The Battle of Neighborhoods

IBM Data Science Professional Certificate Course

Capstone Project

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January 2021

Introduction

Yangon is the capital city of Myanmar with over seven million population. It is located at the strategic place and central to all kind of major business such as banking, trading, hub for travel and tourism, entertainment, food and beverage, etc. Competition is very demanding for all business and data-driven decision making and planning is the only way for the benefits for the new business. This is the reason why the data scientists are getting more popular to generate valuable inputs for new business and providing consultation services for market analysis and business evaluation.

Problem Statement

One of my clients would like to invest his new business in food and beverage sectors and would like to open new restaurant in Yangon city. But he neither know how many of restaurants has been operating in Yangon nor where exactly and which type of food should be selected for his new restaurant. In this regard, I was asked to assist with available information for new business planning. According to this request, I got started make ideation to be more understanding on the business and explored the data requirement for appropriate report for this assignment.

Data Sources

First of all, I do need the list of restaurants, types of food, locations, and the distribution of different restaurants across the Yangon city. So, decided to use maps API supported by fourSquare.com and python libraries such as pandas, numpy for data frame and folium library for generation of map. Ski-learn was the additional library for clustering. Python geocoder library was also essential for getting geographical coordinates of neighborhoods.

Prior to the data wrangling, I downloaded townships and geocoordinates data from http://themimu.info/place-codes in which townships data, postal code, latitude and longitude data was provided. I removed all the data apart from Yangon data.

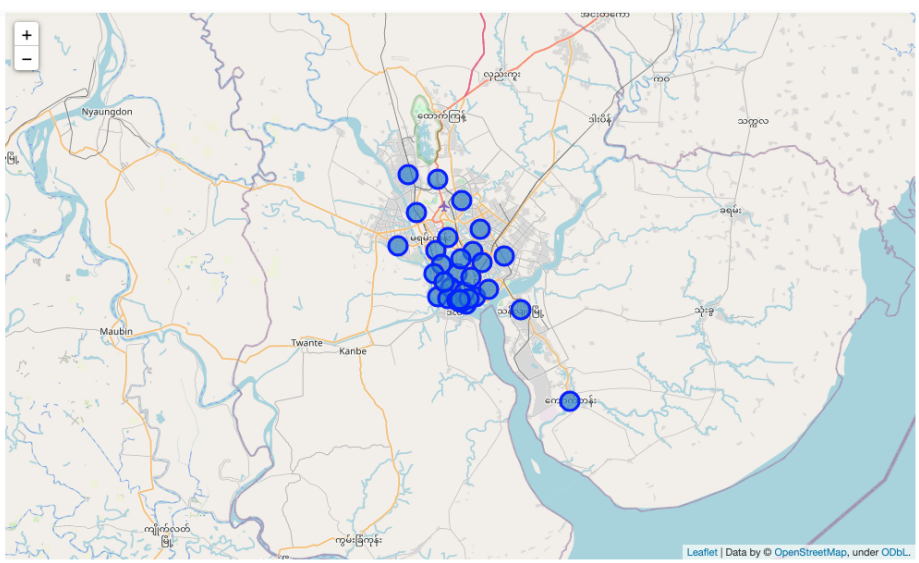
Feature Selection and Data Usage

In the beginning, I first downloaded location data from the http://themimu.info/place-codes and generated the data-frame. It was observed that total number of thirty (30) districts within Yangon Division with respective post codes and geocoordinates. The below figure shows the first five line of the list of districts.

```
/Users/zawtoemyint/OneDrive/Learning and Reading/IT_Data Science_IBM/9. Applied Data Science Capstone/postal_code_ygn.x
.read_excel(url)
()
```

	Region	Township	District	Postcode	latitude	longitude
0	Yangon Division	Ahlone	Ahlone	11121	16.782398	96.127863
1	Yangon Division	Bahan	Bahan	11201	16.815427	96.156112
2	Yangon Division	Botahtaung	Botahtaung	11162	16.771967	96.169709
3	Yangon Division	Dagon	Dagon	11191	16.794952	96.146900
4	Yangon Division	Dagon Myothit (North)	Dagon Myothit (North)	11421	16.877740	96.190790

Secondly, the map was generated by using python geocoder library and visualized the location on the map with folium library.



After linking up with FourSquare data with respective neighborhoods, total of 272 venues were observed within 30 districts. Among those, there were 85 unique categories identified after making group within respective districts.

```
In [191]: df.groupby('District').count()
```

Out[191]:

District	Neighborhood Latitude	Neighborhood Longitude	Venue	Venue Latitude	Venue Longitude	Venue Category
Ahlone	5	5	5	5	5	5
Bahan	25	25	25	25	25	25
Botahtaung	16	16	16	16	16	16
Dagon	15	15	15	15	15	15
Dagon Myothit (South)	1	1	1	1	1	1
Dawbon	1	1	1	1	1	1
Hlaing	4	4	4	4	4	4
Insein	1	1	1	1	1	1
Kamayut	10	10	10	10	10	10
Kyauktada	40	40	40	40	40	40
Kyimyindaing	2	2	2	2	2	2
Lanmadaw	33	33	33	33	33	33
Mayangone	17	17	17	17	17	17
Mingalar Taung Nyunt	4	4	4	4	4	4
Mingalardon	2	2	2	2	2	2
Okkalapa (North)	2	2	2	2	2	2
Okkalapa (South)	4	4	4	4	4	4
Pabedan	26	26	26	26	26	26
Pazundaung	5	5	5	5	5	5
Sanchaung	19	19	19	19	19	19
Tamwe	4	4	4	4	4	4
Tanyin	1	1	1	1	1	1
Tharkayta	1	1	1	1	1	1
Thingangyun	5	5	5	5	5	5
Yangon	22	22	22	22	22	22
Yankin	7	7	7	7	7	7

```
In [192]: print('There are {} uniques categories.'.format(len(df['Venue Category'].unique())))
There are 85 uniques categories.
```

Methodology

It is necessary to observed the most common type of business in Yangon and their distribution in different location, so, I used the sorted function to generate the result. The following figure show the top 5 common type of business in different districts within Yangon Division.

	Neighborhood	1st Most Common Venue	2nd Most Common Venue	3rd Most Common Venue	4th Most Common Venue	5th Most Common Venue
0	Ahlone	Café	Shopping Mall	Food Stand	Noodle House	Juice Bar
1	Bahan	Korean Restaurant	Japanese Restaurant	Whisky Bar	Bar	Gym
2	Botahtaung	Burmese Restaurant	Dim Sum Restaurant	Chinese Restaurant	Massage Studio	Pizza Place
3	Dagon	Asian Restaurant	Chinese Restaurant	Restaurant	Bubble Tea Shop	Fast Food Restaurant
4	Dagon Myothit (South)	Indian Restaurant	Dim Sum Restaurant	Chinese Restaurant	Clothing Store	Cocktail Bar
5	Dawbon	Bus Station	Dim Sum Restaurant	Chinese Restaurant	Clothing Store	Cocktail Bar
6	Hlaing	BBQ Joint	Park	Fast Food Restaurant	Warehouse Store	Dessert Shop
7	Insein	Department Store	Warehouse Store	Dim Sum Restaurant	Chinese Restaurant	Clothing Store
8	Kamayut	Shopping Mall	Snack Place	Korean Restaurant	Clothing Store	Noodle House
9	Kyauktada	Bar	Hotel	Burmese Restaurant	Restaurant	Bed & Breakfast
10	Kyimyindaing	Chinese Restaurant	Fish Market	Warehouse Store	Dim Sum Restaurant	Clothing Store
11	Lanmadaw	Restaurant	Hotel	Hostel	Multiplex	Supermarket
12	Mayangone	Shopping Mall	Intersection	Seafood Restaurant	Hotel	Dim Sum Restaurant
13	Mingalar Taung Nyunt	Hotel	Restaurant	Department Store	Boxing Gym	Warehouse Store
14	Mingalardon	Bus Stop	Lake	Dessert Shop	Chinese Restaurant	Clothing Store
15	Okkalapa (North)	Food Truck	Chinese Restaurant	Dim Sum Restaurant	Clothing Store	Cocktail Bar
16	Okkalapa (South)	Chinese Restaurant	Photography Studio	Japanese Restaurant	Breakfast Spot	Café
17	Pabedan	Hostel	Market	Hotel	Restaurant	Fast Food Restaurant
18	Pazundaung	Hotel	Asian Restaurant	Hostel	Warehouse Store	Dim Sum Restaurant
19	Sanchaung	Thai Restaurant	Department Store	Hotel	Warehouse Store	Seafood Restaurant
20	Tamwe	Chinese Restaurant	Tea Room	Asian Restaurant	Convenience Store	Warehouse Store

Due to the numerous categories for specific business types, I clustered into 15 by using K-mean clustering algorithm to identify the specific location and distribution.

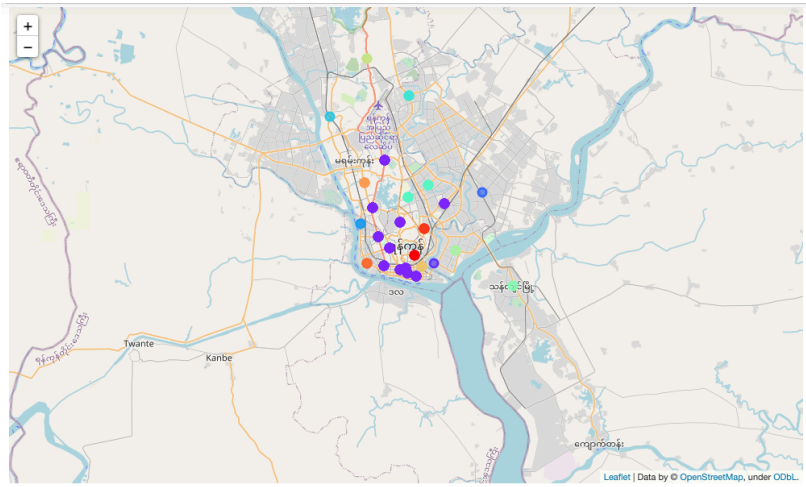
```
kclusters = 15

yangon_grouped_clustering = yangon_grouped.drop('Neighborhood', 1)

kmeans = KMeans(n_clusters=kclusters, random_state=0).fit(yangon_grouped_clustering)

kmeans.labels_[0:10]
```

```
array([13,  1,  1,  1,  3,  2, 12,  5,  1,  1], dtype=int32)
```



Results

Hotel business stands for the most common type in cluster "0", Minglar Taung Nyunt, followed by restaurant, departments stores, gym and warehouse stores respectively.

```
yangon_merged2.loc[yangon_merged2['Cluster Label'] == 0, yangon_merged2.columns[[0,1,2,4] + list(range(6, yangon_mergec
```

Steakhouse	Supermarket	Sushi Restaurant	Szechuan Restaurant	Tea Room	Thai Restaurant	Vietnamese Restaurant	Warehouse Store	Cluster Label	1st Most Common Venue	2nd Most Common Venue	3rd Most Common Venue	4th Most Common Venue	5th Most Common Venue
0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0	Hotel	Restaurant	Department Store	Boxing Gym	Warehouse Store
0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0	Hotel	Restaurant	Department Store	Boxing Gym	Warehouse Store
0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0	Hotel	Restaurant	Department Store	Boxing Gym	Warehouse Store
0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0	Hotel	Restaurant	Department Store	Boxing Gym	Warehouse Store

In cluster 1, Korean and Japanese restaurants are the top common venues however bars are also common business in Bahan.

```
: .loc[yangon_merged2['Cluster Label'] == 1, yangon_merged2.columns[[0,1,2,4] + list(range(6, yangon_merged2.shape[1]))]]
```

Steakhouse	Supermarket	Sushi Restaurant	Szechuan Restaurant	Tea Room	Thai Restaurant	Vietnamese Restaurant	Warehouse Store	Cluster Label	1st Most Common Venue	2nd Most Common Venue	3rd Most Common Venue	4th Most Common Venue	5th Most Common Venue
0.04	0.000000	0.000000	0.0	0.000	0.040000	0.000	0.000000	1	Korean Restaurant	Japanese Restaurant	Whisky Bar	Bar	Gym
0.04	0.000000	0.000000	0.0	0.000	0.040000	0.000	0.000000	1	Korean Restaurant	Japanese Restaurant	Whisky Bar	Bar	Gym
0.04	0.000000	0.000000	0.0	0.000	0.040000	0.000	0.000000	1	Korean Restaurant	Japanese Restaurant	Whisky Bar	Bar	Gym
0.04	0.000000	0.000000	0.0	0.000	0.040000	0.000	0.000000	1	Korean Restaurant	Japanese Restaurant	Whisky Bar	Bar	Gym
0.04	0.000000	0.000000	0.0	0.000	0.040000	0.000	0.000000	1	Korean Restaurant	Japanese Restaurant	Whisky Bar	Bar	Gym
0.04	0.000000	0.000000	0.0	0.000	0.040000	0.000	0.000000	1	Korean Restaurant	Japanese Restaurant	Whisky Bar	Bar	Gym
0.04	0.000000	0.000000	0.0	0.000	0.040000	0.000	0.000000	1	Korean	Japanese	Whisky	Bar	Gym

In cluster 2,3,4,5, and 6 varieties of restaurants paly the most common business. In this clusters, high competition will be existing if we are going to open restaurant.

```
In [207]: yangon_merged2.loc[yangon_merged2['Cluster Label'] == 2,
Out[207]:
```

	Neighborhood	Neighborhood Latitude	Neighborhood Longitude	Venue Latitude	Venue Category	Whis B
62	Dawbon	16.781917	96.18435	16.780077	Bus Station	(

```
In [208]: yangon_merged2.loc[yangon_merged2['Cluster Label'] == 3,
Out[208]:
```

	Neighborhood	Neighborhood Latitude	Neighborhood Longitude	Venue Latitude	Venue Category	Whi
61	Dagon Myothit (South)	16.84016	96.22582	16.841605	Indian Restaurant	

```
In [209]: yangon_merged2.loc[yangon_merged2['Cluster Label'] == 4,
Out[209]:
```

	Neighborhood	Neighborhood Latitude	Neighborhood Longitude	Venue Latitude	Venue Category	Wh
135	Kyimyindaing	16.814573	96.121879	16.812152	Fish Market	
136	Kyimyindaing	16.814573	96.121879	16.810530	Chinese Restaurant	

```
In [210]: yangon_merged2.loc[yangon_merged2['Cluster Label'] == 5,
Out[210]:
```

	Neighborhood	Neighborhood Latitude	Neighborhood Longitude	Venue Latitude	Venue Category	Wh
67	Insein	16.901771	96.095959	16.903452	Department Store	

```
In [211]: yangon_merged2.loc[yangon_merged2['Cluster Label'] == 6,
Out[211]:
```

	Neighborhood	Neighborhood Latitude	Neighborhood Longitude	Venue Latitude	Venue Category	Wh
176	Okkalapa (North)	16.918775	96.163028	16.918842	Food Truck	
177	Okkalapa (North)	16.918775	96.163028	16.922843	Chinese Restaurant	

```
== 2, yangon_merged2.columns[[0,1,2,4] + list(range(6, yangon_merge
```

hai ant	Vietnamese Restaurant	Warehouse Store	Cluster Label	1st Most Common Venue	2nd Most Common Venue	3rd Most Common Venue	4th Most Common Venue	5th Most Common Venue
0.0	0.0	0.0	2	Bus Station	Dim Sum Restaurant	Chinese Restaurant	Clothing Store	Cocktail Bar

```
== 3, yangon_merged2.columns[[0,1,2,4] + list(range(6, yangon_merge
```

ai nt	Vietnamese Restaurant	Warehouse Store	Cluster Label	1st Most Common Venue	2nd Most Common Venue	3rd Most Common Venue	4th Most Common Venue	5th Most Common Venue
.0	0.0	0.0	3	Indian Restaurant	Dim Sum Restaurant	Chinese Restaurant	Clothing Store	Cocktail Bar

```
== 4, yangon_merged2.columns[[0,1,2,4] + list(range(6, yangon_merge
```

ai nt	Vietnamese Restaurant	Warehouse Store	Cluster Label	1st Most Common Venue	2nd Most Common Venue	3rd Most Common Venue	4th Most Common Venue	5th Most Common Venue
0	0.0	0.0	4	Chinese Restaurant	Fish Market	Warehouse Store	Dim Sum Restaurant	Clothing Store
0	0.0	0.0	4	Chinese Restaurant	Fish Market	Warehouse Store	Dim Sum Restaurant	Clothing Store

```
== 5, yangon_merged2.columns[[0,1,2,4] + list(range(6, yangon_merge
```

Vietnamese Restaurant	Warehouse Store	Cluster Label	1st Most Common Venue	2nd Most Common Venue	3rd Most Common Venue	4th Most Common Venue	5th Most Common Venue
0.0	0.0	5	Department Store	Warehouse Store	Dim Sum Restaurant	Chinese Restaurant	Clothing Store

```
== 6, yangon_merged2.columns[[0,1,2,4] + list(range(6, yangon_merge
```

hai ant	Vietnamese Restaurant	Warehouse Store	Cluster Label	1st Most Common Venue	2nd Most Common Venue	3rd Most Common Venue	4th Most Common Venue	5th Most Common Venue
0.0	0.0	0.0	6	Food Truck	Chinese Restaurant	Dim Sum Restaurant	Clothing Store	Cocktail Bar
0.0	0.0	0.0	6	Food Truck	Chinese Restaurant	Dim Sum Restaurant	Clothing Store	Cocktail Bar

In cluster 7, althouth chinese restaurant and japanese restaurant are common in South Okalarpa, breakfast spot and seafood restaurant are the common business in Yankin when it comes to consideration for opening restaurant.

```
In [212]: yangon_merged2.loc[yangon_merged2['Cluster Label'] == 7, y
Out[212]:
```

	Neighborhood	Neighborhood Latitude	Neighborhood Longitude	Venue Latitude	Venue Category	W
178	Okkalapa (South)	16.846249	96.179859	16.846639	Breakfast Spot	
179	Okkalapa (South)	16.846249	96.179859	16.845130	Japanese Restaurant	
180	Okkalapa (South)	16.846249	96.179859	16.843579	Chinese Restaurant	
181	Okkalapa (South)	16.846249	96.179859	16.842762	Photography Studio	
265	Yankin	16.836010	96.162395	16.835114	Café	
266	Yankin	16.836010	96.162395	16.836767	Soup Place	
267	Yankin	16.836010	96.162395	16.833776	Asian Restaurant	
268	Yankin	16.836010	96.162395	16.836735	Breakfast Spot	
269	Yankin	16.836010	96.162395	16.833985	Breakfast Spot	
270	Yankin	16.836010	96.162395	16.833248	Diner	
271	Yankin	16.836010	96.162395	16.832559	Seafood Restaurant	

```
7, yangon_merged2.columns[[0,1,2,4] + list(range(6, yangon_merge
```

namese staurant	Warehouse Store	Cluster Label	1st Most Common Venue	2nd Most Common Venue	3rd Most Common Venue	4th Most Common Venue	5th Most Common Venue
0.0	0.0	7	Chinese Restaurant	Photography Studio	Japanese Restaurant	Breakfast Spot	Café
0.0	0.0	7	Chinese Restaurant	Photography Studio	Japanese Restaurant	Breakfast Spot	Café
0.0	0.0	7	Chinese Restaurant	Photography Studio	Japanese Restaurant	Breakfast Spot	Café
0.0	0.0	7	Chinese Restaurant	Photography Studio	Japanese Restaurant	Breakfast Spot	Café
0.0	0.0	7	Breakfast Spot	Diner	Seafood Restaurant	Asian Restaurant	Soup Place
0.0	0.0	7	Breakfast Spot	Diner	Seafood Restaurant	Asian Restaurant	Soup Place
0.0	0.0	7	Breakfast Spot	Diner	Seafood Restaurant	Asian Restaurant	Soup Place
0.0	0.0	7	Breakfast Spot	Diner	Seafood Restaurant	Asian Restaurant	Soup Place
0.0	0.0	7	Breakfast Spot	Diner	Seafood Restaurant	Asian Restaurant	Soup Place
0.0	0.0	7	Breakfast Spot	Diner	Seafood Restaurant	Asian Restaurant	Soup Place
0.0	0.0	7	Breakfast Spot	Diner	Seafood Restaurant	Asian Restaurant	Soup Place

Restaurants are not very common in cluster 8,9,10 and 11 but some people do.

```
In [213]: yangon_merged2.loc[yangon_merged2['Cluster Label'] == 8, yang
Out[213]:
```

	Neighborhood	Neighborhood Latitude	Neighborhood Longitude	Venue Latitude	Venue Category	Whisky Bar
236	Tanyin	16.76378	96.25184	16.763908	Restaurant	0.0

```
In [214]: yangon_merged2.loc[yangon_merged2['Cluster Label'] == 9, yang
Out[214]:
```

	Neighborhood	Neighborhood Latitude	Neighborhood Longitude	Venue Latitude	Venue Category	Whisky Bar
237	Tharkayta	16.793009	96.202959	16.793569	Café	0.0

```
In [215]: yangon_merged2.loc[yangon_merged2['Cluster Label'] == 10, yan
Out[215]:
```

	Neighborhood	Neighborhood Latitude	Neighborhood Longitude	Venue Latitude	Venue Category	Whisky Bar
174	Mingalardon	16.94914	96.12795	16.944849	Bus Stop	0.0
175	Mingalardon	16.94914	96.12795	16.944729	Lake	0.0

```
8, yangon_merged2.columns[[0,1,2,4] + list(range(6, yangon_merge
```

ietnamese Restaurant	Warehouse Store	Cluster Label	1st Most Common Venue	2nd Most Common Venue	3rd Most Common Venue	4th Most Common Venue	5th Most Common Venue
0.0	0.0	8	Restaurant	Warehouse Store	Dessert Shop	Chinese Restaurant	Clothing Store

```
9, yangon_merged2.columns[[0,1,2,4] + list(range(6, yangon_merge
```

Vietnamese Restaurant	Warehouse Store	Cluster Label	1st Most Common Venue	2nd Most Common Venue	3rd Most Common Venue	4th Most Common Venue	5th Most Common Venue
0.0	0.0	9	Café	Dim Sum Restaurant	Chinese Restaurant	Clothing Store	Cocktail Bar

```
10, yangon_merged2.columns[[0,1,2,4] + list(range(6, yangon_merge
```

Vietnamese Restaurant	Warehouse Store	Cluster Label	1st Most Common Venue	2nd Most Common Venue	3rd Most Common Venue	4th Most Common Venue	5th Most Common Venue
0.0	0.0	10	Bus Stop	Lake	Dessert Shop	Chinese Restaurant	Clothing Store
0.0	0.0	10	Bus Stop	Lake	Dessert Shop	Chinese Restaurant	Clothing Store

Pasundaung and Hlaing fell in the cluster 11 and 12 respectively. In these clusters, restaurants are not the top business there.

```
In [216]: yangon_merged2.loc[yangon_merged2['Cluster Label'] == 11,
```

```
11, yangon_merged2.columns[[0,1,2,4] + list(range(6, yangon_merge
```

Out[216]:

	Neighborhood	Neighborhood Latitude	Neighborhood Longitude	Venue Latitude	Venue Category	Whis E	Vietnamese Restaurant	Warehouse Store	Cluster Label	1st Most Common Venue	2nd Most Common Venue	3rd Most Common Venue	4th Most Common Venue	5th Most Common Venue
208	Pazundaung	16.779648	96.174392	16.775627	Hostel		0.0	0.0	11	Hotel	Asian Restaurant	Hostel	Warehouse Store	Dim Sum Restaurant
209	Pazundaung	16.779648	96.174392	16.781328	Asian Restaurant		0.0	0.0	11	Hotel	Asian Restaurant	Hostel	Warehouse Store	Dim Sum Restaurant
210	Pazundaung	16.779648	96.174392	16.777305	Hotel		0.0	0.0	11	Hotel	Asian Restaurant	Hostel	Warehouse Store	Dim Sum Restaurant
211	Pazundaung	16.779648	96.174392	16.776364	Hotel		0.0	0.0	11	Hotel	Asian Restaurant	Hostel	Warehouse Store	Dim Sum Restaurant
212	Pazundaung	16.779648	96.174392	16.775683	Hotel		0.0	0.0	11	Hotel	Asian Restaurant	Hostel	Warehouse Store	Dim Sum Restaurant

```
In [217]: yangon_merged2.loc[yangon_merged2['Cluster Label'] == 12,
```

```
12, yangon_merged2.columns[[0,1,2,4] + list(range(6, yangon_merge
```

Out[217]:

	Neighborhood	Neighborhood Latitude	Neighborhood Longitude	Venue Latitude	Venue Category	Whisk Ba	Vietnamese Restaurant	Warehouse Store	Cluster Label	1st Most Common Venue	2nd Most Common Venue	3rd Most Common Venue	4th Most Common Venue	5th Most Common Venue
63	Hlaing	16.847934	96.125227	16.847453	BBQ Joint	0.	0.0	0.0	12	BBQ Joint	Park	Fast Food Restaurant	Warehouse Store	Dessert Shop
64	Hlaing	16.847934	96.125227	16.846510	BBQ Joint	0.	0.0	0.0	12	BBQ Joint	Park	Fast Food Restaurant	Warehouse Store	Dessert Shop
65	Hlaing	16.847934	96.125227	16.849542	Fast Food Restaurant	0.	0.0	0.0	12	BBQ Joint	Park	Fast Food Restaurant	Warehouse Store	Dessert Shop
66	Hlaing	16.847934	96.125227	16.849415	Park	0.	0.0	0.0	12	BBQ Joint	Park	Fast Food Restaurant	Warehouse Store	Dessert Shop

Ahlone and Tamwe fell into the cluster 13 and 14 respectively, where cafe shop and Chinese restaurant are the top position out of 5 common business.

```
In [218]: yangon_merged2.loc[yangon_merged2['Cluster Label'] == 13,
```

```
13, yangon_merged2.columns[[0,1,2,4] + list(range(6, yangon_merge
```

Out[218]:

	Neighborhood	Neighborhood Latitude	Neighborhood Longitude	Venue Latitude	Venue Category	Whisky Bar	Vietnamese Restaurant	Warehouse Store	Cluster Label	1st Most Common Venue	2nd Most Common Venue	3rd Most Common Venue	4th Most Common Venue	5th Most Common Venue
0	Ahlone	16.782398	96.127863	16.781087	Shopping Mall	0.0	0.0	0.0	13	Café	Shopping Mall	Food Stand	Noodle House	Juice Bar
1	Ahlone	16.782398	96.127863	16.782257	Food Stand	0.0	0.0	0.0	13	Café	Shopping Mall	Food Stand	Noodle House	Juice Bar
2	Ahlone	16.782398	96.127863	16.786160	Café	0.0	0.0	0.0	13	Café	Shopping Mall	Food Stand	Noodle House	Juice Bar
3	Ahlone	16.782398	96.127863	16.786057	Juice Bar	0.0	0.0	0.0	13	Café	Shopping Mall	Food Stand	Noodle House	Juice Bar
4	Ahlone	16.782398	96.127863	16.784361	Noodle House	0.0	0.0	0.0	13	Café	Shopping Mall	Food Stand	Noodle House	Juice Bar

```
In [219]: yangon_merged2.loc[yangon_merged2['Cluster Label'] == 14,
```

```
14, yangon_merged2.columns[[0,1,2,4] + list(range(6, yangon_merge
```

Out[219]:

	Neighborhood	Neighborhood Latitude	Neighborhood Longitude	Venue Latitude	Venue Category	W	namese staurant	Warehouse Store	Cluster Label	1st Most Common Venue	2nd Most Common Venue	3rd Most Common Venue	4th Most Common Venue	5th Most Common Venue
232	Tamwe	16.810182	96.17646	16.809353	Chinese Restaurant		0.0	0.0	14	Chinese Restaurant	Tea Room	Asian Restaurant	Convenience Store	Warehouse Store
233	Tamwe	16.810182	96.17646	16.807496	Convenience Store		0.0	0.0	14	Chinese Restaurant	Tea Room	Asian Restaurant	Convenience Store	Warehouse Store
234	Tamwe	16.810182	96.17646	16.805975	Tea Room		0.0	0.0	14	Chinese Restaurant	Tea Room	Asian Restaurant	Convenience Store	Warehouse Store
235	Tamwe	16.810182	96.17646	16.806480	Asian Restaurant		0.0	0.0	14	Chinese Restaurant	Tea Room	Asian Restaurant	Convenience Store	Warehouse Store

Discussion

This analysis mainly focusses on seeking the appropriate location and type of restaurant for starting new restaurant business. Available data are used for better evidence-based decision for business planning. Location, top common business and distribution data alone could not generate concrete information for the real situation. Other factors should be included in this analysis to be more precises decision such as population density, customer's preferences, etc.

According to this analysis result, we can identify which type of restaurants are less competition and which place should be considered for new start up regardless consideration on other factors.

Conclusion

This analysis exercise is the main objective for getting certificate for data science course. However, we need to make more practices in the real world to be able to generate great result and need to use more variables for better precision. Be that as it may, this is the good assignment for this course and we had learned a lot from our team mates.