

# Capstone Project

# The Battle of the Neighborhoods

## Osaka vs Manhattan

### Purpose

- This document provides the details of my final peer reviewed assignment for the IBM Data Science Professional Certificate program –Coursera Capstone. In this project, it is aimed to compare the neighborhoods of Osaka and Manhattan and determine how similar or dissimilar they are.

# Table of contents

- Introduction: Business Problem
- Data Acquisition
- Methodology Analysis
- Results and Discussion
- Conclusion

# Introduction: Business Problem

**Osaka** is one of the most famous cities in Japan. My friend is moving from **Manhattan**, NY to **Osaka** for a career change.

The topic assumed here is to help her to find a place living in Osaka where the environment is similar to her previous home in Manhattan. In this project, I will cluster the venues of all neighborhoods in both cities and make a comparison to understand the similarity and dissimilarity of them. I will also collect and provide a data driven recommendation about where to eat or visit in Osaka.

# Data Acquisition

- Osaka neighborhoods names

Osaka districts names will be retrieved from Wikipedia: <https://en.wikipedia.org/wiki/Osaka>

- Osaka , Manhattan and their neighborhoods location

Data coordinates of Osaka and Manhattan's neighborhood will be retrieved using google API.

- Osaka top Venue recommendations

(Foursquare Category: <https://developer.foursquare.com/docs/resources/categories>)

Osaka and Mahattan's neighborhoods are explored using Foursquare API . The following information are retrieved.

Venue ID

Venue name

Coordinates: Latitude and Longitude

Category names

Venue ratings (Due to the Foursquare access limitation, only 2 types of ratings were retrieved in this project)

# Methodology Analysis

- The website information will be retrieved using BeautifulSoup tool.
- Using Pandas for proper cleaning to create a dataframe.
- The locations are marked upon the map to obtain the co-ordinates of the places via the Geocoding API from Google. Combine with FourSquare API which provides venues in different categories of Osaka and Manhattan. The weighted matrix can be applied on 10 top categories with venues information to generate a ranking result.
- K-means clustering algorithm will be used to analyze the similarity or dissimilarity between two cities.
- For exploring the Osaka, Foursquare API were queried to get to most highest score food restaurant and so on.

# Results and Discussion

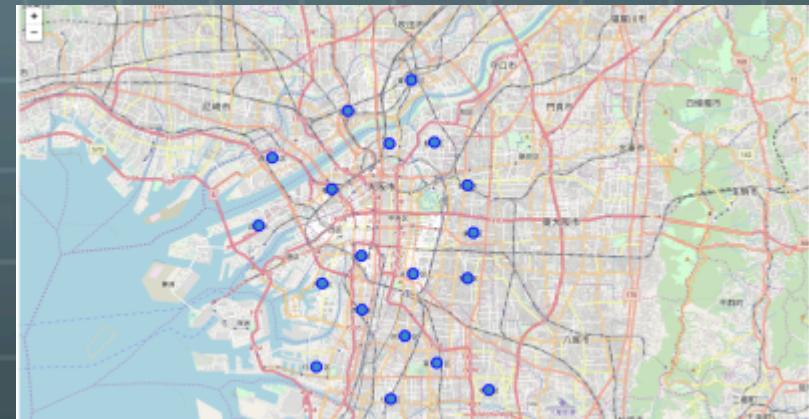
## The diversity of neighborhoods in Osaka

For this analyze, I located 24 neighborhoods in Osaka search in google map. The coordinators are shown in the table. Only top 5 rows are shown here.

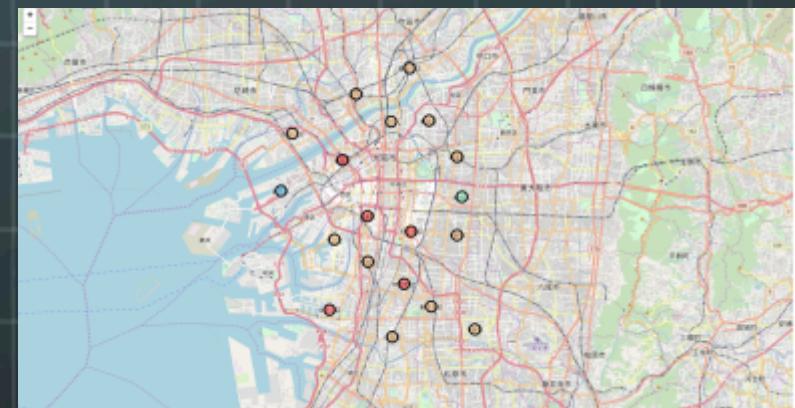
Then these neighborhoods are clustered using k-mean methods by analyzing venues counts and categories. The top 5 common venues in Red circles cluster will shown in the next slide.

On the other hand, the similarities (showing the same color) and dissimilarities (showing the different color) are also displayed here.

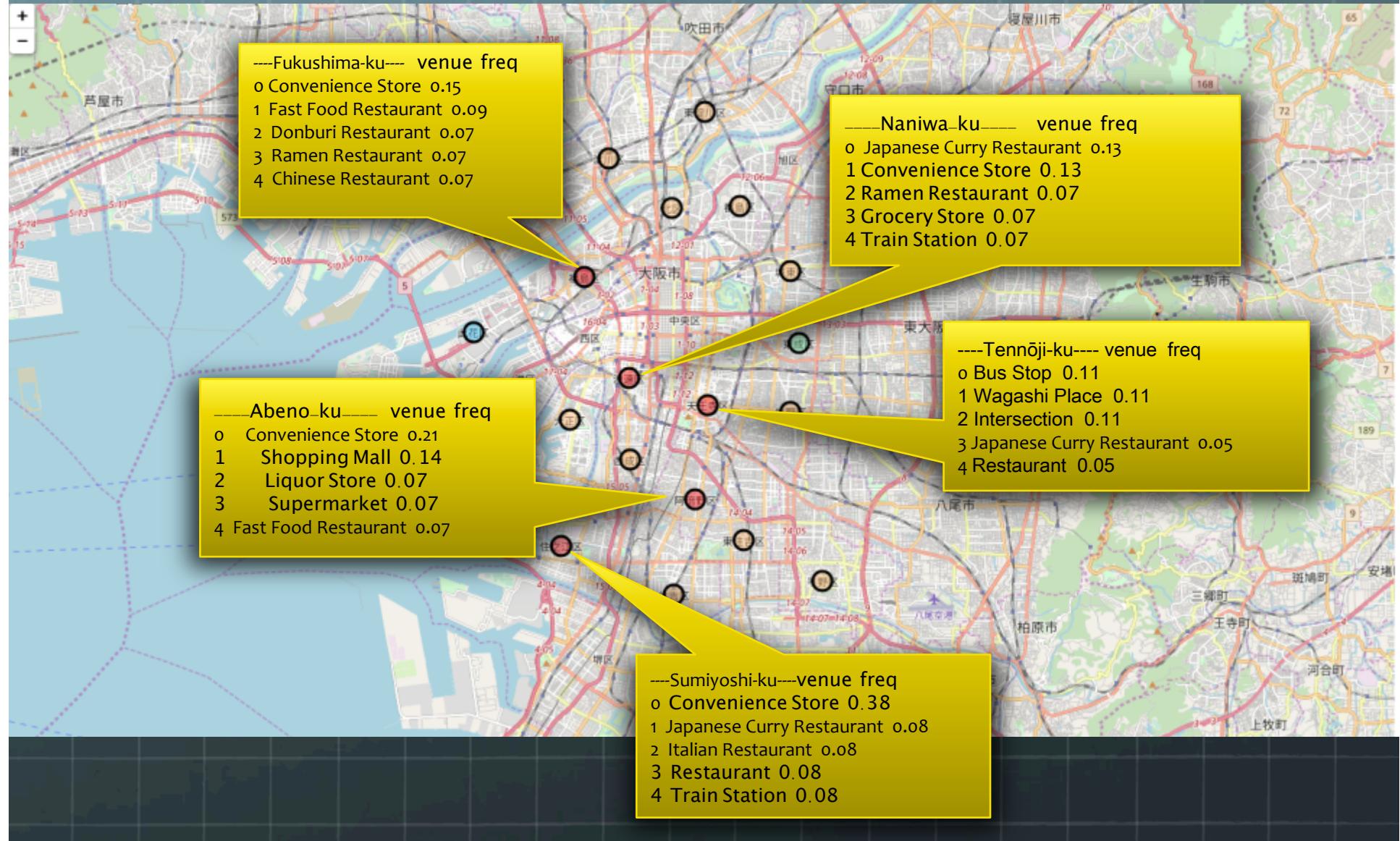
index	Neighborhood	Neighborhood (Kanji)	Latitude	Longitude
1	Abeno-ku	阿倍野区	34.627501	135.514095
2	Asahi-ku	旭区	35.476018	139.531920
3	Chūō-ku	中央区	35.666255	139.775565
4	Fukushima-ku	福島区	34.692104	135.474812
5	Higashinari-ku	東成区	34.672912	135.550567



After clustering



# The top 5 common venues of Red circles clustered neighborhoods in Osaka



# Results and Discussion

## The diversity of neighborhoods in Manhattan

For this analyze, I located 24 neighborhoods in Manhattan in google map. (fig 1)

By using k-mean method, similar neighborhoods are categorized in the same color. The clusters showed us Manhattan is a very diverse city. (fig2)

The top 5 common venues samples are also displayed here only for our reference. (tab1)

tab.1

Neighborhood	1st Most Common Venue	2nd Most Common Venue	3rd Most Common Venue	4th Most Common Venue	5th Most Common Venue
1 Chinatown	Chinese Restaurant	Cocktail Bar	Dim Sum Restaurant	American Restaurant	Vietnamese Restaurant
2 Upper East Side	Italian Restaurant	Exhibit	Coffee Shop	Juice Bar	Bakery
3 Yorkville	Italian Restaurant	Coffee Shop	Bar	Gym	Pizza Place
4 Lenox Hill	Italian Restaurant	Coffee Shop	Sushi Restaurant	Pizza Place	Gym / Fitness Center
12 Upper West Side	Italian Restaurant	Bar	Coffee Shop	Indian Restaurant	Wine Bar
5 Murray Hill	Coffee Shop	Japanese Restaurant	Hotel	French Restaurant	Sandwich Place
17 Chelsea	Coffee Shop	Italian Restaurant	Ice Cream Shop	Bakery	American Restaurant
19 East Village	Bar	Ice Cream Shop	Wine Bar	Mexican Restaurant	Pizza Place
20 Lower East Side	Cafe	Coffee Shop	Art Gallery	Banana Restaurant	Park
22 Little Italy	Bakery	Cafe	Chinese Restaurant	Seafood Restaurant	Sandwich Place
26 Manhattan Valley	Pizza Place	Coffee Shop	Indian Restaurant	Yoga Studio	Thai Restaurant
27 Gramercy	Italian Restaurant	Thrift / Vintage Store	Cocktail Bar	Bagel Shop	Pizza Place
30 Carnegie Hill	Pizza Place	Cafe	Coffee Shop	Bar	Cosmetics Shop
31 NoHo	Italian Restaurant	French Restaurant	Cocktail Bar	Bookstore	Pizza Place
34 Sutton Place	Gym / Fitness Center	Italian Restaurant	Furniture / Home Store	Indian Restaurant	American Restaurant

fig.1

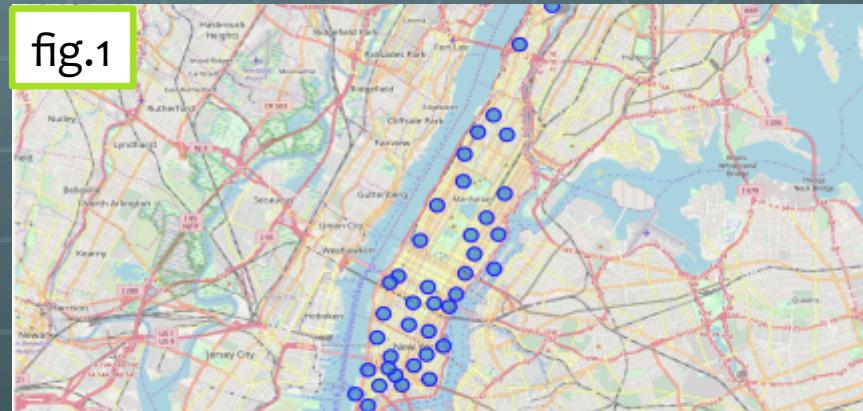
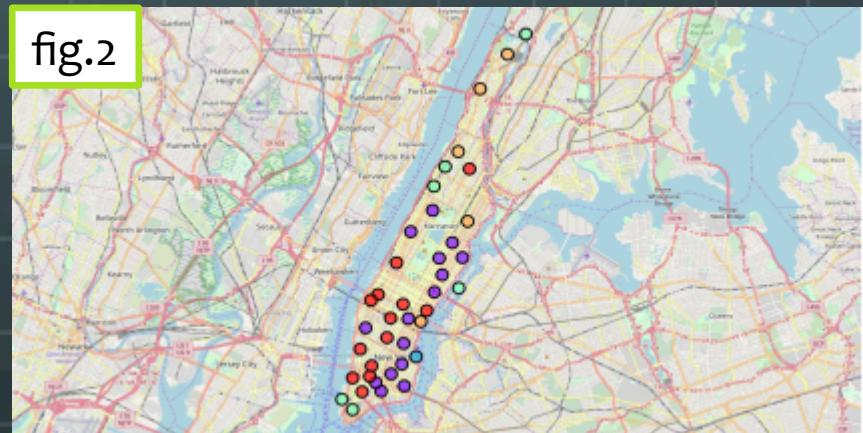


fig.2



# Results and Discussion

## Osaka vs Manhattan

After both Osaka and Manhattan places information were merged together, the cities were categorized again. I got a very interesting result.

Cluster classification both were changed for each city. Compared to Osaka neighborhoods, Manhattan neighborhoods showed much more similarity (clustered to one category- red circles)

In Osaka neighborhoods, Tennoji-ku and Sumiyoshi-ku showed the most similarity to Manhattan. Other three neighborhoods which were in the same cluster with Tennoji-ku and Sumiyoshi-ku in the previous slide were categorized differently at this time.



# Results and Discussion

## -Explore Osaka-

### Top 3 recommended restaurants in Osaka

	Town	Town Latitude	Town Longitude	VenueID	VenueName	score	category	catID	latitude	longitude
10	Abeno-ku	34.627501	135.514095	4c2748b95c5ca593b48047fe	CoCo Ichibanya (CoCo壱番屋 阿倍野昭和町店)	6.2	Japanese Curry Restaurants	55a59bace4b013909087cb30	34.631800	135.514095
25	Abeno-ku	34.627501	135.514095	4bcae59c68f976b0a1206083	なか卯 西田辺店	5.7	Donburi Restaurants	55a59bace4b013909087cb0c	34.621780	135.514095
28	Abeno-ku	34.627501	135.514095	4bf4d2db98ac0f47db7964a8	餃子の王将 西田辺店	6.3	Chinese Restaurants	4bf58dd8d48988d145941735	34.622100	135.514095

The best three restaurants are all located in Abeno-Ku.

(I researches several categories (such as food, ART, museum, cinema et al.) using Foursquare API in order to make a recommendation list. Due to the limitation of accesses to Foursquare API, I only showed the food restaurants results here. )

# Results and Discussion

## -Explore Osaka-

### Top 10 neighborhoods with restaurants numbers

	Town	Japanese Restaurant counts
158	Naniwa-ku	26
57	Higashisumiyoshi-ku	17
144	Miyakojima-ku	17
210	Sumiyoshi-ku	17
243	Yodogawa-ku	17
5	Abeno-ku	15
128	Minato-ku	15
183	Nishinari-ku	14
36	Fukushima-ku	13
71	Higashiyodogawa-ku	12

I listed the top 10 neighborhoods in Osaka with Japanese restaurants numbers.

I am very glad to see that one of my recommended city – Sumiyoshi-ku ranked in Number 4!!

# Conclusion



The stakeholder's problem is resolved. This project was aimed to help my friend to find the best place which neighborhood is similar to where she lived before. Compared to Manhattan, Osaka city showed much more diversities of its neighborhoods. Tennōji-ku and Sumiyoshi-ku in Osaka showed the most similarity with Manhattan.

The data showed that Abeno-ku owned the best 3 food restaurants in Osaka. Sumiyoshi-ku ranked in number 4 neighborhoods with Japanese restaurants numbers. As the ranking algorithms was developed, I can quickly ranked every category as I want to recommend to my friend.