Seafood Restaurant Expansion in SC

Analysis of South Carolina Restaurants, Cities, and Towns

Prepared for the Yachtsman Group

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Introduction

Problem Statement: A business owner with the Yachtsman Group is looking to expand their popular seafood restaurant into South Carolina. They have a couple of models of their restaurant (the Yacht Stop - mid-range menu pricing and the Yacht Club - upscale). They would like to know what the market looks like in the state for restaurants, particularly seafood restaurants. If the market is open for their restaurant models, the business owner will commit to opening two restaurants in the state to start.

I will identify the types of restaurants in the cities and towns. I will use this information along with location information to determine which areas would be the best options to open seafood restaurant(s).

Assumptions before starting data analysis:

- South Carolina is a coastal state, so the market may be oversaturated with seafood restaurants.
- Major coastal, tourist cities would have a higher concentration of seafood restaurants.

Note: I list the assumptions to see if they hold true at the end of the modeling and analysis.

Data Used

I will use the following data sources to gather a list of cities, towns, and venues for each. Once the information is gathered I will use different methodologies to analyze the data to summarize the best locations for my clients to open their restaurant(s).

Wikipedia | To find restaurants located in South Carolina, we need a list of all cities and towns. The data is available in the Wikipedia page. In the project, we will scrape the towns and cities table information available from the Wikipedia page.

Source: https://en.wikipedia.org/wiki/List_of_cities_and_towns_in_South_Carolina

Geocoder Nominatim | I need to gather the geolocation (latitude and longitude) of all the towns and cities. In order to get this information, I will use the Geocoder Nominatim OpenStreepMap (OSM) API to get the geographical location (latitude and longitude) of each town/city.

FourSquare | I will use FourSquare crowdsource data to get all the restaurant and category details of all the venues of type of *food*. I will use the endpoint – *Venues*.

Data Description

The data sample used was found on Wikipedia based on the latest census information they have. South Carolina contains 269 incorporated municipalities consisting of cities and towns. At incorporation, the municipalities chose to be named either "City of" or "Town of", however there is no legal difference between the two.

Data Analysis

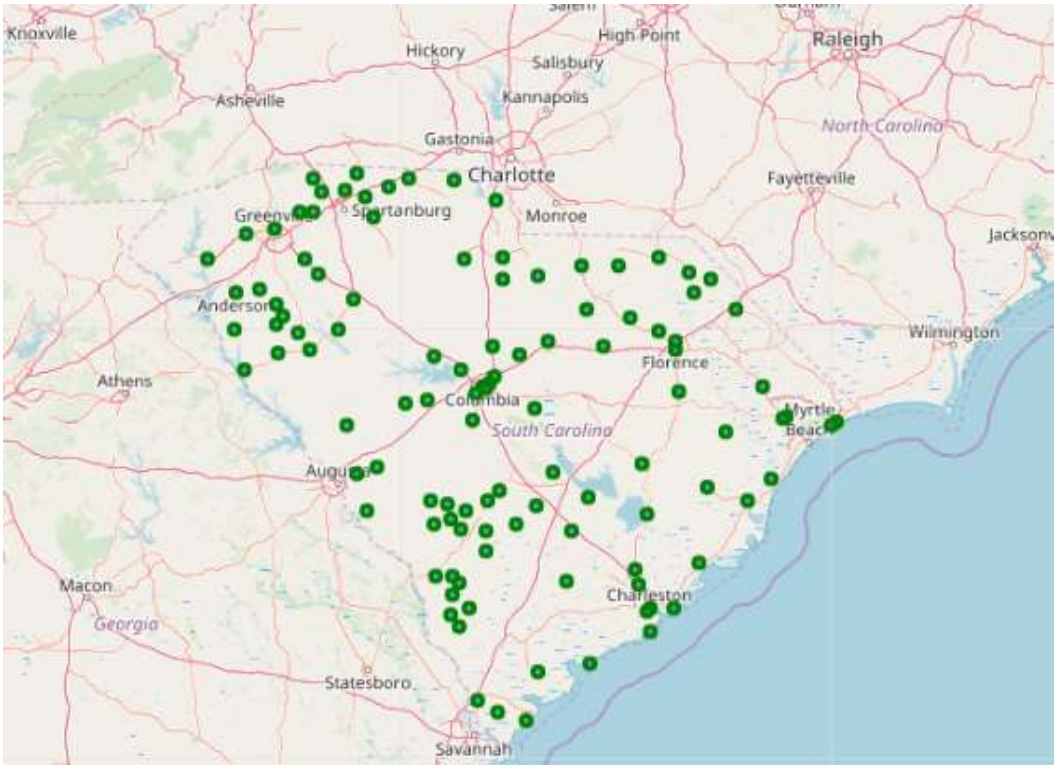
I used BeautifulSoup and the Wikipedia data with the municipalities (cities and towns) to load into the Pandas dataframe, which resulted in the first dataframe:

	Name
0	Abbeville, SC
1	Aiken, SC
2	Allendale, SC
3	Anderson, SC
4	Andrews, SC

The geolocation (latitude and longitude) were obtained using Geocoder Nominatim, looping through each town/city in the list.

	Name	latitude	longitude
0	Abbeville, SC	34.177949	-82.379246
1	Aiken, SC	33.559859	-81.721952
2	Allendale, SC	32.963501	-81.340006
3	Anderson, SC	34.506860	-82.650626
4	Andrews, SC	33.451278	-79.560897

I used Folium to create the following visualization of SC after cleaning up the data (removing null values):



I used FourSquare (venue explore API), to obtain all the venues with Food category in the vicinity of each of these towns/cities remaining in the dataset.

```
LIMIT = 100 # limit of number of venues returned by Foursquare API
rad = 5000 # define radius
section = 'Food'
```

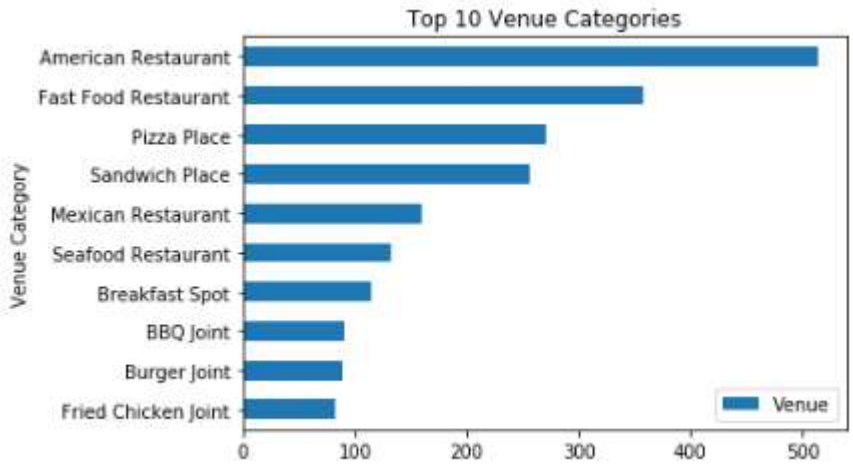
This resulted in 3035 venues and a total of 65 distinct venue categories.

Taking into account that some categories may be incorrect, I cleansed the data to account for missing categories, incorrect categories, and the removal of incorrect entries. The result was 60 distinct venue categories. I cleaned out 5 categories.

I then grouped to obtain the top 10 venue categories:

Venue Category	Venue
American Restaurant	513
Fast Food Restaurant	358
Pizza Place	270
Sandwich Place	257
Mexican Restaurant	160
Seafood Restaurant	133
Breakfast Spot	115
BBQ Joint	90
Burger Joint	89
Fried Chicken Joint	83

I also charted the results:



Note: I notice that the number of seafood restaurants in the state don't quite line up to the mid point of the list. They rank 6th in the top 10.

The key to our feature set is applying one-hot encoding technique. We will use the mean of the frequency of occurrence of each category. This will help us arrive at a numerical score for each of the 79 categories, for each town/city.

One Hot Encoding | Was applied because the distribution of the venue category beyond the top 10 categories for each city to generate the top 10 most common venue categories in the feature set.

Methodology

The dataset for the problem statements do not have a predefined label or the primary category that a city belongs to. Because of this, I'd classify this dataset unsupervised data. The model selected is K-means clustering for unsupervised dataset

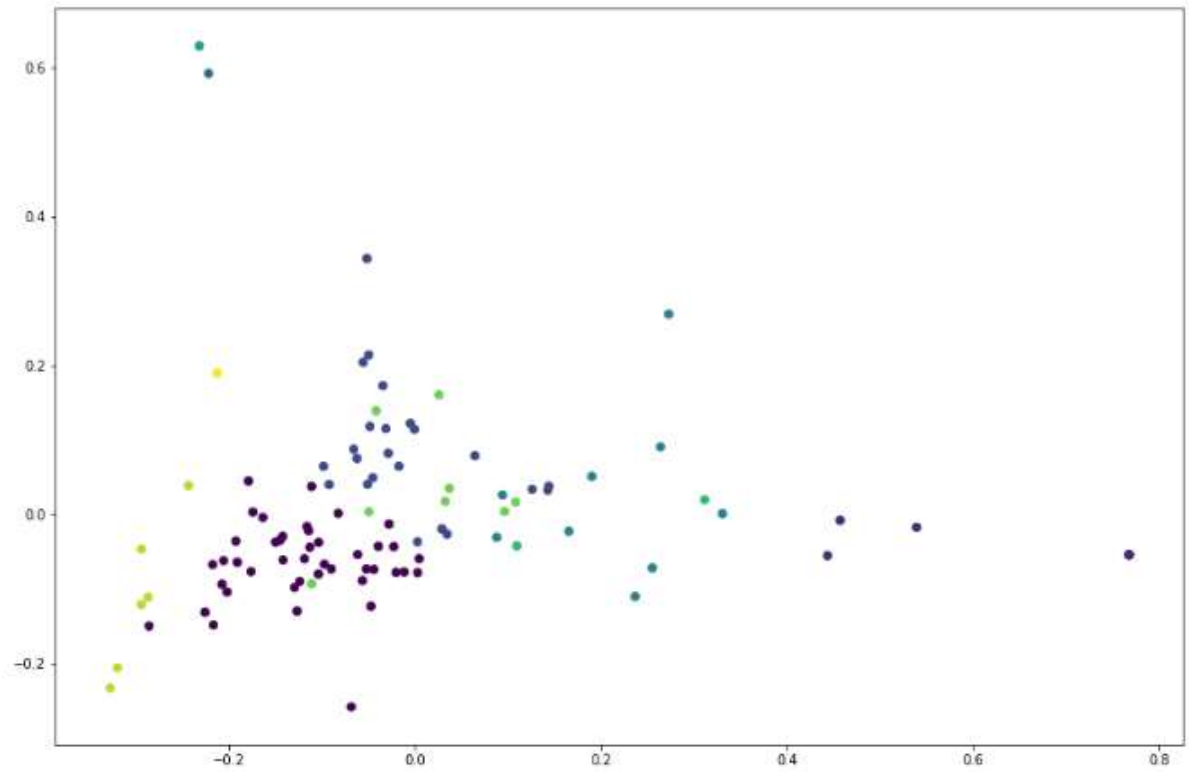
I used the K-means clustering algorithm, and label all the towns/cities into 10 clusters.

Below is a sample cluster generated from a model:

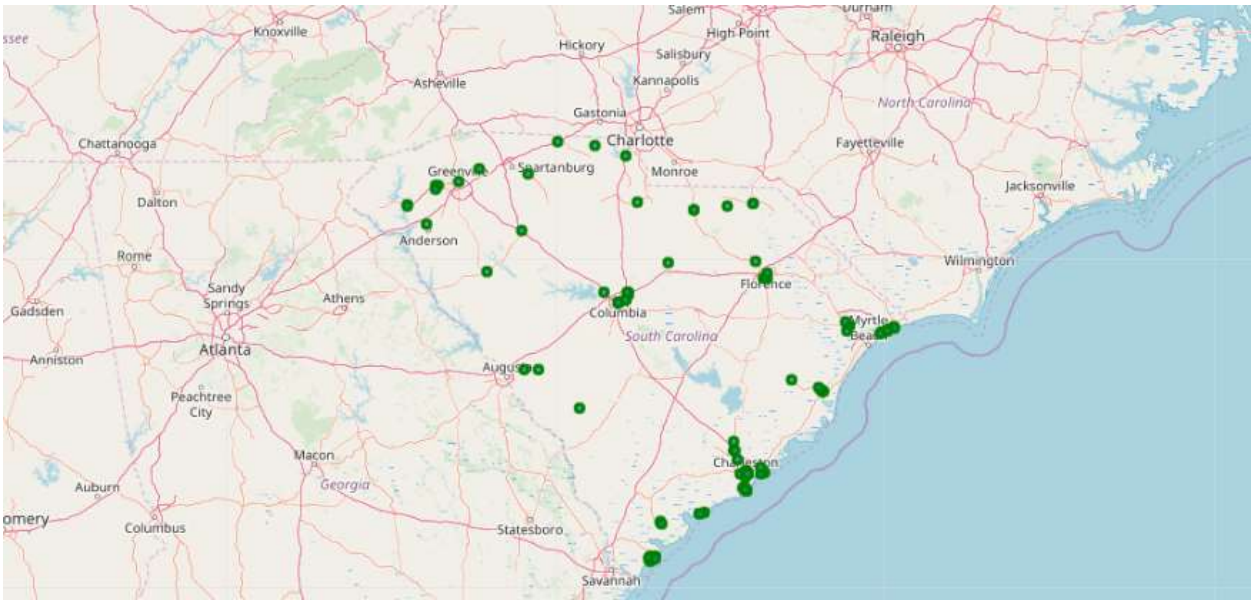
	Name	1st Most Common Venue	2nd Most Common Venue	3rd Most Common Venue	4th Most Common Venue	5th Most Common Venue	6th Most Common Venue	7th Most Common Venue	8th Most Common Venue	9th Most Common Venue	10th Most Common Venue
0	Abbeville, SC	American Restaurant	Fast Food Restaurant	Greek Restaurant	Fried Chicken Joint	Southern / Soul Food Restaurant	Pizza Place	Creperie	Café	Sandwich Place	Mexican Restaurant
1	Aiken, SC	Sandwich Place	American Restaurant	Pizza Place	Fast Food Restaurant	Fried Chicken Joint	Donut Shop	Sushi Restaurant	Mexican Restaurant	Breakfast Spot	Burger Joint
3	Anderson, SC	American Restaurant	Fast Food Restaurant	Pizza Place	Sandwich Place	Diner	Mexican Restaurant	Fried Chicken Joint	Asian Restaurant	Japanese Restaurant	Breakfast Spot
5	Arcadia Lakes, SC	Sandwich Place	Fast Food Restaurant	Pizza Place	American Restaurant	Mexican Restaurant	Breakfast Spot	Chinese Restaurant	Deli / Bodega	Korean Restaurant	Seafood Restaurant
8	Aynor, SC	Fast Food Restaurant	American Restaurant	Breakfast Spot	Italian Restaurant	Sandwich Place	Café	Donut Shop	Chinese Restaurant	Fish & Chips Shop	Creperie
10	Barnwell, SC	Fast Food Restaurant	American Restaurant	Pizza Place	Food Truck	Sandwich Place	Seafood Restaurant	Italian Restaurant	Chinese Restaurant	Mexican Restaurant	Bakery
11	Batesburg-Leesville, SC	Fast Food Restaurant	Mexican Restaurant	Café	American Restaurant	BBQ Joint	Pizza Place	Fried Chicken Joint	Chinese Restaurant	Breakfast Spot	Japanese Restaurant
14	Bennettsville, SC	Fast Food Restaurant	American Restaurant	Fried Chicken Joint	Burger Joint	Mexican Restaurant	Pizza Place	Greek Restaurant	Sandwich Place	Café	Diner
16	Bishopville, SC	Fast Food Restaurant	Fried Chicken Joint	Pizza Place	Diner	Sandwich Place	Café	Burger Joint	Breakfast Spot	BBQ Joint	American Restaurant
21	Blythewood, SC	Fast Food Restaurant	Cafeteria	American Restaurant	Pizza Place	Sandwich Place	Wings Joint	Chinese Restaurant	Fried Chicken Joint	Deli / Bodega	Southern / Soul Food Restaurant
27	Burnettown, SC	Fast Food Restaurant	American Restaurant	Pizza Place	Sandwich Place	Chinese Restaurant	Seafood Restaurant	BBQ Joint	Fried Chicken Joint	Breakfast Spot	Mexican Restaurant
29	Camden, SC	Fast Food Restaurant	American Restaurant	Japanese Restaurant	Sandwich Place	Breakfast Spot	Pizza Place	Fried Chicken Joint	Mexican Restaurant	Burger Joint	Seafood Restaurant

Results

After obtaining the clusters, I plotted them in a scatter plot:



After grouping the data, I created a map to show the distribution of seafood restaurants in South Carolina.

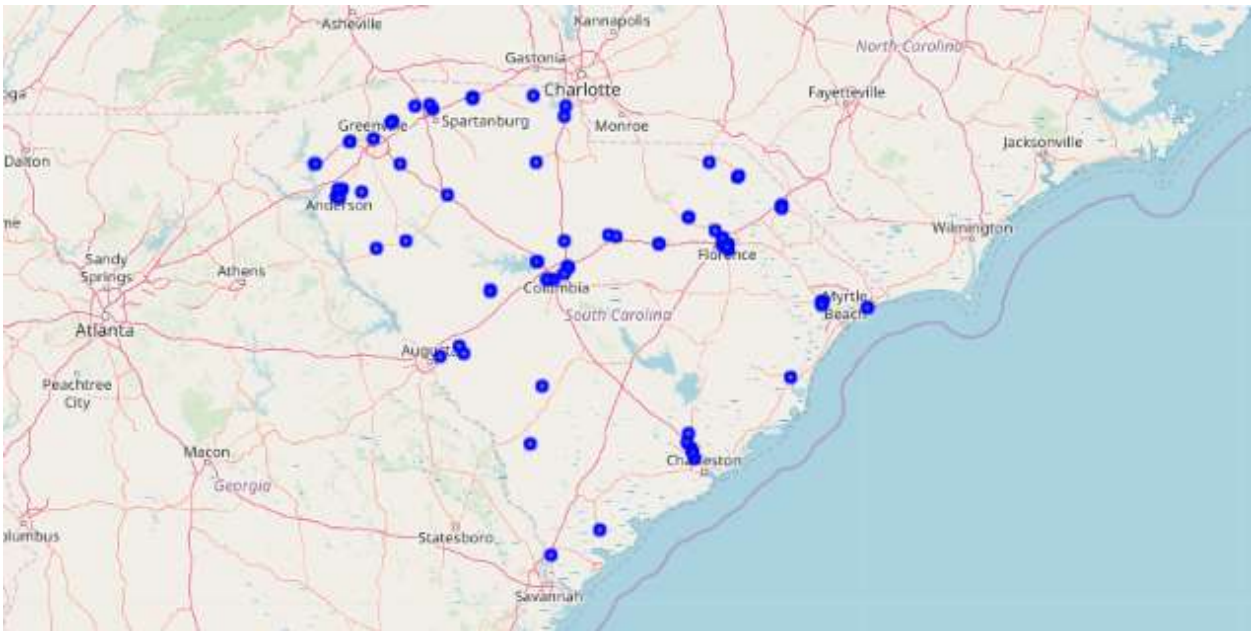


I also took a look at the cities where the most common venue was a seafood restaurant.

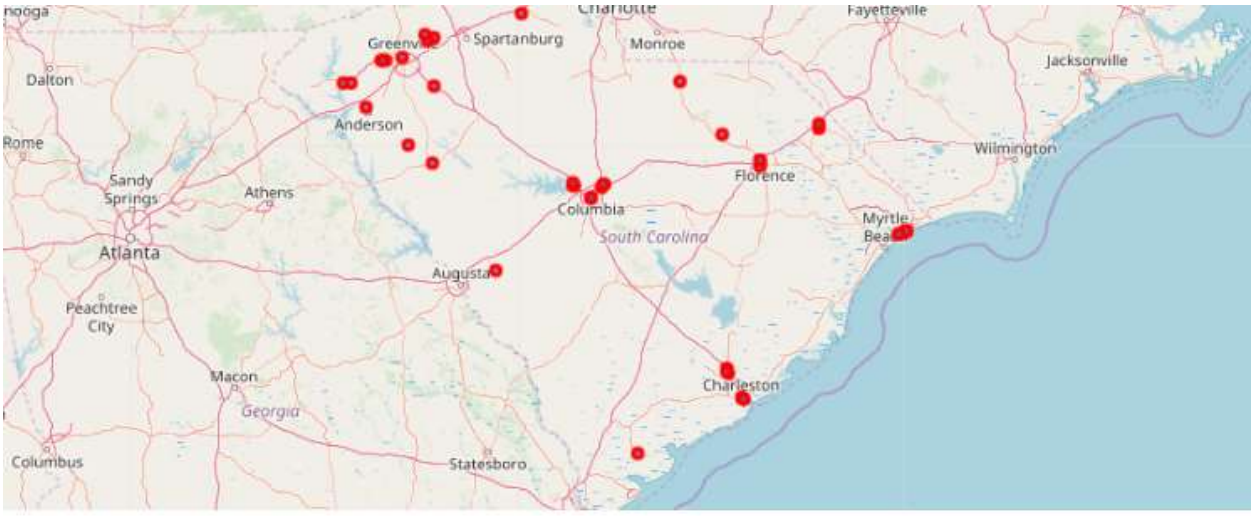
	Name	latitude	longitude	Cluster Labels	1st Most Common Venue	2nd Most Common Venue	3rd Most Common Venue	4th Most Common Venue	5th Most Common Venue	6th Most Common Venue	7th Most Common Venue	8th Most Common Venue	9th Most Common Venue	10th Most Common Venue
41	Chesterfield, SC	34.650058	-80.141784	5	Seafood Restaurant	Wings Joint	Caribbean Restaurant	French Restaurant	Food Truck	Food Stand	Food Court	Fish & Chips Shop	Fast Food Restaurant	Donut Shop
63	Edisto Beach, SC	32.479355	-80.334823	2	Seafood Restaurant	Pizza Place	American Restaurant	Sandwich Place	Breakfast Spot	Food Truck	Food Court	Fish & Chips Shop	Fast Food Restaurant	Donut Shop
72	Folly Beach, SC	32.654997	-79.940609	2	Seafood Restaurant	American Restaurant	Sandwich Place	Mexican Restaurant	Café	Food Truck	Breakfast Spot	Irish Pub	BBQ Joint	Pizza Place
80	Georgetown, SC	33.378834	-79.294496	0	Seafood Restaurant	American Restaurant	Fast Food Restaurant	Pizza Place	Japanese Restaurant	Deli / Bodega	Sushi Restaurant	Chinese Restaurant	Diner	Mexican Restaurant
112	Jefferson, SC	34.649889	-80.389540	2	Seafood Restaurant	Steakhouse	Southern / Soul Food Restaurant	American Restaurant	BBQ Joint	Creperie	Cuban Restaurant	Deli / Bodega	Diner	Donut Shop

I was surprised that an inland city earned the distinction. However, there are three other coastal cities in the top four results.

I also generated maps for two other meat based categories for visual comparisons: chicken joints (which made the top 10 category list) and steakhouses (which didn't make the top 10 category list).



Chicken Joints



Steakhouse

Discussion

I am surprised there aren't more seafood restaurants in the state considering how close it is to the coast and fresh seafood. The areas that I expected to have the higher concentration of seafood restaurants didn't make the top 10 list.

I expected Charleston and Myrtle Beach to be in the top 10 because of their closeness to the ocean and high volume of tourist traffic. Instead, an inland city (Chesterfield) led the list.

Because of this the assumptions made before the data was gathered were debunked.

Conclusion

Because of the data, I would recommend that Yachtsman Group expand both restaurant models (the Yacht Stop - mid-range menu pricing and the Yacht Club - upscale) into South Carolina.

After looking at the data and visualizations my recommendations for expansion would be to look at an inland city: perhaps Columbia, Florence, Rock Hill or Spartanburg. These are all large cities that are not currently oversaturated with seafood restaurants. They are also close enough to the coast to receive fresh seafood shipments regularly.

I would also suggest a coastal city such as Charleston, Myrtle Beach, or Hilton Head. These cities have great populations but also see a high volume of tourists, which may appeal to a business owner.