COURSERA
IBM APPLIED CAPSTONE PROJECT

Opening a New American Restaurant in Brooklyn, New York.

By: Timilehin Akinlusi
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INTRODUCTION

Because food is universal, it provides a commonality for people to prepare, eat and enjoy food with friends and partners. The entire experience can be the highlight of someone's day or week.

One of the main benefits of a restaurant is that it provides good food to people in the community at a reasonable cost. Also, they contribute to the local economy and culture. Many towns and cities build their nightlife and culture centers around a particular location, and a thriving restaurant scene helps contribute mightily to those centers for the people to gather.

There are approximately 8.4 million Americans living in New york. This means there should be an avenue to cater for them. Having an american restaurant in that district will help the lives of those living there and also the community at large.

BUSINESS PROBLEM

This project is to find the most suitable location to open an American restaurant in New york. It is important to consider competitiveness and the optimal location to open an american restaurant in Brooklyn, New york. An important factor is to make sure there aren't too many american restaurants in that vicinity as it can stifle the new business. The question will be posed as such- where can i open an American restaurant in Brooklyn, New york??

TARGET AUDIENCE

This project is aimed at individuals looking to open a restaurant in Brooklyn. It will help discover suitable locations and assist in making optimal decisions.

DATA

What will be needed for this project will be :

- Longitude and latitude of neighborhoods in Brooklyn, New York.
- List of neighborhoods in Brooklyn, New york.
- Venue data that are in close proximity to American Restaurants. This will aid in the search for locations with suitable restaurants to open American Restaurants.

HOW TO GET THE DATA

- Using the CSV file provided by coursera which contains longitude and latitude of several locations and neighborhoods in New York.
- Getting the longitude and latitude of these locations via the Geocoder package in Python.
- Using foursquare API to extract venue data and neighborhoods that are related to those locations.

METHODOLOGY

This section will further go into the details of how the data is structured and extracted. The data will be read from the json file provided downloaded course into a pandas dataframe. The data contains the 5 boroughs and 306 neighborhoods. A brief outlook of how the data frame looks below:

```
[15]: neighborhoods.head()
```

[15]:

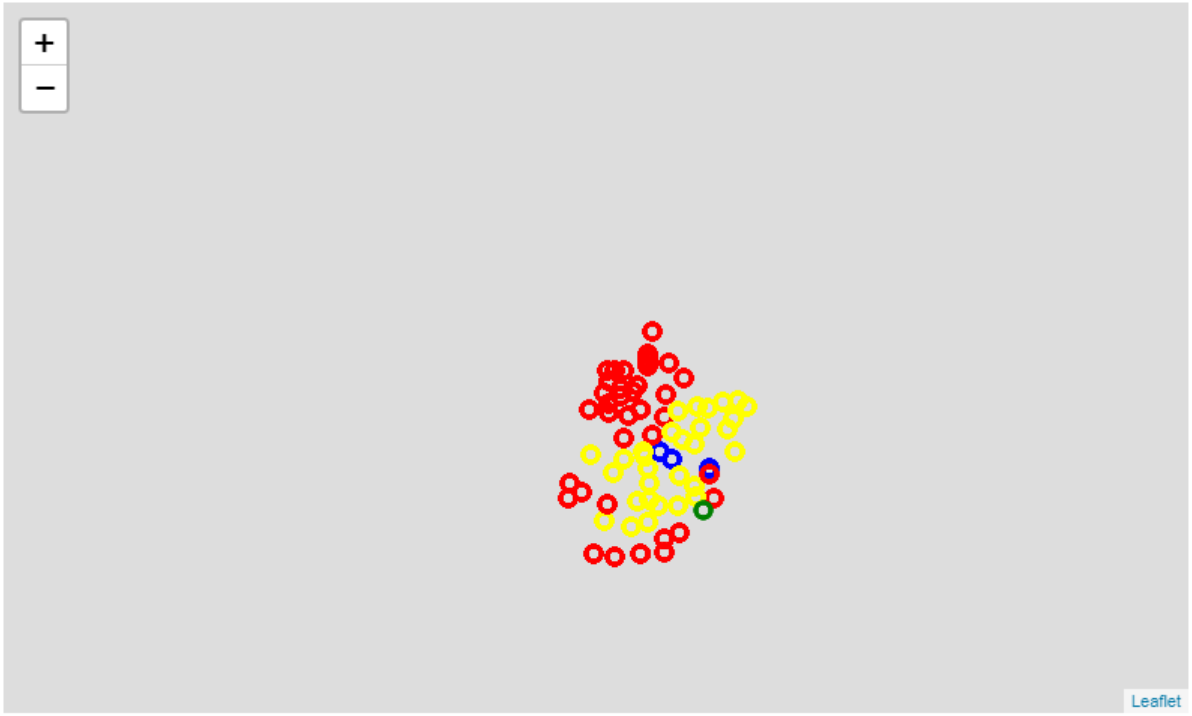
	Borough	Neighborhood	Latitude	Longitude
0	Bronx	Wakefield	40.894705	-73.847201
1	Bronx	Co-op City	40.874294	-73.829939
2	Bronx	Eastchester	40.887556	-73.827806
3	Bronx	Fieldston	40.895437	-73.905643
4	Bronx	Riverdale	40.890834	-73.912585

Upon reading the data into a dataframe, I visualized the city of New york using the folium visualization library. After that, the next step is to get the top 100 venues within a radius of 600 meters. For this, a foursquare account will be created and I was issued a client ID and client service key which will be key to retrieving the venue data. From this method, the venue, longitude, latitude and venue specifications can be obtained easily.

After this, the rows are grouped by their neighborhoods and the mean and frequency in which each restaurant occurred in that neighborhood is recorded.

The next step is to make use of KMeans which is a popular unsupervised machine learning model. Here I will cluster the frequency of occurrence of african restaurants in the neighborhood into 3 main clusters. KMeans algorithm does this by identifying 3 centroids, and grouping the data to the nearest cluster based on its distance. Based on the results of the clusters, an ideal and less competitive location will be recommended.

RESULTS



Cluster 0 represents the red marker which is around Bay ridge, south side and north side. The results from the map shows there are 2 major clusters in the

neighborhood which are cluster 1 and 3.

[29]:
```
brooklyn_merged.loc[(brooklyn_merged['Cluster Labels'] ==0) & (brooklyn_merged['Venue Category'] == 'American
```

[29]:

	Neighborhood	American Restaurant	Cluster Labels	Neighborhood Latitude	Neighborhood Longitude	Venue	Venue Latitude	Venue Longitude	Venue Category
1	Bay Ridge	0.020619	0	40.625801	-74.030621	Greenhouse Cafe	40.629542	-74.028514	American Restaurant
1	Bay Ridge	0.020619	0	40.625801	-74.030621	Chadwick's Restaurant	40.621450	-74.031964	American Restaurant
2	Bedford Stuyvesant	0.021739	0	40.687232	-73.941785	Bert's Catering & Restaurant	40.689835	-73.936591	American Restaurant
5	Boerum Hill	0.010000	0	40.685683	-73.983748	The HiHi Room	40.687119	-73.990417	American Restaurant
9	Brooklyn Heights	0.010000	0	40.695864	-73.993782	Colonie	40.690733	-73.995963	American Restaurant
11	Bushwick	0.011236	0	40.698116	-73.925258	The Hart Bar	40.696320	-73.930100	American Restaurant
16	Cobble Hill	0.010000	0	40.687920	-73.998561	Colonie	40.690733	-73.995963	American Restaurant
22	Dumbo	0.037975	0	40.703176	-73.988753	Westville DUMBO	40.702021	-73.989596	American Restaurant
22	Dumbo	0.037975	0	40.703176	-73.988753	The River Café	40.703754	-73.994834	American Restaurant
22	Dumbo	0.037975	0	40.703176	-73.988753	The Osprey	40.702360	-73.995523	American Restaurant
31	Fort Hamilton	0.017241	0	40.614768	-74.031979	Bay Ridge Eatery	40.618083	-74.029372	American Restaurant
32	Fulton Ferry	0.032787	0	40.703281	-73.995508	The River Café	40.703754	-73.994834	American Restaurant
32	Fulton Ferry	0.032787	0	40.703281	-73.995508	Westville DUMBO	40.702021	-73.989596	American Restaurant
35	Gowanus	0.020000	0	40.673931	-73.994441	Buttermilk Channel	40.676012	-73.999183	American Restaurant
37	Greenpoint	0.010000	0	40.730201	-73.954241	Anella	40.733272	-73.958019	American Restaurant
49	North Side	0.020000	0	40.714823	-73.958809	St. Anselm	40.714145	-73.955984	American Restaurant
49	North Side	0.020000	0	40.714823	-73.958809	The Commodore	40.714086	-73.955817	American Restaurant
53	Park Slope	0.034884	0	40.672321	-73.977050	Stone Park Café	40.672920	-73.983358	American Restaurant
53	Park Slope	0.034884	0	40.672321	-73.977050	Bonnie's Grill	40.674317	-73.982182	American Restaurant

```
[32]: brooklyn_merged.loc[(brooklyn_merged['Cluster Labels'] ==3) & (brooklyn_merged['Venue Category'] == 'American
```

[32]:

	Neighborhood	American Restaurant	Cluster Labels	Neighborhood Latitude	Neighborhood Longitude	Venue	Venue Latitude	Venue Longitude	Venue Category
6	Borough Park	0.038462	3	40.633131	-73.990498	Orchidea	40.636390	-73.993899	American Restaurant
33	Georgetown	0.030303	3	40.623845	-73.916075	Gourmet Grill	40.619543	-73.916111	American Restaurant
39	Homecrest	0.023256	3	40.598525	-73.959185	Three Star Restaurant	40.599043	-73.954987	American Restaurant
46	Mill Basin	0.023256	3	40.615974	-73.915154	Gourmet Grill	40.619543	-73.916111	American Restaurant
63	Starrett City	0.066667	3	40.647589	-73.879370	Boston Market	40.647250	-73.882550	American Restaurant
64	Sunset Park	0.021277	3	40.645103	-74.010316	George's Restaurant	40.641116	-74.014348	American Restaurant

RECOMMENDATIONS

There are fewer american restaurants in Sunset park, starett city, Mill Basin, Homecrest, Borough park and George town. This can represent a good deal of business for a potential restaurant opener. An individual looking to open a new restaurant should try any of these neighborhoods as there will be lesser competition involved.