Searching the Optimal Location to Open a Coffee Shop in the Ho Chi Minh City

1 Introduction

Ho Chi Minh City (Saigon) is the business and financial hub of Vietnam. The population of HCM City in 2019 was put at 9.0 million people. The area is 2,095,239 km2 with 24 districts. The city develops and modernizes key sectors, namely trading, import-export, finance and banking, insurance, tourism, telecommunications, science and technology, and services for trading and production in HCM City and southern provinces. Today, Ho Chi Minh City is a popular tourist destination due to the fact that the weather is warm, fascinating culture, sleek skyscrapers, ornate temples, and pagodas. The city is also filled with bars, coffice shops, restaurants that overlook Saigon and beyond, while fantastic restaurants offer local Vietnamese cuisine. The city has contributed the largest budget in the country, dubbed the most livable city in Vietnam.

In this project, we will try to find an optimal location for a coffee shop. Specifically, this report will be targeted to stakeholders interested in opening a coffee shop in the center of Ho Chi Minh City. This project will address the following 3 issues:

Firstly, segmenting and Clustering Neighborhoods in Ho Chi Minh City. After segmenting and clustering, we locate the center. This location is located between Tan Son Nhat International Airport and the city center (District 1). This is the direction visitors will move when traveling to Vietnam and the ability to find a cafe. Next, using the Foursquare API to explore neighborhoods in the City.

Secondly, finding reasonable areas to open a coffee shop. Because there are many coffee shops in Ho Chi Minh City, we will try to detect locations that are not already crowded with coffee shops. And, we are also particularly interested in areas with no cafe in the vicinity. We would also prefer locations as close to the city center as possible.

Thirdly, after identifying a reasonable area, we analyze the data to find locations for opening the coffee shop in the most economical way.

The structure of the report consists of five parts as follows: (1) Introduction: Business Problem, (2) Data Description, (3) Methodology, (4) Results of Data Analysis, (5) Conclusion.

2 Data Description

Based on the definition of the above problem, data factors that will influence this project as follows:

- Number of existing coffee shops in the area.
- Number of and distance of coffee shops each other in the area.
- A distance of the area from the central location (This location is located between Tan Son Nhat International Airport and the city center).

We will create a grid of cells covering our area of interest which is approx. The radius of 12 kilometers centered around the center location that we defined. And, we use a regularly spaced grid of locations, centered around the central location, to define areas.

Following data sources will be needed to extract/generate the required information:

- Centers of candidate areas will be generated algorithmically and approximate addresses of centers of those areas will be obtained.
- Using Google Maps API reverse geocoding number of the coffee shops and their type and location in every area will be obtained using Foursquare API.
- Coordinate of the central location will be obtained using Google Maps API geocoding.

3 Methodology

In this project, we will find and detect areas of the city that have low density of the coffee shop, particularly those with low number of coffee shop. We will limit our analysis to an area about 12 km around the central location. That is the position between Tan Son Nhat International Airport and the central city (coordinates taken at the

People's Committee of District 1). The method of implementation consists of three stages as follows:

- ***Stage #1***: Collecting the required data: location and type of every restaurant within 7 km from the central location that we have defined above. According to Foursquare about categorizations of the coffee shops. We search the location of the coordinates of the cafes in the same mutual area.
- ***Stage #2***: After obtaining the data collected from stage #1, we proceed to the analysis phase. The initial analysis process will data exploration, such as the density of the coffee shop across different areas. Using heatmaps to identify a few promising areas close to center with the low number of coffee shops in general and focus our attention on those areas.
- ***Stage #3***: Focus on most promising areas and within those create clusters of locations that meet some basic requirements established in discussion with stakeholders: (1) Take into consideration locations with no more than two the coffee shop in a radius of 400 meters, and we want locations without the coffee shops in radius of 600 meters. (2) Resenting a map of all such locations. (3) Creating clusters of those locations to identify a general area which should be a starting point for final 'street level' exploration and search for optimal venue location by stakeholders.

4 Results of Data Analysis

Based on the collected data set and the presented stages in the methodology, the project achieved the following typical results:

The number of drinking shops (food) in every area candidate is 1452 shops. Every area with a radius is 350 m. The average number of drinking shops in every area with the 300m radius is 14.369.

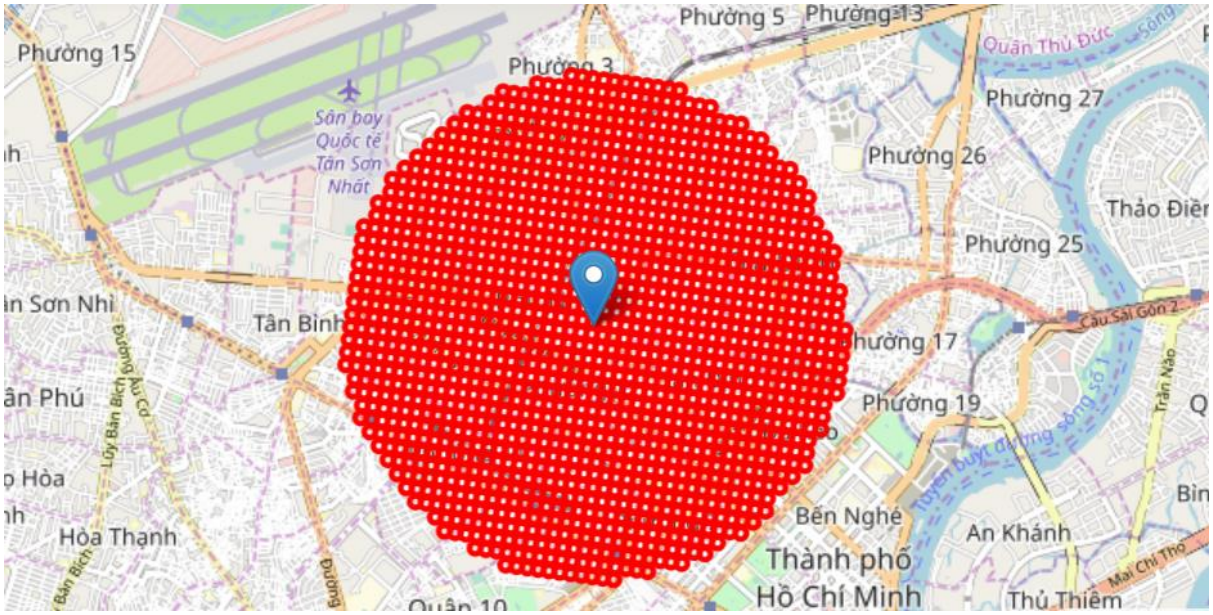

Figure 1. Visualizing the data of city central location and candidate areas centers.

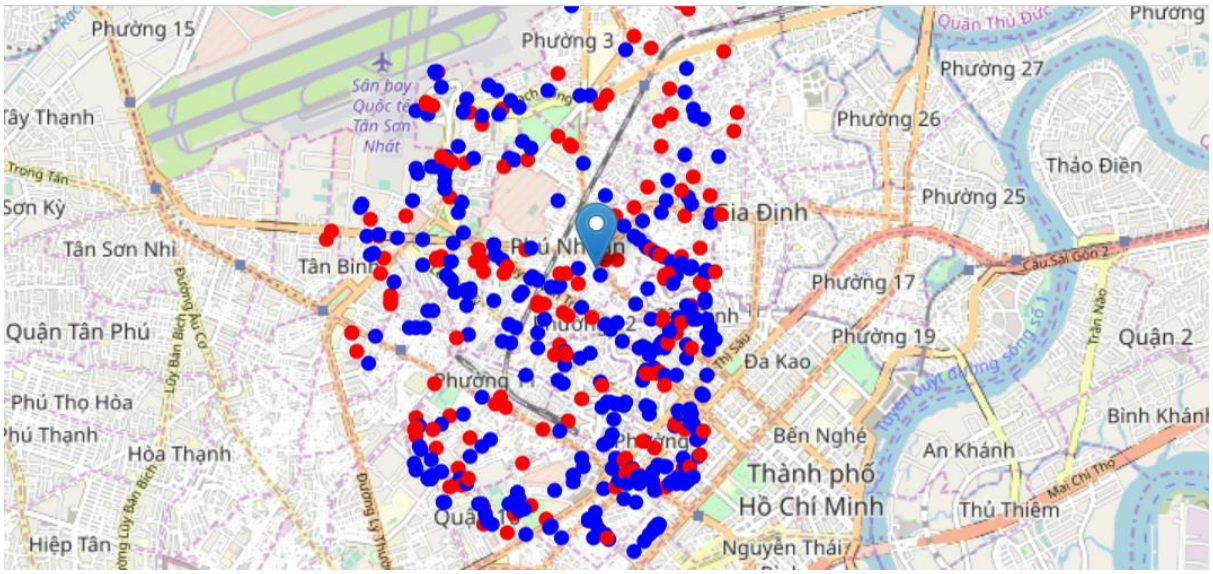

Figure 2. Visualizing the central location and the drinking shops.

	Address	Latitude	Longitude	X	Y	Distance from center	Drinking shops in area	Distance to Coffee shop
0	30 Phan Thúc Duyện, Phường 4, Tân Bình, Hồ Chí...	10.806386	106.659513	1.521749e+07	1.088831e+07	11945.259904	3	1936.913461
1	6/22 Hẻm số 6 Đồ Sơn, Phường 4, Tân Bình, Hồ C...	10.805288	106.659364	1.521809e+07	1.088831e+07	11793.609888	2	1422.432468
2	27 Sầm Sơn, Phường 4, Tân Bình, Hồ Chí Minh	10.804190	106.659216	1.521869e+07	1.088831e+07	11670.871184	2	1007.469353
3	36/14 Hẻm 36 Giải Phóng, Phường 4, Tân Bình, H...	10.803092	106.659068	1.521929e+07	1.088831e+07	11577.963300	3	852.452268
4	2/15 Hẻm số 2 Đồng Khởi, Phường 4, Tân Bình, H...	10.801995	106.658919	1.521989e+07	1.088831e+07	11515.608286	3	776.172745
5	15 Cộng Hòa, Phường 4, Tân Bình, Hồ Chí Minh	10.800897	106.658771	1.522049e+07	1.088831e+07	11484.303818	4	471.641500
6	51 Nguyễn Thái Bình, Phường 4, Tân Bình, Hồ Ch...	10.799800	106.658623	1.522109e+07	1.088831e+07	11484.303818	3	583.693624
7	308/5 Hoàng Văn Thụ, Phường 4, Tân Bình, Hồ Ch...	10.798702	106.658475	1.522169e+07	1.088831e+07	11515.608286	2	22.405614
8	40a, 40B Út Tịch, Phường 4, Tân Bình, Hồ Chí Minh	10.797605	106.658326	1.522229e+07	1.088831e+07	11577.963300	1	231.524389
9	437/13- 437/15 Hoàng Văn Thụ, Phường 4, Tân Bì...	10.796508	106.658178	1.522289e+07	1.088831e+07	11670.871184	3	433.386300

Figure 3. Using Foursquare API to get info on drinking shop in each candidate area.

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Addresses of centers of areas recommended for further analysis
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223A Trần Huy Liệu, Phường 8, Phú Nhuận, Hồ Chí Minh => 1.5km from my Center
129 Nguyễn Đình Chính, Phường 8, Phú Nhuận, Hồ Chí Minh => 1.9km from my Center
232 Nguyễn Trọng Tuyển, Phường 8, Phú Nhuận, Hồ Chí Minh => 3.5km from my Center
10 Hoàng Văn Thụ, Phường 9, Phú Nhuận, Hồ Chí Minh => 1.1km from my Center
11/12 Nguyễn Trọng Tuyển, Phường 15, Phú Nhuận, Hồ Chí Minh => 0.6km from my Center
251/4 Nguyễn Văn Trỗi, Phường 10, Phú Nhuận, Hồ Chí Minh => 3.6km from my Center
12/18 Chiến Thắng, Phường 9, Phú Nhuận, Hồ Chí Minh => 2.6km from my Center
94/8 Trần Khắc Chân, Phường 9, Phú Nhuận, Hồ Chí Minh => 1.9km from my Center
90A Nguyễn Trọng Tuyển, Phường 15, Phú Nhuận, Hồ Chí Minh => 0.5km from my Center
10/8i Trần Hữu Trang, Phường 11, Phú Nhuận, Hồ Chí Minh => 3.0km from my Center
73/2/3 Duy Tân, Phường 15, Phú Nhuận, Hồ Chí Minh  => 1.3km from my Center
159/39E Hoàng Văn Thụ, Phường 8, Phú Nhuận, Hồ Chí Minh => 2.5km from my Center
76 Nguyễn Văn Trỗi, Phường 8, Phú Nhuận, Hồ Chí Minh => 2.7km from my Center
117 - 119 Nguyễn Văn Trỗi, Phường 12, Phú Nhuận, Hồ Chí Minh => 2.2km from my Center
194 Hoàng Văn Thụ, Phường 9, Phú Nhuận, Hồ Chí Minh => 3.2km from my Center
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Figure 4. Recommended locations to open cafes.

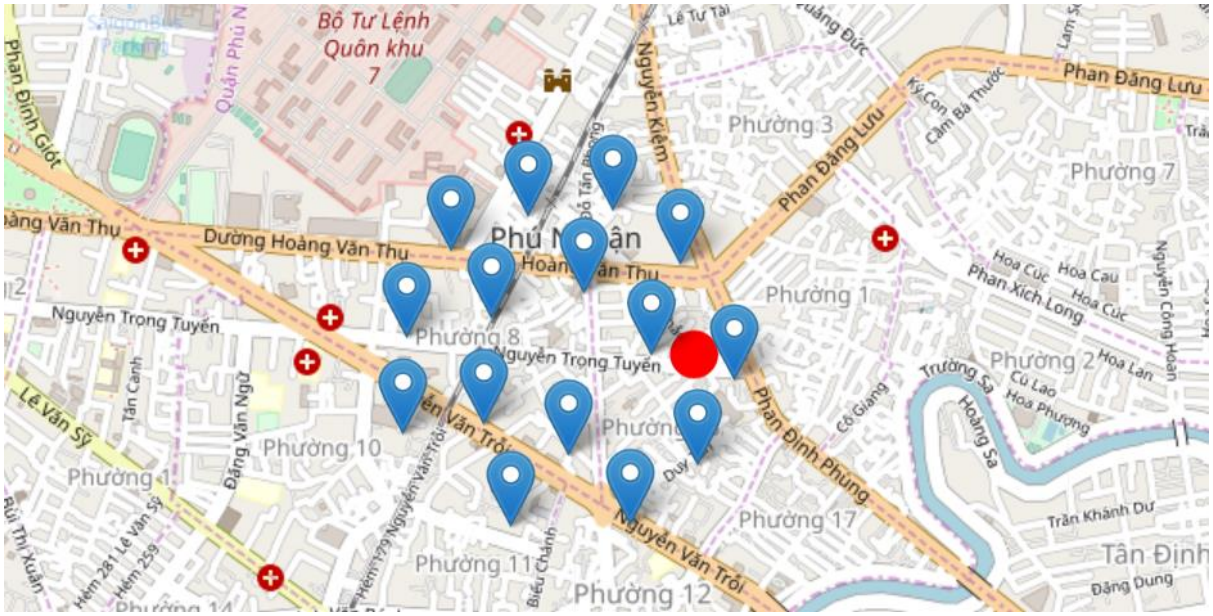

Figure 5. Visualizing the recommended locations.

5 Conclusion

The purpose of this project was to find the optimal location to open a coffee shop in Ho Chi Minh City. By computing coffee shop density distribution from Foursquare data, we have identified areas that are likely to open a cafe based on the appropriate location criteria that are where the area has few cafes.

6 Acknowledgment

This project is based on a sample project that this course has introduced (Ref.).