. The cluster variables were limited to obtain the first 5 venues and then also assessed under 10 venues to obtain a larger set of data of venues. If a zip code did not contain any venues or had a 'NaN' response, it was removed from the dataset prior to creating the markers map.

```
[ ]
# create a new dataframe
neighborhoods_venues_sorted = pd.DataFrame(columns=columns)
neighborhoods_venues_sorted['Zipcode'] = buffalo_grouped['Zipcode']

for ind in np.arange(buffalo_grouped.shape[0]):
    neighborhoods_venues_sorted.iloc[ind, 1:] = return_most_common_venues(buffalo_grouped.

neighborhoods_venues_sorted.head()
```

	Zipcode	1st Most Common Venue	2nd Most Common Venue	3rd Most Common Venue	4th Most Common Venue	5th Most Common Venue	C
0	14001	Deli / Bodega	Pharmacy	Liquor Store	Chinese Restaurant	Optical Shop	
1	14006	Convenience Store	Burger Joint	Sandwich Place	Yoga Studio	Fast Food Restaurant	
2	14010	Pizza Place	Café	Discount Store	Athletics & Sports	Burger Joint	
3	14026	Construction & Landscaping	Food	Yoga Studio	Fast Food Restaurant	French Restaurant	
4	14027	Plaza	Construction & Landscaping	Food Service	Yoga Studio	Fast Food Restaurant	

Table 2. This table represents the venues obtained using Foursquare API to depict what venues are commonly found under around the zip codes in Buffalo.

A marker's map was used to assess both the of the datasets analyzed in this assignment. The marker's map allows visual interpretation to see where the cluster of venues was located in order to help assess where to open up the Buffalo Wings Restaurant.

Furthermore, the second marker's map that was created for the population densities allowed to see where the greatest population densities were. Thus, when looking at where the majority cluster label markers are and where the greatest population density markers fall, the best location for a restaurant could be determined.

4. Results

When examining the folium marker's map with the population densities, the marker dot right above Buffalo, representing the subdivision of Buffalo, has the greatest population density of 6,413 (/mi^2). The next highest subdivision is Tonawanda which has a population density of 3,941 (/mi^2). When looking at the merged table the cluster label that appears the most is 1, which is reflected in the markers map. The greatest clustering markers are around Buffalo and there are no other sections with comparable marker clusters (Foursquare).

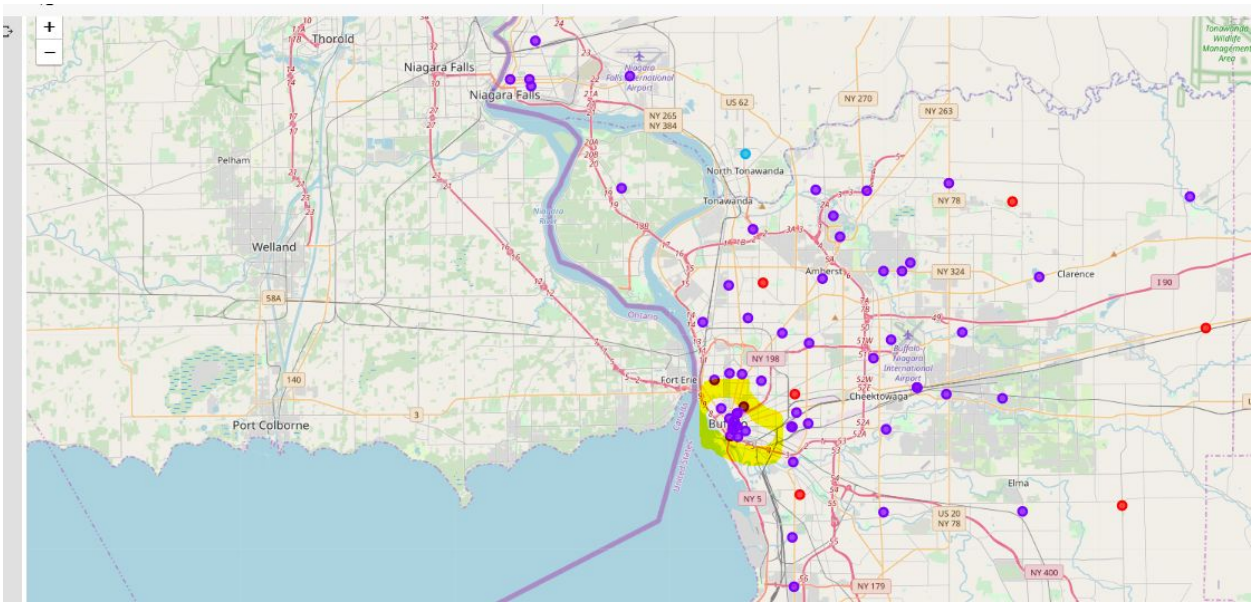

Figure 1. This figure illustrates the folium markers map of Buffalo from the csv file created. The yellow circle indicates the predominant cluster of labels.

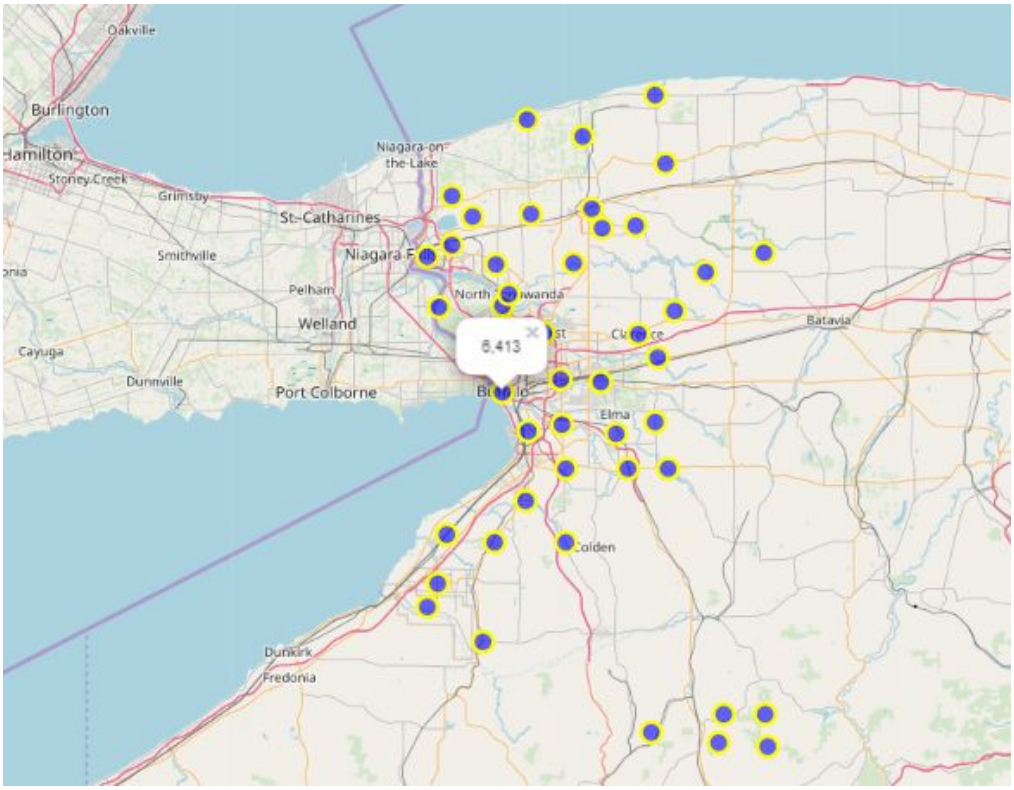

Figure 2. This cluster map indicates markers representing the population density of Buffalo subdivisions.

5. Discussion

Based on the results obtained from the the folium marker's map it appears as if the largest population density is Buffalo, NY. This makes sense because Buffalo is the second largest city in New York. Therefore, it is expected to have the greatest population density. As seen through the information about the venues obtained from Foursquare API, some of the zip codes such as 14004 and 14008 were dropped from the venue table because there was no information about them. Therefore, the loss of these venues from the dataset lowered the number of postal codes in the data pool. However, since there were 110 zip codes that were being examined.

When determining the best location for the Buffalo Wings restaurant, a location with a cluster marker of 1 and a high population density would be the best location for a business. Opening up a restaurant in zip code 14273 is a location that falls near Buffalo, which has the largest population density, and it is under the cluster label 1. Looking at the venues in this location it appears as if the restaurants are similar to Buffalo Wings. The top 5 venues are music, bar, hotel, wine bar, and American restaurant. This location would be beneficial to locate a restaurant because hotels are the third common venues in the Buffalo, HSBC Atrium postal code area. Hotels being high up on the venue list indicates that it might be a location for tourists and where many might stay when they are visiting Buffalo. The other 5 common venues are sandwich place, steakhouse, multiplex, cocktail bar, and a BBQ joint (Foursquare). These venues indicate traditional American food, therefore creating a Buffalo Wings business would be beneficial to add to this complex because it would be surrounded by other common cuisines. Since bars are also common, it would be beneficial to add to this location because the restaurant that I would be pursuing in opening would allow for watching sports, having drinks, and eating wings among other traditional foods.

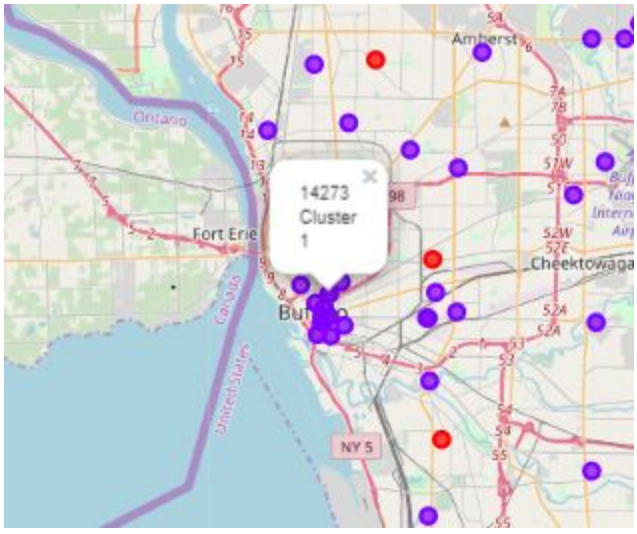

Figure 3. This illustrates where the zip code chosen for the location of the restaurant is found. It is a label 1 cluster which is the most recurring cluster label

Lastly, I used Google Maps to assess how far of a commute it would be to Niagara Falls and the Buffalo Bills stadium, from the zip code 14273 and it is approximately a thirty minute commute (Google Maps). This still seems like a reasonable location for a restaurant largely because it would provide for a

way for tourists to be able to see more of Buffalo and it would not be located too close to the falls. Having a location that is not too close to the falls would be beneficial because so many tourists come to see it that in areas around Niagara Falls there would be too much traffic. This location would allow individuals to see more of the city. In addition to this, Buffalo NY 14273, is only 19 minutes away from the Buffalo Bills stadium (Google Maps). This location would be in close proximity for individuals to stop by and grab food before the game and reasonable walking distance if individuals wanted to avoid going far to get food because of the high traffic during games.

6. Conclusion

From the markers map of the subdivisions and the map of the venues, it can be concluded that there are many options for opening up a venue in close proximity. Any location that is around Buffalo would be a good place to open up a business, largely because it is the second largest city in New York and seems to be a place that is largely visited by tourists due to the fact that hotels are in the top 3 most common venues. There are other variables that would need to be considered when deciding where to place a restaurant such as the cost of opening up a business in Buffalo or in areas around Buffalo. More analysis would need to be done. However, looking at the population densities and the most common venues that are in close proximity to the highly populated areas was a way to narrow down the search for opening a business. Assessing how close the postal code chosen is to Niagara Falls and the Buffalo Bills stadium were also two important factors to consider because both are driving factors for individuals coming to the city.

7. References

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