The Battle of Neighborhood

Introduction:

For this capstone project, we are going to explore the optimal location of opening up a new restaurant in Atlanta, GA. The goal of the project is to identify the most popular type of restaurant in the city and suggest a few locations which are good community with strong demand of dining but there is not a very strong competition in this category, as a result this might be a good opportunity for small business owner to capture those demand.

The target audience of this project is small business owner who is looking to open up a restaurant in the city of Atlanta, the result of this project would help find out the most popular type of restaurant in the city and recommend several optimal locations based on data instead of pick a business and location based on gut feeling. This would help increase the chance of success.

Data:

To solve this problem, below data will be used:

- List of Atlanta Neighborhood, including Neighborhood name, population
  https://en.wikipedia.org/wiki/Table_of_Atlanta_neighborhoods_by_population

Neighborhood ⬍	Population (2010) ⬍
Adair Park	1,331
Adams Park	1,763
Adamsville	2,403
Almond Park	1,020
Ansley Park	2,277

- Latitude and Longitude of these neighborhood (*Python Geopy*)

  The neighborhood name from the first step is going to be converted to latitude and longitude by using Python Geopy library. See example below:

	Neighborhood	Latitude	Longitude
0	Adair Park, Atlanta	33.724974	-84.411429
1	Adams Park, Atlanta	33.712052	-84.456873
2	Adamsville, Atlanta	33.759274	-84.505209
3	Ansley Park, Atlanta	33.794550	-84.376315
4	Ardmore, Atlanta	33.806282	-84.400028
5	Argonne Forest, Atlanta	33.776905	-84.377668

- Venue data related to these neighborhood (*Foursquare API*)

  We will leverage the location data from Foursquare, including Venue name, location and category. See example of data below

Neighborhood	Neighborhood Latitude	Neighborhood Longitude	Venue	Venue Latitude	Venue Longitude	Venue Category
Adair Park, Atlanta	33.724974	-84.411429	Nick's Food To Go	33.747492	-84.379749	Greek Restaurant
Adair Park, Atlanta	33.724974	-84.411429	Aviva by Kameel	33.760597	-84.386548	Mediterranean Restaurant
Adair Park, Atlanta	33.724974	-84.411429	Six Feet Under Pub & Fish House	33.746555	-84.372869	Seafood Restaurant
Adair Park, Atlanta	33.724974	-84.411429	Alma Cocina	33.759070	-84.387536	Latin American Restaurant
Adair Park, Atlanta	33.724974	-84.411429	Agave	33.747968	-84.368020	Mexican Restaurant

Methodology:

The problem will be tackled in two folds:

First, venue of all restaurant in city of Atlanta will be analyzed to identify the most popular type of restaurant. Ideally the review count data should be used from Foursquare to evaluate the popularity of different type of restaurant, however review count is considered a premium call in Foursquare, for standard access we will use the count by restaurant instead to evaluate the popularity. Also to work around the challenge of pulling a complete restaurant list in the city of Atlanta due to the limitation of 50 venues per call for standard access, I had to break the data pull into multiple calls. In each call, we are pulling the restaurant list within 15km radius of the neighborhood from the previous list. The restaurant list is then combined together from each call and unique restaurants selected to get rid of duplicates when evaluating popularity.

Then we will structure the data to form a restaurant type * neighborhood matrix with information of restaurant count by restaurant type in each neighborhood. The data is staged and prepared for clustering analysis to group the neighborhood into several clusters. The cluster with large number of total restaurants and small number of the most popular type of restaurant would be the recommended location for opening up a new business.

Results:

Top 5 most popular restaurants in Atlanta:

Venue Category	Venue
American Restaurant	36
Mexican Restaurant	29
Italian Restaurant	18
Seafood Restaurant	15
Vietnamese Restaurant	13

American food is the most popular type of food in the city of Atlanta with 36 restaurants in this category followed by Mexican 29 and Italian 18. As a result American food is

recommended for the new business owner which should be easy to accept and fit the taste of most people.

Clustering:

Data with count of restaurants in each type and in each neighborhood is prepared for clustering. And clustering of 8 was selected to detect the similarity between different neighborhoods.
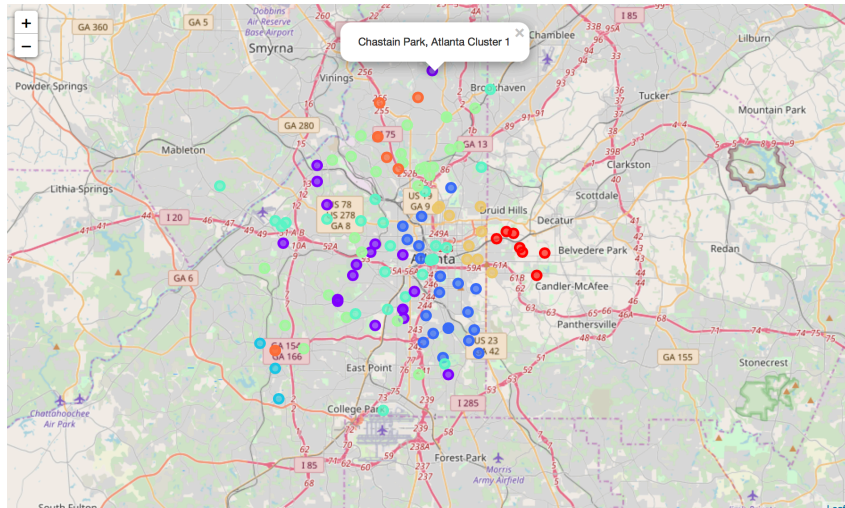
	Neighborhood	African Restaurant	American Restaurant	Arepa Restaurant	Asian Restaurant	Brazilian Restaurant	Cajun / Creole Restaurant	Caribbean Restaurant	Chinese Restaurant
0	Adair Park, Atlanta	0	4	0	0	0	0	0	0
1	Adams Park, Atlanta	0	2	0	1	0	0	0	0
2	Adamsville, Atlanta	0	3	0	1	0	0	0	0
3	Ansley Park, Atlanta	0	4	0	0	0	0	0	0
4	Ardmore, Atlanta	0	2	0	0	1	0	0	0
5	Argonne Forest, Atlanta	0	5	0	0	0	0	0	0
6	Ashview Heights, Atlanta	0	4	0	0	0	0	0	0

Result of clustering:

Neighborhood	Latitude	Longitude	American Restaurant	Total	Cluster Lables
Adair Park, Atlanta	33.724974	-84.411429	4	26	7
Adams Park, Atlanta	33.712052	-84.456873	2	29	1
Adamsville, Atlanta	33.759274	-84.505209	3	30	1
Ansley Park, Atlanta	33.794550	-84.376315	4	22	5
Ardmore, Atlanta	33.806282	-84.400028	2	23	2
Argonne Forest, Atlanta	33.776905	-84.377668	5	21	5
Ashview Heights, Atlanta	33.704830	-84.378537	4	22	5
Atlanta University Center, Atlanta	33.751543	-84.413597	3	26	7
Atlantic Station, Atlanta	33.792029	-84.396072	3	21	0
Audubon Forest, Atlanta	33.726219	-84.470485	2	28	1
Bankhead, Atlanta	33.772235	-84.428882	3	22	5
Beecher Hills, Atlanta	33.723174	-84.463411	3	29	1
Ben Hill, Atlanta	33.690664	-84.511319	1	30	1
Ben Hill Terrace, Atlanta	33.690664	-84.511319	1	30	1

Discussion:

Clustering 7 was determined to be the best fit (orange dots) which is a group of neighborhood with large number of total restaurant which indicates a strong demand of dining in these neighborhood and also a small number of American Restaurants. There is a potential gap that can be filled by opening up additional American Restaurant in these popular locations.

Here are some examples of clustering 7, Ben Hill, Tuxedo Park and Peachtree Heights are 3 good options. They are all fast growing community with very convenient location and close to landmarks such as Buckhead, Downtown Atlanta, Piedmont Park where there would be a lot of traffic and visits.

Neighborhood	American Restaurant	Total	Cluster Lables
Ben Hill, Atlanta	1	30	7
Ben Hill Terrace, Atlanta	1	30	7
Cross Creek, Atlanta	1	22	7
Paces, Atlanta	1	24	7
Peachtree Heights East, Atlanta	1	23	7
Peachtree Heights West, Atlanta	1	23	7
Tuxedo Park, Atlanta	1	26	7
Underwood Hills, Atlanta	1	22	7

Conclusion:

The battle of neighborhood in Atlanta is targeting potential new business owner who is looking to open up a restaurant in the city of Atlanta. The report leveraged foursquare location data identified that American Restaurant is the most popular type of food and used clustering uncovered several neighborhoods where there is a strong demand of dining but not a big competition of American food. The result of this study should help increase the chance of success for small business owner to success.