

Coursera Capstone

IBM Applied Data Science Capstone

Discovering the Most Popular Venues in Metro Cebu

By: Jade R. Laranjo

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I. Introduction

Problem Description and Discussion of the Background

Metro Cebu is the Philippines' second largest metropolitan area next to Metro Manila. It is located in the Cebu province and is the main urban center of the province and the Visayas region. It comprises 7 cities and 6 municipalities with a total land area of 1,063 square kilometer. As of 2015 census, the metro has a population of around 2.8 million people.

Metro Cebu is undoubtedly a well-know domestic and international destination in the region. In fact, it is a global hub for business processing services, tourism, shipping, furniture-making, and heavy industry.

The main goal of this project is to identify the most common venues in each of the cities and municipalities of Metro Cebu. This project will help recommend entrepreneurs and investors of the

potential businesses to start in the metro. This will serve as well as a guide to tourists in discovering the location of their favorite type of venues.

II. Data

The data used in the study includes the postal addresses located in the cities and municipalities comprising Metropolitan Cebu. The data was scraped from the Philippine Postal Corporation website (<http://philpost.gov.ph/post-office-location.php>). It was cleaned and then converted to CSV file before uploading to my GitHub repository for the analysis.

The corresponding geographic coordinates of each postal address were also determined using the *Geocoder* package in Python. Then, applying all the collected information, I utilized Foursquare API to explore and segment the postal addresses to get the most common venues in each address. Table 1 below shows the list of postal addresses with their coordinates.

Table 1. Metropolitan Cebu list of postal address and coordinates.

Postal Address	Municipality	Province	Latitude	Longitude
Poblacion, Carcar	Carcar	Cebu	10.108641	123.646669
D. Jakosalem St., Cebu City	Cebu City	Cebu	10.311481	123.899834
J. Urgello St., Cebu City	Cebu City	Cebu	10.30025	123.89372
Sanciangko St., Cebu City	Cebu City	Cebu	10.297502	123.896675
Osmeña Boulevard City	Cebu City	Cebu	10.296373	123.89816
Leon Kilat St. City	Cebu City	Cebu	10.297982	123.895811
A. Pigafetta Street City	Cebu City	Cebu	10.292608	123.905398
Magallanes Street City	Cebu City	Cebu	10.293582	123.897648
Camp Lapulapu Road City	Cebu City	Cebu	10.316685	123.890995
Poblacion, Compostela	Compostela	Cebu	10.454294	124.01283
Poblacion, Consolacion	Consolacion	Cebu	10.378031	123.950215
Poblacion, Cordova	Cordova	Cebu	10.253497	123.949757
Sabang, Danao	Danao	Cebu	10.495413	124.029537
Poblacion, Danao	Danao	Cebu	10.584171	124.017494
Pajo, Lapu-Lapu City	Lapu-Lapu City	Cebu	10.313216	123.976267
Liloan Municipal Hall, Liloan	Liloan	Cebu	10.399614	123.999513
M. Logarta Ave, Mandaue City	Mandaue City	Cebu	10.314392	123.923037
Subangdaku, Mandaue City	Mandaue City	Cebu	10.323101	123.924541
Poblacion, Minglanilla	Minglanilla	Cebu	10.244726	123.798738
Poblacion, Naga	Naga	Cebu	10.212782	123.758066
Poblacion, San Fernando	San Fernando	Cebu	10.162154	123.70715
City Hall of Talisay, Talisay	Talisay	Cebu	10.256674	123.86978

III. Methodology

For this project, I applied the *folium* library of Python and used the geographic coordinates to visualize the map of Metro Cebu and the postal addresses of each city/municipality (see Figure 1).

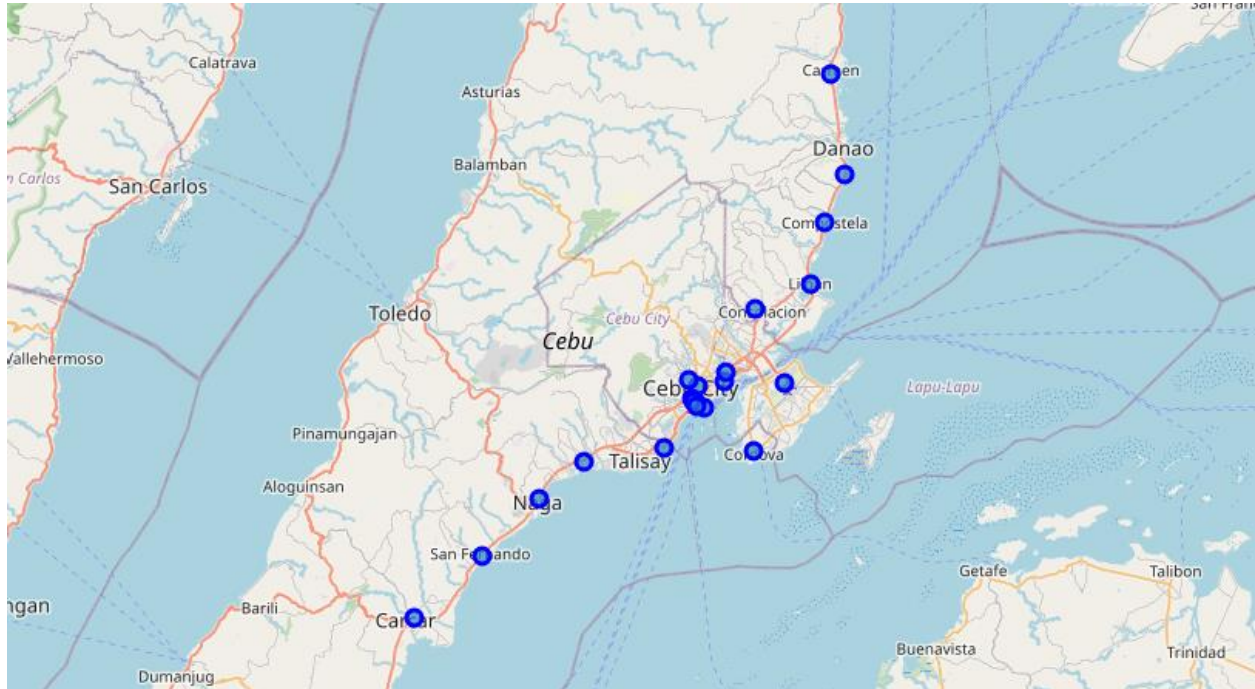


Figure 1. Map of postal addresses of Metro Cebu.

Then, I utilized Foursquare API to explore the top 50 venues within 1 kilometer of each postal address. A total of 637 venues were returned by Foursquare as showed in Table 2 below. Out of that number, 125 are unique venue categories.

Table 2. Number of venues returned by postal address.

Postal Address	Number of Venues
Poblacion, Carcar	50
D. Jakosalem St., Cebu City	50
J. Urgello St., Cebu City	8
Sanciangko St., Cebu City	50
Osmeña Boulevard City	50
Leon Kilat St. City	50
A. Pigafetta Street City	16
Magallanes Street City	50
Camp Lapulapu Road City	50

Poblacion, Compostela	50
Poblacion, Consolacion	39
Poblacion, Cordova	14
Sabang, Danao	6
Poblacion, Danao	7
Pajo, Lapu-Lapu City	10
Liloan Municipal Hall, Liloan	5
M. Logarta Ave, Mandaue City	11
Subangdaku, Mandaue City	9
Poblacion, Minglanilla	7
Poblacion, Naga	5
Poblacion, San Fernando	50
City Hall of Talisay, Talisay	50
Total	637

Next, I analyzed and selected the 10 most common venue categories of each postal address by taking the mean of the frequency of occurrence of each category. And then, I applied K-Means algorithm to cluster the postal addresses into 5 clusters. Figure 2 below shows the resulting clusters.

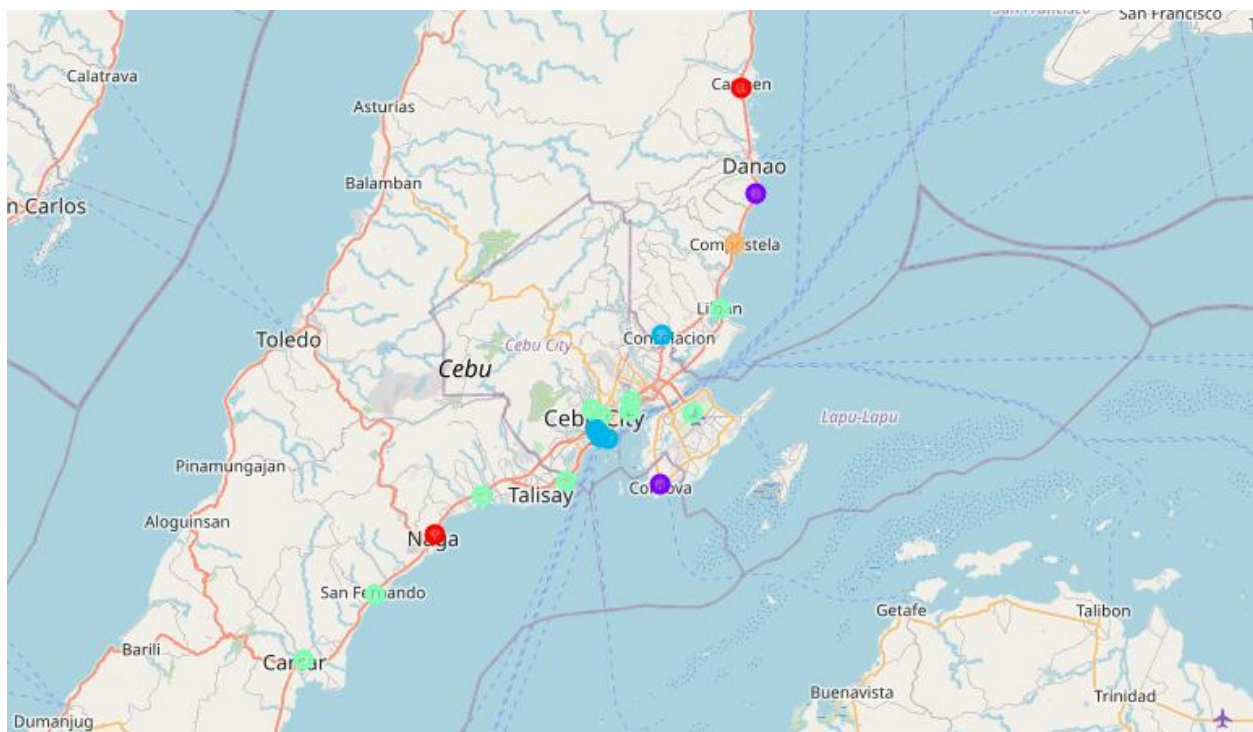


Figure 2. Map of Metro Cebu by cluster.

IV. Results

With the analysis and clustering results, I can now examine each cluster and identify the venue categories that distinguish each cluster. Table 3 presented the 5 clusters created and the 10 most popular venues in each address. For this project, I focused on the first most common venue to distinguish each cluster and city/municipality.

Based on the data, venues in addresses that belongs to cluster 0 are mostly convenience stores and plazas whereas in cluster 1 are generally event spaces and resorts. On the other hand, cluster 2 is a popular destination for restaurants. Cluster 3 is a mixture of cafés, bakeries, restaurant, and amusement venues. Finally, cluster 4 is a popular address for spas.

Table 3. Cluster groups and most common venues by postal address.

Postal Address	City/ Municipality	Cluster Labels	Most Common Venue									
			1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th
Poblacion, Danao	Danao	0	Convenience Store	Plaza	Flea Market	Supermarket	Trail	Nightclub	Nature Preserve	New American Restaurant	Night Market	Noodle House
Poblacion, Naga	Naga	0	Plaza	BBQ Joint	Pharmacy	Fast Food Restaurant	Supermarket	Basketball Stadium	Tennis Court	Convenience Store	Lighthouse	Lounge
Poblacion, Cordova	Cordova	1	Event Space	Resort	Convenience Store	Basketball Stadium	Clothing Store	Gas Station	Beach	Plaza	Market	Massage Studio
Sabang, Danao	Danao	1	Resort	Convenience Store	Filipino Restaurant	Massage Studio	Noodle House	Nature Preserve	New American Restaurant	Night Market	Nightclub	Airport
J. Urgello St., Cebu City	Cebu City	2	Pizza Place	Chinese Restaurant	Fast Food Restaurant	Coffee Shop	Café	Hotel	Diner	Shopping Mall	Clothing Store	Road
Sanciangko St., Cebu City	Cebu City	2	Chinese Restaurant	Fast Food Restaurant	Pizza Place	Dim Sum Restaurant	BBQ Joint	Fried Chicken Joint	Café	Historic Site	Museum	Motel
Osmeña Boulevard, Cebu City	Cebu City	2	Chinese Restaurant	Fast Food Restaurant	Pizza Place	Dim Sum Restaurant	BBQ Joint	Convenience Store	Fried Chicken Joint	Snack Place	Asian Restaurant	Historic Site
Leon Kilat St., Cebu City	Cebu City	2	Fast Food Restaurant	Pizza Place	Chinese Restaurant	Fried Chicken Joint	Dim Sum Restaurant	Café	Historic Site	Hotel	Motel	Church
A. Pigafetta Street, Cebu City	Cebu City	2	Fast Food Restaurant	Boat or Ferry	Convenience Store	Historic Site	Pier	Chinese Restaurant	Pizza Place	Park	Grocery Store	History Museum
Magallanes Street, Cebu City	Cebu City	2	Fast Food Restaurant	Chinese Restaurant	Convenience Store	Pizza Place	Dim Sum Restaurant	Asian Restaurant	Fried Chicken Joint	BBQ Joint	Snack Place	Historic Site
Poblacion, Consolacion	Consolacion	2	Chinese Restaurant	Basketball Court	Burger Joint	Pharmacy	Fast Food Restaurant	BBQ Joint	Snack Place	New American Restaurant	Night Market	Nightclub
Poblacion, Carcar	Carcar	3	History Museum	Supermarket	Pharmacy	Coffee Shop	Park	Farmers Market	Restaurant	Food & Drink Shop	Food Stand	Nature Preserve

D. Jakosalem St., Cebu City	Cebu City	3	Café	Coffee Shop	Hotel	Restaurant	Asian Restaurant	Shopping Mall	Department Store	Chinese Restaurant	Nightclub	Clothing Store
Camp Lapulapu Road, Cebu City	Cebu City	3	Café	Coffee Shop	Filipino Restaurant	Shopping Mall	Hotel	Restaurant	BBQ Joint	Bakery	Seafood Restaurant	Pizza Place
Pajo, Lapu-Lapu City	Lapu-Lapu City	3	Airport Lounge	Fast Food Restaurant	Coffee Shop	Café	Breakfast Spot	Pizza Place	Convenience Store	Airport	Airport Service	Airport Terminal
Liloan Municipal Hall, Liloan	Liloan	3	Bakery	Pharmacy	Flea Market	Beach	Hotel	Convenience Store	Harbor / Marina	Lake	Lighthouse	Shopping Mall
M. Logarta Ave, Mandaue City	Mandaue City	3	Bakery	Ice Cream Shop	Coffee Shop	Clothing Store	Shoe Store	Buffet	Snack Place	Diner	Café	Hotel
Subangdaku, Mandaue City	Mandaue City	3	Café	Asian Restaurant	Fast Food Restaurant	Hotel	Diner	Karaoke Bar	Spa	Football Stadium	Convenience Store	Ramen Restaurant
Poblacion, Minglanilla	Minglanilla	3	BBQ Joint	Dessert Shop	Plaza	Shopping Mall	Convenience Store	Noodle House	Athletics & Sports	Café	Fast Food Restaurant	Flea Market
Poblacion, San Fernando	San Fernando	3	Pool	Resort	Flea Market	Gas Station	Beach	Restaurant	Skate Park	Noodle House	Nightclub	Optical Shop
City Hall of Talisay, Talisay	Talisay	3	Seafood Restaurant	Convenience Store	Asian Restaurant	Pizza Place	Snack Place	BBQ Joint	Hotel	Trail	Women's Store	Pharmacy
Poblacion, Compostela	Compostela	4	Spa	Park	Flea Market	Resort	BBQ Joint	Pharmacy	Pastry Shop	Optical Shop	Motel	Noodle House

V. Discussion

Metro Cebu is a well-known global hub for business processing services, tourism, shipping, furniture-making, and heavy industry in the Visayas region. And the goal of this project is to help entrepreneurs, investors, and tourists in discovering the most common venues in each city/municipality that comprises Metro Cebu.

I utilized the postal addresses with corresponding geographic coordinates in each city/municipality of the metro and then I used Foursquare API to explore and segment the postal addresses to get the most common venues in each address. K-means algorithm was used in the clustering.

The data revealed that, Cebu City, Mandaue City, Lapu-Lapu City, Consolacion, Liloan, Minglanilla, and Talisay are popular venues for restaurants, cafés, and bakeries. Meanwhile, the municipalities of Carcar, Compostela, Cordova, Danao, Naga, and San Fernando are the destinations for relaxation, amusement, and sight-seeing.

VI. Conclusion

Through the outcome provided by this project, entrepreneurs or investors who would like to put-up business or invest in Metro Cebu can decide what type of business to start by looking at the most popular venues in the cities and municipalities. Aside from that, they will be able to identify which type of business are not present yet in those areas.

Moreover, tourists going to Metro Cebu can use the information as guide in discovering their favorite venues.