

# **The Interaction between Tourist Attractions and Neighborhoods in Tainan**

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## **1. Introduction**

### **1.1 Motives and Background**

As a citizen living in Tainan, a small coastal city locating in southern Taiwan, I always wonder the functions of tourist attractions. I mean, it is obvious why Tainan is a great place for tourists. Since Tainan is the most ancient city in Taiwan, the ubiquitous temples and cultural heritages propel tourism growth and bring economical advantage to the local neighborhoods. However, what confounds me is how the tourism impact our city's morphology. As our government has forged our city into a tourism city, the economic system in the local area has altered in recent years. Therefore, I intend to discover what comprise of the neighborhoods near tourist attractions.

### **1.2 Problem**

This project identified the relationship between the tourist attractions and their respective neighborhoods by exploring the neighborhood morphology around tourist attractions. The results of this project will benefit those who are looking for business opportunities around tourist attractions.

## **2. Data**

### **2.1 Data Source**

The data of tourist attractions comes from Data.Tainan [1], a government-established platform that provides open datasets. The data of venues comes from Foursquare [2].

### **2.2 Data Cleaning**

In this dataset, a data point with missing value in latitude and longitude was dropped.

## 2.3 Feature selection

The dataset comprises of the name of the acknowledged tourist attraction, telephone number, address, longitude, latitude, etc. The dataset will be cleaned and left only the information that is related to my analysis. In other words, only the location and the name will be left. The cleaned dataset is shown in Fig1.

	name	district	lat	long
0	Koxinga Museum(鄭成功文物館)	West Central Dist.	22.98737	120.20821
1	KSK Church(看西街教會)	West Central Dist.	22.99610	120.19853
2	Puji Temple(普濟殿)	West Central Dist.	22.99897	120.19919
3	Shuixian Temple(水仙宮)	West Central Dist.	22.99679	120.19821
4	Tainan Dehua Hall (臺南德化堂)	West Central Dist.	22.98911	120.20602

Figure 1. The head of the cleaned dataset of tourist attractions. “lat” stands for latitude whereas “long” stands for longitude.

## 3. Methodology

### 3.1 Exploratory Data Analysis

Next, to identify the geospatial relationship between our tourist sites, the tourist sites were pinpointed on the Tainan map with the help from folium library as shown in Fig2.

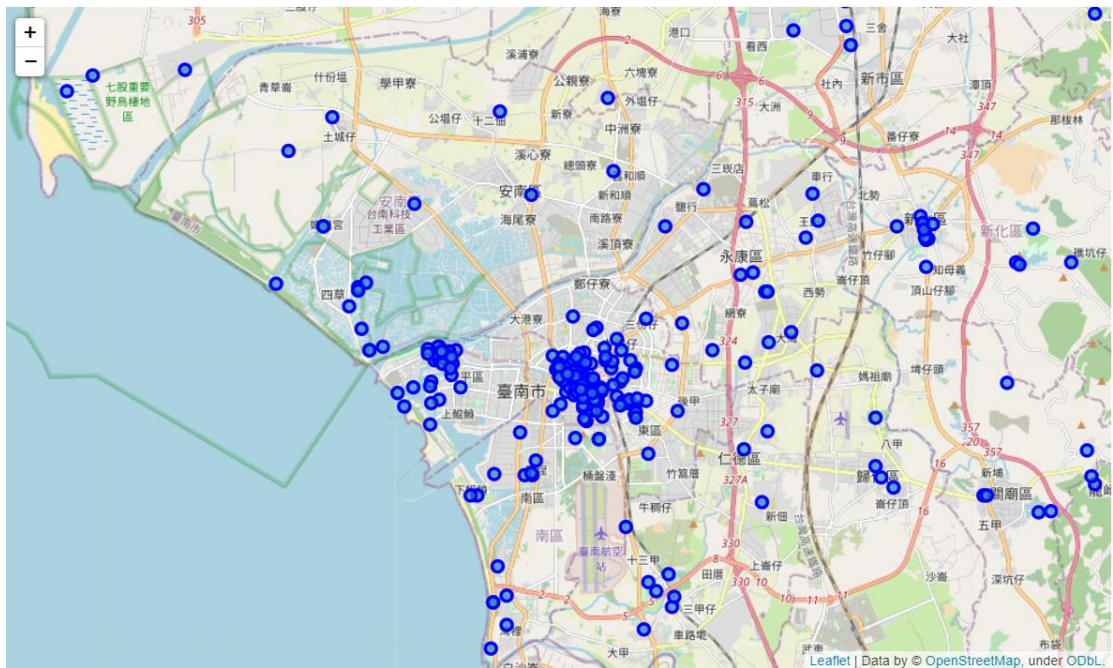


Figure 2. The dataset accompanied by features - the top 10 most common venues around a tourist attraction.

### 3.2 Venues Recommendation

Through the Foursquare API, the top 10 most common venues within 500-meter radius centered at a given tourist attraction were recommended and updated to the dataset. The selected features are presented in Fig3.

	Neighborhood	1st Most Common Venue	2nd Most Common Venue	3rd Most Common Venue	4th Most Common Venue	5th Most Common Venue	6th Most Common Venue	7th Most Common Venue	8th Most Common Venue	9th Most Common Venue	10th Most Common Venue
0	1934 Historic Restaurant at Xinhua District Co...	Café	Bus Station	Food Truck	Road	Fishing Spot	Food Stand	Food Court	Food & Drink Shop	Food	Flower Shop
1	Alexander Butterfly Ecology Farm(亞力山大蝴蝶生態教育農場)	Asian Restaurant	Zoo	Fish Market	Food Truck	Food Stand	Food Court	Food & Drink Shop	Food	Flower Shop	Flea Market
2	Ancient Mansion of the Su Family(蘇家古厝)	Café	Bus Station	History Museum	Historic Site	Road	Zoo	Fishing Spot	Food Stand	Food Court	Food & Drink Shop
3	Anping Canal Tours(台南運河遊船)	Chinese Restaurant	Seafood Restaurant	Dessert Shop	Juice Bar	Food & Drink Shop	Food Truck	Convenience Store	Historic Site	Soup Place	Fast Food Restaurant
4	Anping Catholic Museum(安平天主教文物館)	Historic Site	Dessert Shop	History Museum	Chinese Restaurant	Boat or Ferry	Ice Cream Shop	Convenience Store	Food & Drink Shop	Seafood Restaurant	Museum

Figure 3. The dataset accompanied by features - the top 10 most common venues around a tourist attraction.

### 3.3 Data Pre-processing

Under the Venue Category that was updated by the Foursquare API, this project employed one-hot encoding technique on the unique items. Subsequently, the dataset was sorted to obtain the top 10 common venues for each Neighborhood (see also Fig3.).

### 3.4 Clustering

This project chose K-mean Clustering Algorithms to identify the neighborhood morphology. Moreover, the Elbow Method was adopted to obtain the optimal k hyperparameter in the range from 1 to 9.

## 4. Results and Discussion

### 4.1 Elbow Method

The results obtained through Elbow Method indicated that the optimal k value was 5 as shown in Fig4. Hence, for the following analysis, the k value was set to 5.

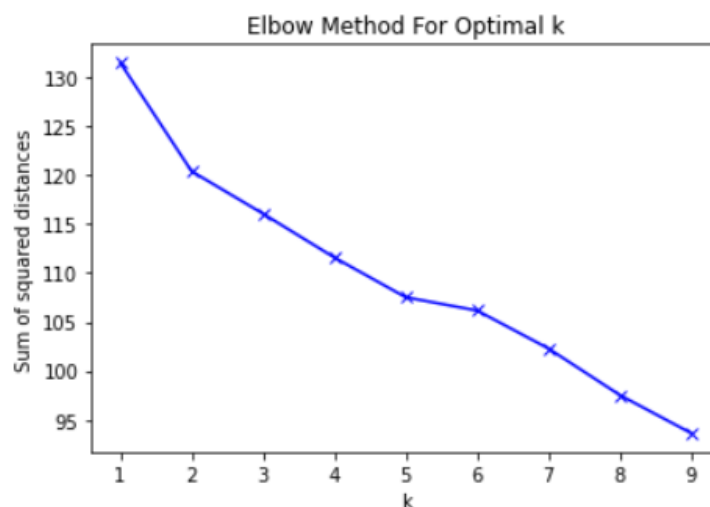
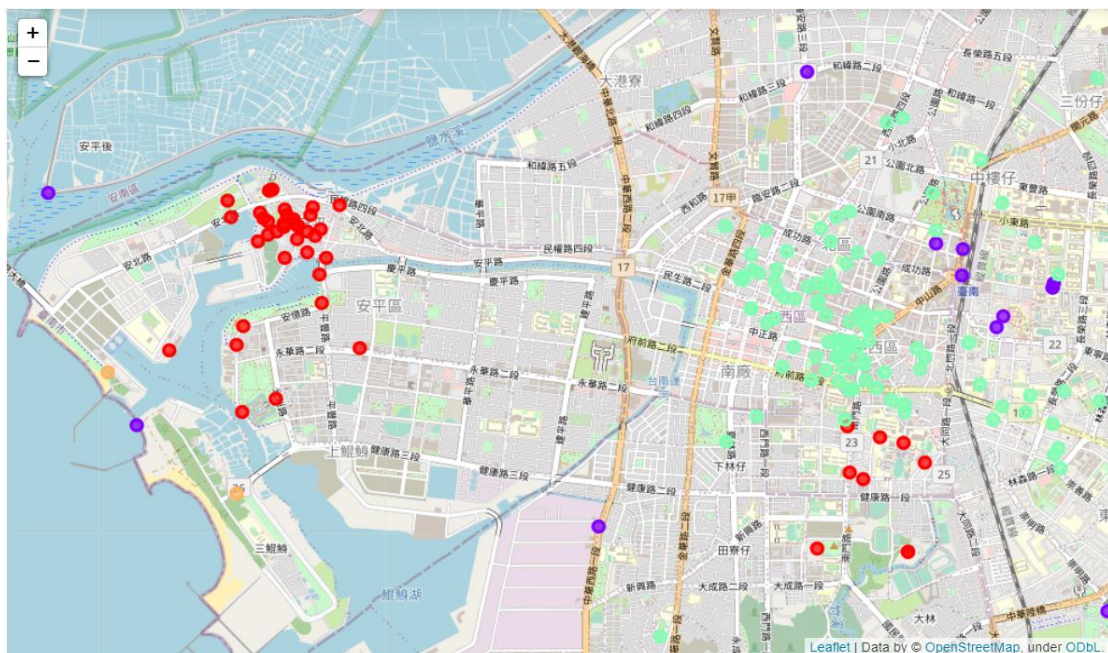
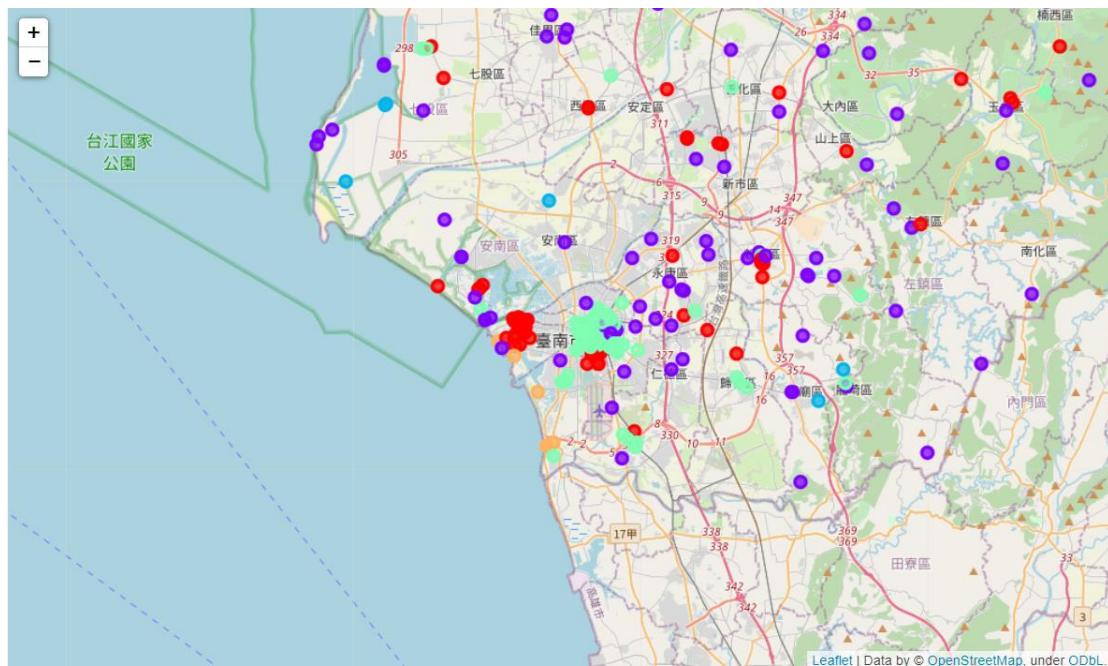


Figure 4. The diagram obtained through Elbow Method.

### 4.2 Clustering

The clustering results were printed on the Tainan map using folium library. From Fig6. (a closer look of Fig5.), it is clear that in Tainan City, there are two major clusters: the green one and the red one. The green cluster concentrated in the center of the Modern Tainan City, whereas the red cluster concentrated in the center of the Ancient Tainan City. Their individual types of top 10 most common venues are provided in Fig7. and

Fig8. The most common venue of the green cluster is "Taiwanese Restaurant", which matches my local experience in Tainan. We do have lots of restaurants. Similarly, the most common venue of the green cluster is "Dessert Shop". It seems that the tourist attractions in Tainan is strongly correlated to food. Indeed, the most famous characteristic of Tainan is our gourmet street food and, many young people opened dessert shops in recent years. Additionally, analysis indicated that dessert shops opened mostly around the tourist attractions in the ancient center of the Tainan City. What factor cause this difference in the business development in these two centers is left for future research as it is beyond the scope of this project.





	district	1st Most Common Venue	2nd Most Common Venue	3rd Most Common Venue	4th Most Common Venue	5th Most Common Venue	6th Most Common Venue	7th Most Common Venue	8th Most Common Venue	9th Most Common Venue	10th Most Common Venue
0	West Central Dist.	Taiwanese Restaurant	Dessert Shop	Café	Noodle House	Temple	Dumpling Restaurant	Chinese Restaurant	Flea Market	Seafood Restaurant	Snack Place
1	West Central Dist.	Taiwanese Restaurant	Dessert Shop	Noodle House	Historic Site	Seafood Restaurant	Café	Chinese Restaurant	Ice Cream Shop	Juice Bar	Bubble Tea Shop
2	West Central Dist.	Taiwanese Restaurant	Historic Site	Café	Noodle House	Fast Food Restaurant	Chinese Restaurant	Sushi Restaurant	Bar	Cocktail Bar	Restaurant
3	West Central Dist.	Taiwanese Restaurant	Dessert Shop	Historic Site	Noodle House	Seafood Restaurant	Café	Chinese Restaurant	Ice Cream Shop	Juice Bar	Fast Food Restaurant
4	West Central Dist.	Taiwanese Restaurant	Café	Chinese Restaurant	Ice Cream Shop	Dessert Shop	Noodle House	Accessories Store	Historic Site	Seafood Restaurant	Department Store
...	...	...	...	...	...	...	...	...	...	...	...
463	East Dist.	Noodle House	Bagel Shop	Café	Music Venue	Taiwanese Restaurant	Bubble Tea Shop	Farm	Farmers Market	Food Stand	Food Court
465	East Dist.	Café	Coffee Shop	Chinese Restaurant	Taiwanese Restaurant	Noodle House	Japanese Restaurant	Bagel Shop	Bar	Food Court	Food & Drink Shop
471	West Central Dist.	Taiwanese Restaurant	Noodle House	Dessert Shop	Historic Site	Seafood Restaurant	Café	Chinese Restaurant	Ice Cream Shop	Juice Bar	Bubble Tea Shop
475	West Central Dist.	Taiwanese Restaurant	Café	Chinese Restaurant	Tea Room	Ice Cream Shop	Art Museum	Coffee Shop	Dessert Shop	Noodle House	Accessories Store
476	Qigu Dist.	Scenic Lookout	Museum	Recreation Center	Café	Seafood Restaurant	Zoo	Food	Flower Shop	Flea Market	Fishing Spot

Figure 7. The top 10 most common venues of the green cluster.

	district	1st Most Common Venue	2nd Most Common Venue	3rd Most Common Venue	4th Most Common Venue	5th Most Common Venue	6th Most Common Venue	7th Most Common Venue	8th Most Common Venue	9th Most Common Venue	10th Most Common Venue
10	West Central Dist.	Dessert Shop	Café	Convenience Store	Taiwanese Restaurant	Pizza Place	Grocery Store	Seafood Restaurant	Sculpture Garden	Chinese Restaurant	Temple
17	West Central Dist.	Dessert Shop	Café	Fried Chicken Joint	Bubble Tea Shop	Donut Shop	Flower Shop	Food Truck	Diner	Food Stand	Food Court
26	West Central Dist.	Dessert Shop	Taiwanese Restaurant	Temple	Convenience Store	Noodle House	Chinese Restaurant	Sculpture Garden	Seafood Restaurant	Fried Chicken Joint	Grocery Store
31	West Central Dist.	Dessert Shop	Café	Ice Cream Shop	BBQ Joint	Steakhouse	Taiwanese Restaurant	Noodle House	Temple	Resort	Middle Eastern Restaurant
37	West Central Dist.	Dessert Shop	Convenience Store	Pizza Place	Athletics & Sports	Sculpture Garden	Burger Joint	Grocery Store	Noodle House	Taiwanese Restaurant	Field
...	...	...	...	...	...	...	...	...	...	...	...
432	Anping Dist.	Historic Site	Dessert Shop	History Museum	Seafood Restaurant	Tapas Restaurant	Convenience Store	Chinese Restaurant	Café	Museum	Food & Drink Shop
434	Zuozhen Dist.	History Museum	BBQ Joint	Zoo	Field	Food Stand	Food Court	Food & Drink Shop	Food	Flower Shop	Flea Market
457	Guiren Dist.	Convenience Store	Shoe Store	Chinese Restaurant	Zoo	Fish & Chips Shop	Food Court	Food & Drink Shop	Food	Flower Shop	Flea Market
464	Anping Dist.	Historic Site	Dessert Shop	Seafood Restaurant	Food & Drink Shop	Tapas Restaurant	Soup Place	Monument / Landmark	Museum	Convenience Store	Chinese Restaurant
466	Madou Dist.	Museum	Art Gallery	History Museum	Zoo	Fish & Chips Shop	Food Stand	Food Court	Food & Drink Shop	Food	Flower Shop

Figure 8. The top 10 most common venues of the red cluster.

## 5. Conclusion

This project successfully identified the component of neighborhoods near tourist attractions. Through K-mean Clustering Algorithms, the disparate business development in Tainan City was revealed. According to the analysis, the tourist attractions in the modern center are surrounded mostly with

Taiwanese Restaurants. Comparatively, the tourist attractions in the ancient center are surrounded with Dessert Shops. As both main contributions to the most common venues in the green cluster (modern Tainan center) and the red cluster (ancient Tainan center) are food-related, one seeking business opportunities around tourist attractions needs to consider whether it is appropriate to open a restaurant in the center of Tainan City. On the other hand, one may seek out the tourist attractions in the outskirts of Tainan if he/she intends to start a restaurant in a less competitive environment. In brief, this project provides a visualization of opportunities for those looking to start a business around tourist attractions.

## 7. Reference

[1] <https://data.tainan.gov.tw/dataset/landmark2/resource/0faea8ce-212e-40bd-861a-65f0d2789db6>