IBM Applied Data Science Capstone

What is the best town in the lower north island of New Zealand to open a burger joint in ?

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Introduction

- My friend has approached me asking what town is best to open a burger joint in the lower North Island of New Zealand.

- I have decided to help out my friend and look into this by reviewing each town by:
    - Visibility
    - Population
    - Fast Food Joints
    - Other businesses within the towns

Business Problem

- My friend is unsure where to open his burger joint and if he chooses the wrong town this could lead to low foot traffic or even bankruptcy, which would affect him substantially.

- Examining the towns of lower North Island of New Zealand and coming up with a conclusion to help where my friend should base his burger joint, is a huge motivation for me as I want my friend to succeed and this would help him and his business get closer to succeeding.

- This report will be useful for stakeholders interested in opening a burger joint in the lower North Island of New Zealand

Data being used

- The dataset going to be used in this project is the Greater_Wellington_Region_Basemap.csv provided from:
  - https://data-gwrc.opendata.arcgis.com/datasets/placenames-towns

- This Wikipedia site will be web scraped for population numbers:
  - https://en.wikipedia.org/wiki/Wellington_Region

- Then using the coordinates provided by the dataset – foursquares API will be searched to find all business locations and types within each town centres with a 6000 metre radius for each town

Data being used

- Here is a screenshot of the data frame:

|	Town	Population	Latitude	Longitude
0	Wellington	215,100	-41.2924	174.7787
1	Lower Hutt	110,700	-41.2100	174.9300
2	Porirua	59,600	-41.1400	174.8100
3	Upper Hutt	44,300	-41.1400	175.0500
4	Paraparaumu	30,100	-40.9100	174.9800
5	Masterton	21,400	-40.9600	175.6600
6	Waikanae	13,650	-40.8600	175.0500
7	Carterton	5,800	-41.0200	175.5300
8	Featherston	2,680	-41.1100	175.3200
9	Greytown	2,690	-41.0800	175.4600
10	Martinborough	1,930	-41.2100	175.4300

Methodology

Methodology

- The methods used in this report were firstly using the Data within the data frame to visualize the data to get a feel for the radius of each town. Using 6000 meters the foursquare api was searched to gather a maximum of 50 businesses within each town. Once gathered, the data was encoded using one hot encoding and minimized to the top 10 most common businesses within each town. From there, I used the Machine Learning algorithm – K clustering, to cluster the rows into three different groups. The data was then visualized and examined for conclusion.

Methodology

- There are 11 towns in total being tested

- Here are all the towns visualized on a map using the folium library:
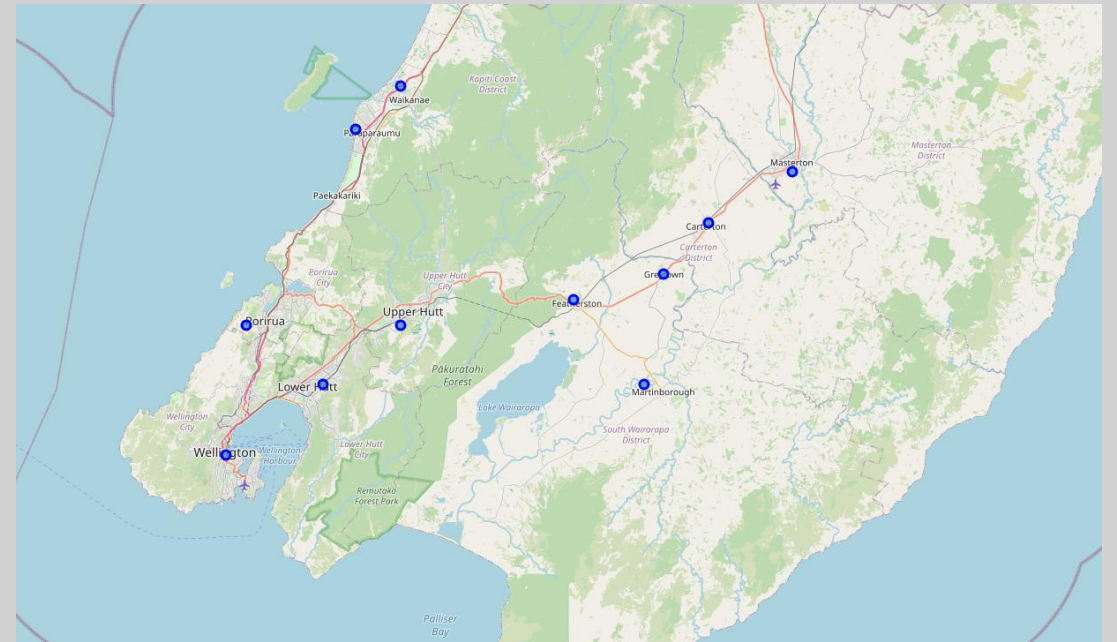
Methodology

- The Foursquare API was then used to search for the recorded businesses in each town, maxing out at 50.

- With a total of 89 unique business categories, here we have grouped together each town by distinct categories, here is that Dataframe:

Town	Town Latitude	Town Longitude	Business	Bu
Carterton	4	4	4	
Featherston	5	5	5	
Greytown	10	10	10	
Lower Hutt	50	50	50	
Martinborough	21	21	21	
Masterton	20	20	20	
Paraparaumu	17	17	17	
Porirua	31	31	31	
Upper Hutt	24	24	24	
Waikanae	15	15	15	
Wellington	50	50	50	

Methodology

Here is the business categories and town population visualized:

Towns Business Category Totals

Towns Population
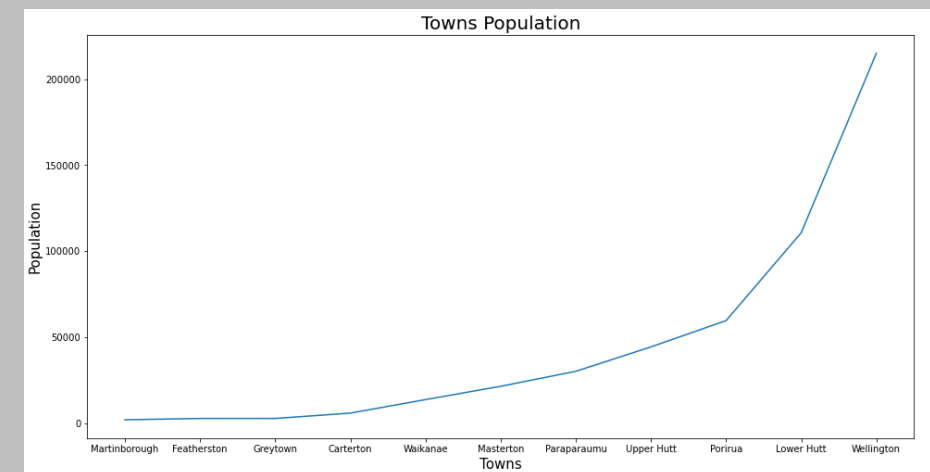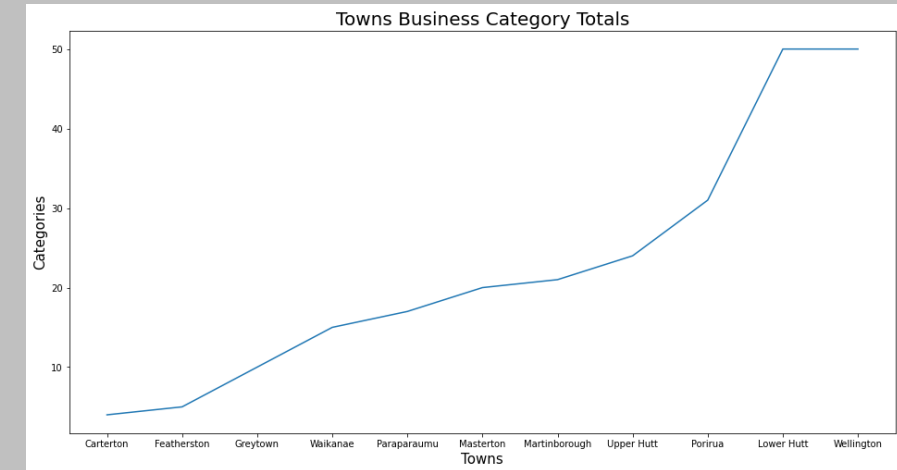
	Town	1st Most Common Business	2nd Most Common Business	3rd Most Common Business	4th Most Common Business	5th Most Common Business	6th Most Common Business	7th Most Common Business	8th Most Common Business	9th Most Common Business	10th Most Common Business
0	Carterton	Grocery Store	Train Station	Café	Bakery	Winery	Fish & Chips Shop	Department Store	Diner	Dive Bar	Electronics Store
1	Featherston	Cheese Shop	Grocery Store	Deli / Bodega	Train Station	Café	Fast Food Restaurant	Department Store	Diner	Dive Bar	Electronics Store
2	Greytown	Grocery Store	Hotel Bar	Candy Store	Café	Farmers Market	Restaurant	Bakery	Deli / Bodega	Arts & Crafts Store	Train Station
3	Lower Hutt	Café	Coffee Shop	Supermarket	Gym	Park	Nature Preserve	Burger Joint	Middle Eastern Restaurant	Italian Restaurant	Indie Movie Theater
4	Martinborough	Winery	Café	Hotel	Thai Restaurant	Restaurant	Diner	Supermarket	Wine Shop	Vineyard	Deli / Bodega
5	Masterton	Café	Supermarket	Fast Food Restaurant	Airport	Bakery	Modern European Restaurant	Department Store	Lake	Recreation Center	Farmers Market
6	Paraparaumu	Grocery Store	Restaurant	Burger Joint	Café	Beach	Supermarket	Pizza Place	Bar	Italian Restaurant	Brewery
7	Porirua	Café	Supermarket	Grocery Store	Train Station	Fast Food Restaurant	Department Store	Park	Burger Joint	Furniture / Home Store	Fish Market
8	Upper Hutt	Café	Fast Food Restaurant	Park	Burger Joint	Pizza Place	Supermarket	Coffee Shop	Pool	Department Store	Racetrack
9	Waikanae	Café	Grocery Store	Beach	BBQ Joint	Gourmet Shop	Cambodian Restaurant	Brewery	Bakery	Museum	Train Station
10	Wellington	Café	Bar	Coffee Shop	Restaurant	Pizza Place	Brewery	Asian Restaurant	Burger Joint	Park	Movie Theater

Methodology

- The business category data was transformed using one hot encoding, grouped by town and the mean was found of each category so no more repetitions of rows were present

- The towns categories were then ordered and reduced to display the top 10 most common businesses in each town as shown above

Results

Results

- Here we can see the results of all 11 Towns divided into 3 different clusters by most common businesses:
  - Cluster 1 in red
  - Cluster 2 in purple
  - Cluster 3 in light green
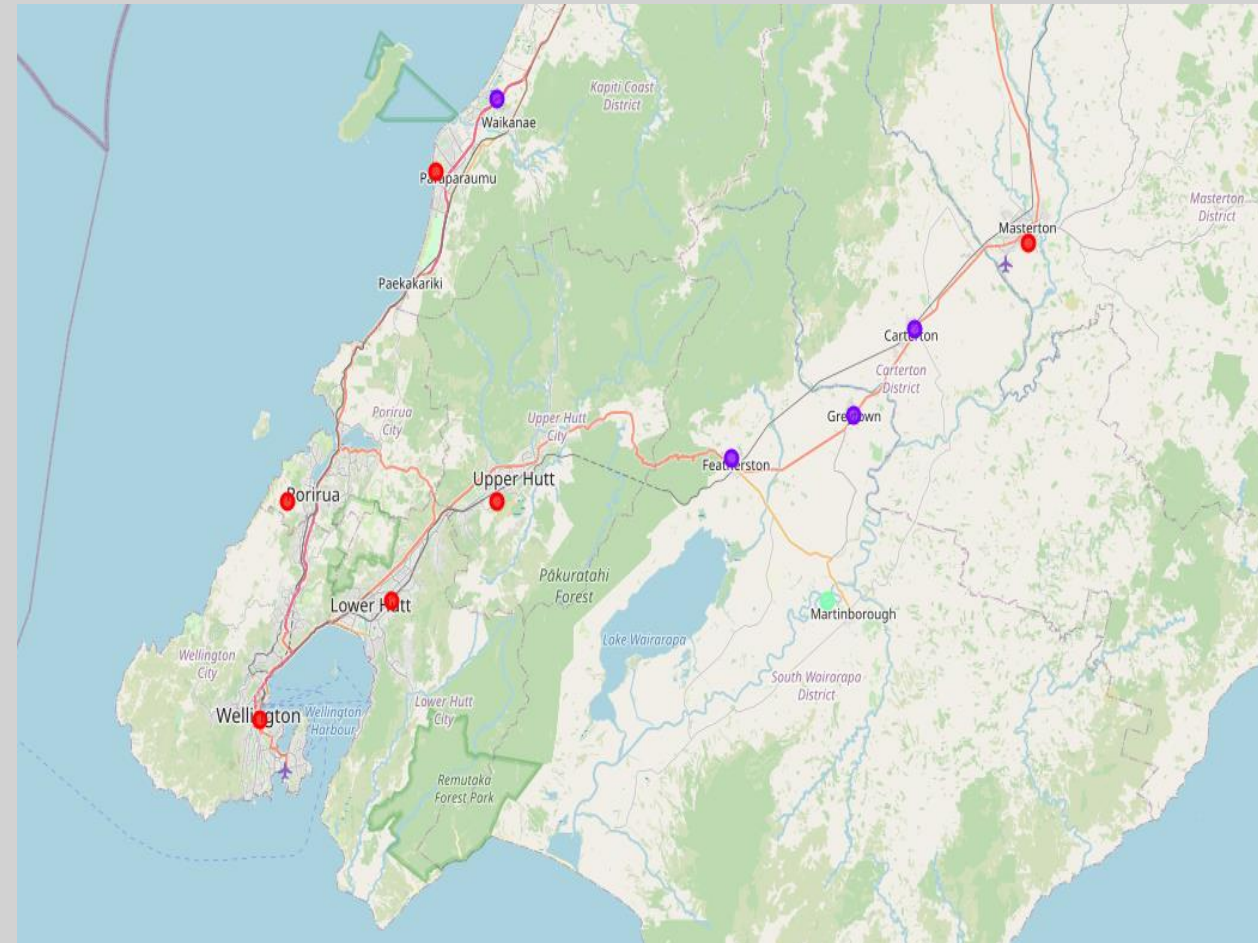
Results

- Here we can see the results for all 11 Towns divided into 3 different clusters by number of Burger Joints in each town:
  - Cluster 1 in red
  - Cluster 2 in purple
  - Cluster 3 in light green

```python
town_merged.loc[town_merged['Cluster Labels'] == 0, town_merged.columns[[0] + [1] + list(range(5, town_merged.shape[1]))]]
```

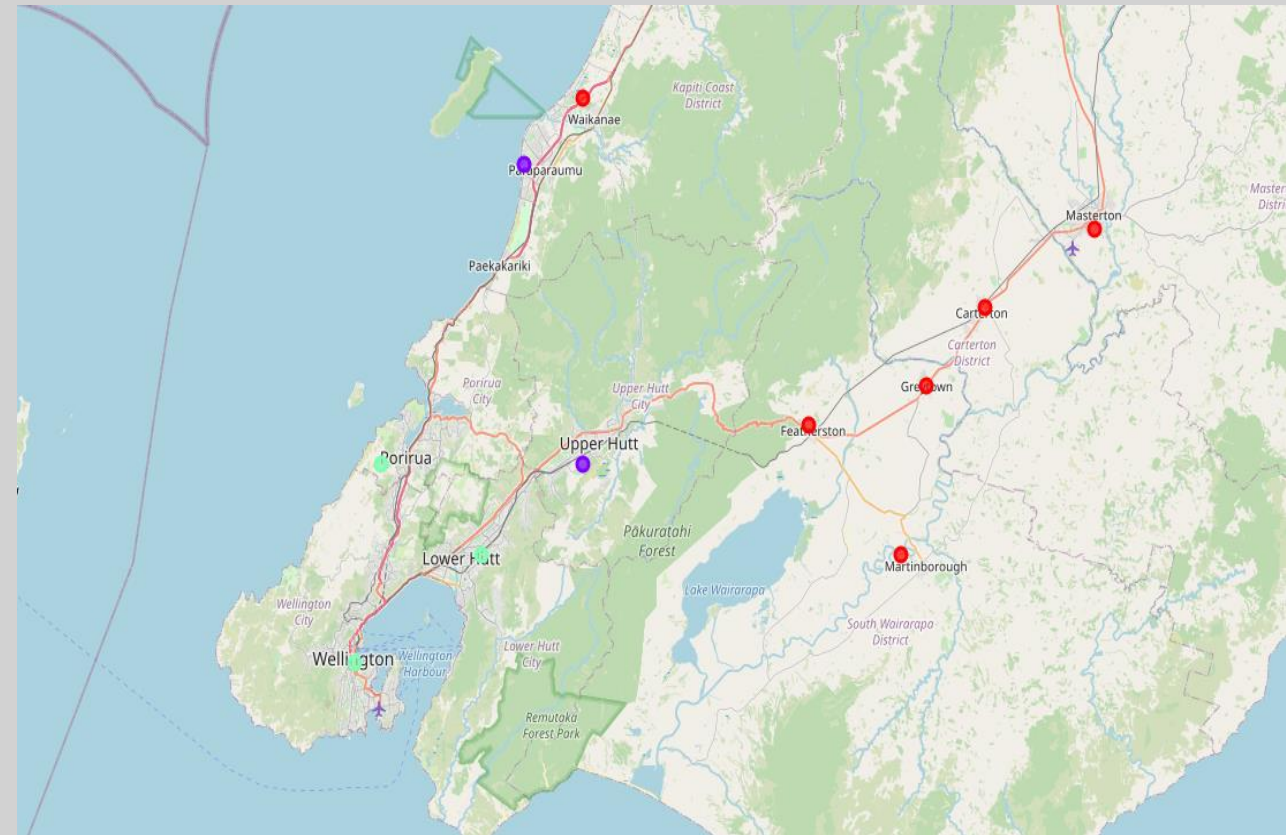|	Town	Population	1st Most Common Business	2nd Most Common Business	3rd Most Common Business	4th Most Common Business	5th Most Common Business	6th Most Common Business	7th Most Common Business	8th Most Common Business	9th Most Common Business	10th Most Common Business
0	Wellington	215,100	Café	Bar	Coffee Shop	Restaurant	Pizza Place	Brewery	Asian Restaurant	Burger Joint	Park	Movie Theater
1	Lower Hutt	110,700	Café	Coffee Shop	Supermarket	Gym	Park	Nature Preserve	Burger Joint	Middle Eastern Restaurant	Italian Restaurant	Indie Movie Theater
2	Porirua	59,600	Café	Supermarket	Grocery Store	Train Station	Fast Food Restaurant	Department Store	Park	Burger Joint	Furniture / Home Store	Fish Market
3	Upper Hutt	44,300	Café	Fast Food Restaurant	Park	Burger Joint	Pizza Place	Supermarket	Coffee Shop	Pool	Department Store	Racetrack
4	Paraparaumu	30,100	Grocery Store	Restaurant	Burger Joint	Café	Beach	Supermarket	Pizza Place	Bar	Italian Restaurant	Brewery
5	Masterton	21,400	Café	Supermarket	Fast Food Restaurant	Airport	Bakery	Modern European Restaurant	Department Store	Lake	Recreation Center	Farmers Market

	Town	Population	1st Most Common Business	2nd Most Common Business	3rd Most Common Business	4th Most Common Business	5th Most Common Business	6th Most Common Business	7th Most Common Business	8th Most Common Business	9th Most Common Business	10th Most Common Business
6	Waikanae	13,650	Café	Grocery Store	Beach	BBQ Joint	Gourmet Shop	Cambodian Restaurant	Brewery	Bakery	Museum	Train Station
7	Carterton	5,800	Grocery Store	Train Station	Café	Bakery	Winery	Fish & Chips Shop	Department Store	Diner	Dive Bar	Electronics Store
8	Featherston	2,680	Cheese Shop	Grocery Store	Deli / Bodega	Train Station	Café	Fast Food Restaurant	Department Store	Diner	Dive Bar	Electronics Store
9	Greytown	2,690	Grocery Store	Hotel Bar	Candy Store	Café	Farmers Market	Restaurant	Bakery	Deli / Bodega	Arts & Crafts Store	Train Station

	Town	Population	1st Most Common Business	2nd Most Common Business	3rd Most Common Business	4th Most Common Business	5th Most Common Business	6th Most Common Business	7th Most Common Business	8th Most Common Business	9th Most Common Business	10th Most Common Business
10	Martinborough	1,930	Winery	Café	Hotel	Thai Restaurant	Restaurant	Diner	Supermarket	Wine Shop	Vineyard	Deli / Bodega

Results

- The results show that three different clusters for most common in businesses in each town:
  - Cluster 1 we can see that the most common business are Cafes
  - Cluster 2 we can see that it is grocery stores
  - Cluster 3 we can see that Wineries are most common

```
town_merged_1.loc[town_merged_1['Cluster Labels'] == 0, town_merged_1.columns[[0] + [1] + list(range(5, town_merged_1.shape[1]))]]
```

	Town	Population	1st Most Common Business	2nd Most Common Business	3rd Most Common Business	4th Most Common Business	5th Most Common Business	6th Most Common Business	7th Most Common Business	8th Most Common Business	9th Most Common Business	10th Most Common Business
5	Masterton	21400	Café	Supermarket	Airport	Food & Drink Shop	Modern European Restaurant	Farmers Market	Bakery	Garden Center	Hotel	Furniture / Home Store
6	Waikanae	13650	Café	Grocery Store	Beach	Cambodian Restaurant	BBQ Joint	Museum	Brewery	Bakery	Gourmet Shop	Train Station
7	Carterton	5800	Bakery	Grocery Store	Café	Train Station	Jewelry Store	Farmers Market	Deli / Bodega	Department Store	Diner	Dive Bar
8	Featherston	2680	Grocery Store	Café	Deli / Bodega	Train Station	Cheese Shop	Farmers Market	Coffee Shop	Department Store	Diner	Dive Bar
9	Greytown	2690	Deli / Bodega	Candy Store	Grocery Store	Arts & Crafts Store	Train Station	Café	Hotel Bar	Bakery	Restaurant	Exhibit
10	Martinborough	1930	Winery	Hotel	Café	Vineyard	Wine Shop	Deli / Bodega	Supermarket	Diner	Resort	Farmers Market

	Town	Population	1st Most Common Business	2nd Most Common Business	3rd Most Common Business	4th Most Common Business	5th Most Common Business	6th Most Common Business	7th Most Common Business	8th Most Common Business	9th Most Common Business	10th Most Common Business
3	Upper Hutt	44300	Café	Fast Food Restaurant	Burger Joint	Supermarket	Park	Train Station	Motel	Golf Driving Range	Pizza Place	Pool
4	Paraparaumu	30100	Café	Grocery Store	Restaurant	Burger Joint	Beach	Museum	Supermarket	Diner	Italian Restaurant	Bar

	Town	Population	1st Most Common Business	2nd Most Common Business	3rd Most Common Business	4th Most Common Business	5th Most Common Business	6th Most Common Business	7th Most Common Business	8th Most Common Business	9th Most Common Business	10th Most Common Business
0	Wellington	215100	Café	Restaurant	Bar	Coffee Shop	Burger Joint	Asian Restaurant	Pizza Place	Brewery	Ice Cream Shop	Dive Bar
1	Lower Hutt	110700	Café	Coffee Shop	Supermarket	Gym / Fitness Center	Deli / Bodega	Bowling Alley	Burger Joint	Middle Eastern Restaurant	Italian Restaurant	Indie Movie Theater
2	Porirua	59600	Café	Supermarket	Park	Grocery Store	Train Station	Fast Food Restaurant	Department Store	Pizza Place	Furniture / Home Store	Gym

Results

- The results show that three different clusters for most common in food joints in each town:
  - Cluster 1 we can see there are no Burger-Joints in their top 10
  - Cluster 2 we can see that burger joints are quite common
  - Cluster 3 we can see that burger joints are in the lower end of the most common business

Discussion

- An observation a correlation between town population and total number of business categories

- Recommendations would be:
    - Masterton as burger joints aren't in their top ten so competition isn't too high however their population is in the middle tier so won't be as much foot traffic
    - Lower Hutt as this is the second most populated town in the dataset however there will be competition with Burger Joints being the 7th most common business

Conclusion

- Useful information for stakeholders
- Radius for each town has room for improvement
- Capture more individual traits of each town
- Ideas include:
  - How much businesses generate per annum
  - Customer income
  - How many tourists visit