**Introduction / Problem:**

An Australian entrepreneur has a fast-food restaurant chain called “Moo Burgers”. He would like to expand his business to America. He wants to setup his first store in New York as it is one of the most popular cities in America. To ensure he has the highest chance of success, he wants to find out which New York borough has the least amount of food venues per capita.

**Data acquisition and cleaning:**

In order to execute this plan, we need to know the number of food venues in each borough and the population of each borough. The number of food venues in each borough can be obtained using FourSquare location. Foursquare has a database with locations of different venues. Venues with a pharmacy category can be extracted through their API and then grouped by borough.

There will be a number of assumptions when requesting for the data. First is that the radius will be set to default as it will defaults to a city-wide area. Secondly, the longitude and latitude will be collected using geolocator.

The population in each borough can be obtained from the US Census Bureau. The latest data is from 1st July 2019. The US Census Bureau is the most ideal source as it is from the government.

**Data cleaning**

The Foursquare data received from the request will require cleaning. The data package will contain meta data as well as the necessary information. The latter is packaged in a response field. Within that, only the category field is required for exploratory data analysis as we only need to know how many food venues exist in each borough. The borough for each venue is listed under "city" in the "location" field of the response field.

Ideally, we would further refine the search to only count food venues that deliver low-cost meals and high speed of service. However, FourSquare currently do not have this capability. Therefore, we will include all food related categories. This will include "Asian restaurant", "Pizza place", "Bakery".

**Methodology**

This analysis aims to identify the borough with the least amount of food venues. This is achieved by first getting the venues in each of the borough through FourSquare API. This data is then cleaned and count as highlighted above.

When trying to determine which borough to open a fast food restaurant, it is important to explore the data after it is normalised. There are different ways to normalise. It can be done based on population or by land area. This is because the quantity of food venues in each borough can be influence by the number of people living there or by the land size of the borough. Less populated areas suggest that the demand is low and we do not want to introduce another restaurant to oversaturate the supply. Similarly, we do not want to have too many restaurants packed into a small area as they generate unnecessary competition and reduce profit margin.

The population data for each borough is collected and used to divide the amount of restaurant. Below is the bar graph showing this.

Chart, bar chart

Description automatically generated

The bar graph shows that Manhattan when normalise by population has the least amount of food venues per capita while Staten Island has the most. There is a 4 times difference between Manhattan and the next least amount food venues per capita.

Chart, bar chart

Description automatically generated

When the data is normalised by square kilometre of land, Manhattan remains as having the least amount of food venues compare to the other borough. However, Brooklyn has the most amount of food venues per square kilometre of land.

When combining both graphs, the high ratio in Staten Island when normalised by population is due to the lack of people in that area rather than being saturated with food venues. This is confirmed by the above graph as Staten Island is placed third in the amount of food venues per square kilometre of land and far below the ratio in Bronx and Brooklyn.

**Conclusion**

In this study, food venues in New York boroughs is explored and compared. We looked at the number of food venues based on per capita and land size. When looking at both graphs, it is clear that Manhattan is the perfect location to open the first Moo Burger in New York. It has the least amount of food venues per capita and per square kilometre of land.

**Future Direction**

I was able to identify the borough which offers the greatest chance of success. However, there is an assumption that all the food venues are recorded in the FourSquare database. Verification can be done by applying the same analysis using different databases such as Google.

Further refinement can also be done with the data. For example, we can only consider food venues which has a low cost. This data may be available in other databases and can be explored.