

## Applied Data Science Capstone

### IBM Data Science Professional Certificate

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#### Data Science Capstone: Battle of Neighborhoods

Find the best Locations in New York City for an African Cuisine/open an African Restaurant.

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#### Introduction/Business Problem:

New York is amongst one of the most diverse cities on the planet. New York is home to over 8.6 million people and over 800 languages. Out of the five boroughs in the city, Queens is the most diverse. Over 37% of the people in New York were born outside of the USA. New York City is the World's Wealthiest, With US\$3 Trillion in Total Wealth. New York City, home to 65 billionaires and over 380,000 millionaires, was the world's wealthiest city, according to a New World Wealth report Thursday and still boast of the top spot in terms of the richest cities in the world 2020. New York City's demographics show that it is a large and ethnically diverse metropolis. It is the largest city in the United States with a long history of international immigration. New York City was home to over 8.3 million people in 2019, accounting for over 40% of the population of New York State and a slightly lower percentage of the New York metropolitan area, home to approximately 23.6 million. Over the last decade the city has been growing faster than the region. The New York region continues to be by far the leading metropolitan gateway for legal immigrants admitted into the United States. Throughout its history, New York City has been a major point of entry for immigrants; the term "melting pot" was coined to describe densely populated immigrant neighborhoods on the Lower East Side. As many as 800 languages are spoken in New York, making it the most linguistically diverse city in the world.

New York is one of the world's great study destinations. Home to well over 8 million people, the city has a rich and diverse population. New York is one of the world's busiest and most exhilarating cities, with countless things to see and do for international students. With over 400 colleges and universities, including New York University, Columbia University, and Cornell University, New York can provide a well-rounded education for students with any and all interests. ... New York is undoubtedly one of the most student-preferred cities in the country, and for good reason!

The United States has more immigrants than any other country in the world. Today, more than 40 million people living in the U.S. were born in another country, accounting for about one-fifth of the world's migrants. The population of immigrants is also very diverse, with just about every country in the world represented among U.S. immigrants. As such New York City is one with one of the largest populations of African immigrants. Homesickness and culture shock are very real problems for those studying or living abroad, and these issues are intensified by the lack of familiar meals for the African immigrant or student. Lifestyle factors associated with a university or places of abode are always a major influencer for international students or African immigrants, and the quality and accessibility of food choices is a key part of that. This final project explores the best locations for African restaurants throughout the city of New York. Just with any business, opening a new restaurant requires a deliberate assessment of a lot of factors key among them is the location of the restaurant. The findings of this project will come in handy for African business men, investors, African governments, international African students and generally African immigrants. African governments who want to project African culture in the diaspora, and of course cuisine is a wonderful way to achieve that! This project will seek to answer the questions "Where should the investor open an African Restaurant?" and "Where should I go if I want a sumptuous African food?"

#### Key Problem Statement:

- What is / are the best location(s) for African cuisine in New York City?
- In what Neighborhood and/or Borough should I open an Africa restaurant to have the best chance of being successful?
- Where would I go in New York City to have the best African cuisine?

#### Data:

New York City will be the object of this analysis, in order to find answers to the questions above. We need to segment the neighborhoods and explore them; we will essentially need a dataset that contains the 5 boroughs and the neighborhoods that exist in each borough as well as the latitude and longitude coordinates of each neighborhood. **Data source:** [https://cocl.us/new\\_york\\_dataset](https://cocl.us/new_york_dataset) This data set contains the required

information. And comes in very handy for our analysis. And we will use this data set to explore various neighborhoods of New York city. We wrangle the data, clean it, and then read it into a pandas dataframe so that it is in a structured format.

#### **FourSquare API:**

Location coordinates of different neighborhoods will be returned using Foursquare API. Finding popular venues in different neighborhoods from FourSquare API. I will use the FourSquare API to explore different neighborhoods in New York City. The Foursquare explore function will be used to get the most popular venues in each neighborhood in terms of African restaurants. All data related to locations and quality of African restaurants will be obtained via the FourSquare API utilized via the Request library in Python. And the best viable locations for establishing an African restaurant.

#### **Methodology:**

- Data will be collected from [https://cocl.us/new\\_york\\_dataset](https://cocl.us/new_york_dataset) dataset and cleaned and processed into a dataframe. This is to allow us to handle the data set structurally and computationally.
- FourSquare be used to locate all venues and then filtered by African restaurants. Ratings, tips, and likes by users will be counted and added to the dataframe. Gives us the best locations and potential markets for African restaurants.
- Data will be sorted based on rankings to bring the hidden juicy locations or places of interest.
- Finally, the data be will be visually assessed using graphing from Python libraries by employing folium.

We first defined a function(`geo_location`) to get the geocodes thus latitude and longitude of a given location via `geopy`. We therefore move on to defining a function to interact with the Foursquare API and getting the top 100 venues within a radius of 1000 metres for a given latitude and longitude by returning the venue id, venue name and category. We move on to set a function to get venue details such as like counts, rating, tip counts for a given venue id to aid us to rank top locations. We went on to define a function to get the New York city data with its elements Boroughs & Neighborhoods along with their latitude & longitude. We therefore analyze to get the number of neighborhoods in each of the boroughs in New York City (This exercise revealed that the Borough of Manhattan has the least number of Neighborhoods in New York, thus about 40 neighborhoods as compared to the other boroughs Bronx, Brooklyn, Queens and Staten Island). We went a little deeper to find the number of African Restaurants in each Neighborhood and Borough, and identify each by ['Borough','Neighborhood', 'ID','Name'] we therefore visualized the findings as well. We therefore put the list of all African restaurants in New York City in a dataframe to handle. By further exploring the African Restaurant data. We find out the number of African Restaurants in each Borough in New York City (we see that the Boroughs Bronx and Manhattan have the highest number of African restaurants in New York City each pegged at five African Restaurants). We go further to find out the number of African Restaurants in each Neighborhood of New York (We found out that the neighborhood of Central Harlem in the Borough of Manhattan has the highest number of African Restaurants (Three in number). We go ahead to find the ratings mainly ratings, likes, tips of the African restaurants in New York City across neighborhoods and boroughs. We get to know the neighborhoods with the maximum or highest average ratings for African Restaurants. (East Harlem is the best neighborhood in terms of restaurant ratings for African restaurants). We also found out the best borough for African restaurants in New York in Manhattan. At this point We will pictorially or visually map the neighborhoods with an average rating greater than or equal to 7.5 after merging the data with initial New York which consist of the geo points (latitudes and longitudes). We therefore merge the African restaurant dataset of rating 7.5 and above with the original New York data set with the geo points (Latitudes and Longitudes). We finally visualize that data set with the top-rated African restaurants and best locations for such a restaurant to be situated. The highest rated Restaurant is Teranga restaurant in East Harlem.

#### **Results Section:**

The results of the analysis revealed the following key insights:

- The borough of Queens which is the largest borough in New York City has the highest number of neighborhoods in New York City.
- This exercise revealed that the Borough of Manhattan has the least number of Neighborhoods in New York, thus about 40 neighborhoods as compared to the other boroughs Bronx, Brooklyn, Queens and Staten Island.
- We see that the Boroughs Bronx and Manhattan have the highest number of African restaurants in New York City each pegged at five African Restaurants.
- We found out that the neighborhood of Central Harlem in the Borough of Manhattan has the highest number of African Restaurants (Three in number)
- East Harlem (8.8) is the best neighborhood in terms of restaurant ratings for African restaurants, followed by Crown Heights (8.5).
- We also found out the highest borough for African restaurants in New York in Manhattan. Thus, Manhattan is the highest rated borough in New York as far as African restaurants are concerned.
- The highest rated Restaurant is Teranga restaurant in East Harlem

#### **Discussion Section:**

From the results of our general and exploratory analysis, I can categorically state that Manhattan is the best location or borough to find some wonderful African cuisine in New York City. Manhattan is the largest and most densely populated borough in the whole of New York City. Manhattan has the least number of neighborhoods in the whole of New York City. This may have accounted for its high rating in terms of the best place for African cuisine. Specifically, we can zero in on the neighborhood of East Harlem as the best neighborhood one can go for a lovely African cuisine. Teranga restaurant is the best restaurant one can go and enjoy a lovely African dish. According to the United States Census Bureau, the

borough of Bronx has an appreciable population of Africans/black or African Americans. A big market or high demand for a business such as a restaurant is critical to the survival and growth. Of course, a restaurant situated at a place or location where an appreciable number of people long for foodies of such a restaurant is plus. Bronx again has multiple neighborhoods with high ratings exceeding 7.5(scale 1.0 – 10.0). The Bronx is home to a growing population of African immigrants, many of whom have arrived within the last ten years, between 2007 and 2014, the number of West African immigrants in the borough increased by more than 60 percent, according to census data collected by Queens College. Again, Bronx is also known for a great place for outdoor activities in New York City. The borough of Bronx is the cheapest borough to live in and The Bronx is 41.4% less expensive than Manhattan. The Bronx housing costs are 65.0% less expensive than Manhattan housing costs. This place is attractive to African immigrants as result of its large community of people of African descent. I would finally recommend a place in the Bronx specifically neighborhoods of Fordham, University Heights or Belmont as all of these places have very high ratings in terms of African restaurants in the Bronx. Again, another good recommendation would be in East Harlem of Manhattan or Crown Heights of Brooklyn. As Brooklyn has a considerable African resident in New York City and cheaper prices of properties compared to Manhattan.

#### **Limitations and suggestions for future researches:**

The accuracy of the analysis is very predicated on the accuracy of the foursquare data. During the project we used sandbox tier (free)account of foursquare API that goes with limitations as the number of API calls and results returned. The use of a paid foursquare account may go a long way to help sort this limitation probably in Future research on this topic.

#### **Conclusion:**

In this project we have chronologically gone through coming up with a business problem and specifying the data required, extracting and preparing the data, leveraging on exploratory data analysis, giving investors/stakeholders recommendations. These finds will help the respective stakeholders have some tips as to the merits and demerits of opening an African cuisine in a particular location. Again, helping stakeholders find the best places they could enjoy some wonderful African Cuisine in Neighborhoods and boroughs of New York City.