

Introduction/Business Problem

The goal of this study is to find the location in Bangkok, Thailand that best suited for a standalone coffee shop.

To explain the problem, this client is an owner of a Coffee shop in Phaya Thai district in Bangkok. After opening the first shop for 3 years, she now has a plan to increase the number of branches to another district in Bangkok.

In the first successful branch, she noticed that her clients mostly are businessmen and university students aged between 18-40, both female and male.

Since coffee is increasingly popular in Bangkok, the number of coffee shops is now increasing too. So, she wants this district to have less competitors or have more ratio of target population per coffee shops

And, if possible, she wants to sell the coffee to the district that has the characteristics of venues like Phaya Thai so that she does not have to adapt much.

To simplify her request, the criteria of the district is provided below

1. Population age 18-40 above average
2. Top 10 Population age 18-40 per 1 coffee shop (including her one)
3. Similar venue characteristics to Phaya Thai
4. If more than 1 district that fit all criteria, pick the one with most population age 18-40 per 1 coffee shop (including her one)

So, the objective of this study is to find a district in Bangkok which is the best location to start this client's next coffee shop with the given criteria.

Data

Wikipedia - List of districts of Bangkok

Link : https://en.m.wikipedia.org/wiki/List_of_districts_of_Bangkok

For scraping list of name, latitude, and longitude of each districts of Bangkok

Official Statistics Registration of Thailand

http://stat.dopa.go.th/stat/statnew/upstat_age.php

Number of population in Thailand group by province, district or sub-district and age (In Thai language)

I will use tables that contained number of population in each district of Bangkok group by age.

Since this webpage is in Thai language, I will provide table that are converted to English >>[here](#)<<

The template of the tables I will use is shown below

Age	M	F	SUM	Age	M	F	SUM
less than 1				1			
2				3			
4				5			
6				7			
8				9			
10				11			
12				13			
14				15			
16				17			
18				19			
20				21			
22				23			
24				25			
26				27			
28				29			
30				31			
32				33			
34				35			
36				37			
38				39			
40				41			
42				43			
44				45			
46				47			
48				49			
50				51			
52				53			
54				55			
56				57			
58				59			
60				61			
62				63			
64				65			
66				67			
68				69			
70				71			
72				73			
74				75			
76				77			

78				79			
80				81			
82				83			
84				85			
86				87			
88				89			
90				91			
92				93			
94				95			
96				97			
98				99			
100				more than 100			

And since we will use only population

FoursquareAPI

For collect information of other coffee shops and other venues in each district, including name, latitude, longitude, and category of venues

Example of data from Foursquare:

Venue	Venue Latitude	Venue Longitude	Venue Category
ขาหมอบางหว้า	13.657136	100.395230	Thai Restaurant
Irashaimase Japanese Restaurant	13.658358	100.401403	Japanese Restaurant
ร้านต้นไม้ ริมถนนกาญจนาภิเษก	13.654098	100.405054	Garden Center
เจ๊โน๊ ก๋วยเตี๋ยวเป็ดตุ๋น	13.654137	100.405323	Noodle House
หมูสะเต๊ะแม่กำไร	13.653925	100.391426	Satay Restaurant

Methodology

The tools of this study are Jupyter Notebook, Library Pandas for managing data frame and folium to visualize map. The stage of this study will be explained below.

Stage 1

The data of number of population in each district of Bangkok group by age was pooled and clean and merge with the data from Wikipedia. There are 50 districts in Bangkok.

Table: Name, latitude, longitude, and population age 18-40 of each Bangkok district

	District	Latitude	Longitude	Population18_40
0	Bang Bon	13.6592	100.3991	33565
1	Bang Kapi	13.76583	100.6478	46041
2	Bang Khae	13.69611	100.4094	62257

3	Bang Khen	13.87389	100.5964	61167
4	Bang Kho Laem	13.69333	100.5025	25477
5	Bang Khun Thian	13.66083	100.4358	61456
6	Bang Na	13.68008	100.5918	29449
7	Bang Phlat	13.79389	100.505	27858
8	Bang Rak	13.73083	100.5242	10924
9	Bang Sue	13.80972	100.5372	38954
10	Bangkok Noi	13.77087	100.4679	31408
11	Bangkok Yai	13.72278	100.4764	20839
12	Bueng Kum	13.78528	100.6692	44623
13	Chatuchak	13.82861	100.5597	50305
14	Chom Thong	13.67722	100.4847	47742
15	Din Daeng	13.76972	100.5528	36669
16	Don Mueang	13.91361	100.5897	60739
17	Dusit	13.77694	100.5206	28227
18	Huai Khwang	13.77667	100.5794	29568
19	Khan Na Yao	13.8271	100.6743	28308
20	Khlong Sam Wa	13.85972	100.7042	67490
21	Khlong San	13.73028	100.5097	20415
22	Khlong Toei	13.70806	100.5839	31062
23	Lak Si	13.8875	100.5789	33504
24	Lat Krabang	13.72232	100.7597	60729
25	Lat Phrao	13.80361	100.6075	36377
26	Min Buri	13.81389	100.7481	45691
27	Nong Chok	13.85556	100.8625	59228
28	Nong Khaem	13.70472	100.3489	50783
29	Pathum Wan	13.74494	100.5222	13543
30	Phasi Charoen	13.71472	100.4372	40079
31	Phaya Thai	13.78	100.5428	22875
32	Phra Khanong	13.70222	100.6017	29393
33	Phra Nakhon	13.76444	100.4992	13291
34	Pom Prap Sattru Phai	13.75806	100.5131	11602
35	Prawet	13.71694	100.6944	59059
36	Rat Burana	13.68222	100.5056	25149
37	Ratchathewi	13.75889	100.5344	21085
38	Sai Mai	13.91917	100.6458	66690
39	Samphanthawong	13.73139	100.5142	6068
40	Saphan Sung	13.77	100.6847	30840
41	Sathon	13.70806	100.5264	22426
42	Suan Luang	13.73028	100.6514	41484
43	Taling Chan	13.77694	100.4567	31932
44	Thawi Watthana	13.7878	100.3638	24147
45	Thon Buri	13.725	100.4858	33565
46	Thung Khru	13.6472	100.4958	39991
47	Wang Thonglang	13.7864	100.6087	33944
48	Watthana	13.74222	100.5858	20433
49	Yan Nawa	13.69694	100.5431	24005

count	50.00
mean	35849.12
std	15953.86
min	6068.00
25%	24397.50
50%	32718.00
75%	45953.50
max	67490.00

Stage 2

Selected only venues with 'Coffee shop' category and show number of coffee shops in each district

	District	Coffee shop
0	Bang Bon	3

1	Bang Kapi	10
2	Bang Khae	2
3	Bang Khen	4
4	Bang Kho Laem	9
5	Bang Khun Thian	10
6	Bang Na	4
7	Bang Phlat	5
8	Bang Rak	6
9	Bang Sue	3
10	Bangkok Noi	4
11	Bangkok Yai	3
12	Bueng Kum	5
13	Chatuchak	13
14	Chom Thong	3
15	Din Daeng	9
16	Don Mueang	10
17	Dusit	7
18	Huai Khwang	4
19	Khan Na Yao	5
20	Khlong Sam Wa	3
21	Khlong San	4
22	Khlong Toei	14
23	Lak Si	11
24	Lat Krabang	0
25	Lat Phrao	10
26	Min Buri	3
27	Nong Chok	4
28	Nong Khaem	1
29	Pathum Wan	4
30	Phasi Charoen	5
31	Phaya Thai	10
32	Phra Khanong	9
33	Phra Nakhon	3
34	Pom Prap Sattru Phai	2
35	Prawet	0
36	Rat Burana	9
37	Ratchathewi	7
38	Sai Mai	1
39	Samphanthawong	5
40	Saphan Sung	8
41	Sathon	6
42	Suan Luang	8
43	Taling Chan	5
44	Thawi Watthana	3

45	Thon Buri	6
46	Thung Khru	5
47	Wang Thonglang	9
48	Wattana	9
49	Yan Nawa	5
	Sum	288

Statistics information of number of coffee shops each district:

```
count 50.000000
mean 5.760000
std 3.323141
min 0.000000
25% 3.000000
50% 5.000000
75% 9.000000
max 14.000000
```

After that, population age 18-40 each district will be divided by number of already existed coffee shops each district plus 1 (her coffee shop). Only top 10 will be selected and shown in result section.

Stage 3

Use data from Foursquare API again, but this time use number of distinct categories in each district, to find the frequency and characteristics of venues in each one.

Table: First 5 rows of table of venues in Bangkok

	District	District Latitude	District Longitude	Venus	Venus Latitude	Venus Longitude	Venus Category
0	Bang Bon	13.6592	100.3991	ขาหมูบางหัว	13.657136	100.395230	Thai Restaurant
1	Bang Bon	13.6592	100.3991	Irashaimase Japanese Restaurant	13.658358	100.401403	Japanese Restaurant
2	Bang Bon	13.6592	100.3991	ร้านต้นไม้ริมถนนกาญจนาภิเษก	13.654098	100.405054	Garden Center
3	Bang Bon	13.6592	100.3991	เจ๊โน๊ ก๋วยเตี๋ยวเบ็ดเตล็ด	13.654137	100.405323	Noodle House
4	Bang Bon	13.6592	100.3991	หมูสะเต๊ะแม่กำไร	13.653925	100.391426	Satay Restaurant

Number of all venues collected: 3927

Then, in each district, the data will be grouped by venue category. Frequency of venue category in one hot encoding form is used to analyze the characteristics of venues in each district.

Top 10 frequency of each district venue categories are provided for the purposed of easier visualization

Table: Top 10 category of venues

Since this table is too large to be shown in this file, the table will be in this [link](#)

Afterwards, Bangkok districts will be clustered by K-mean clustering. Using 6 as number of clusters. Districts that are in a same cluster as Phaya Thai will be assumed to have similar characteristics to Phaya Thai

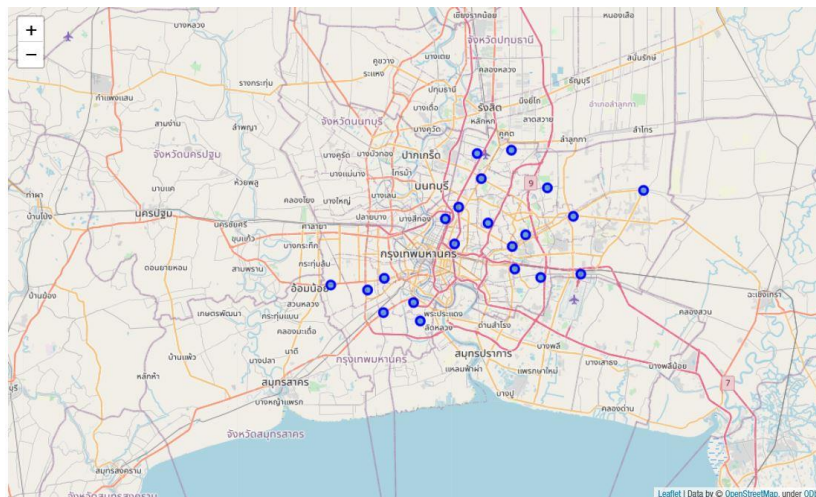
Finally, the district(s) that met all criteria will be selected as a result

Results

1)

Table : Population age 18-40 above average

	District	Population18_40
1	Bang Kapi	46041
2	Bang Khae	62257
3	Bang Khen	61167
4	Bang Khun Thian	61456
5	Bang Sue	38954
6	Bueng Kum	44623
7	Chatuchak	50305
8	Chom Thong	47742
9	Din Daeng	36669
10	Don Mueang	60739
11	Khlong Sam Wa	67490
12	Lat Krabang	60729
13	Lat Phrao	36377
14	Min Buri	45691
15	Nong Chok	59228
16	Nong Khaem	50783
17	Phasi Charoen	40079
18	Prawet	59059
19	Sai Mai	66690
20	Suan Luang	41484
21	Thung Khru	39991

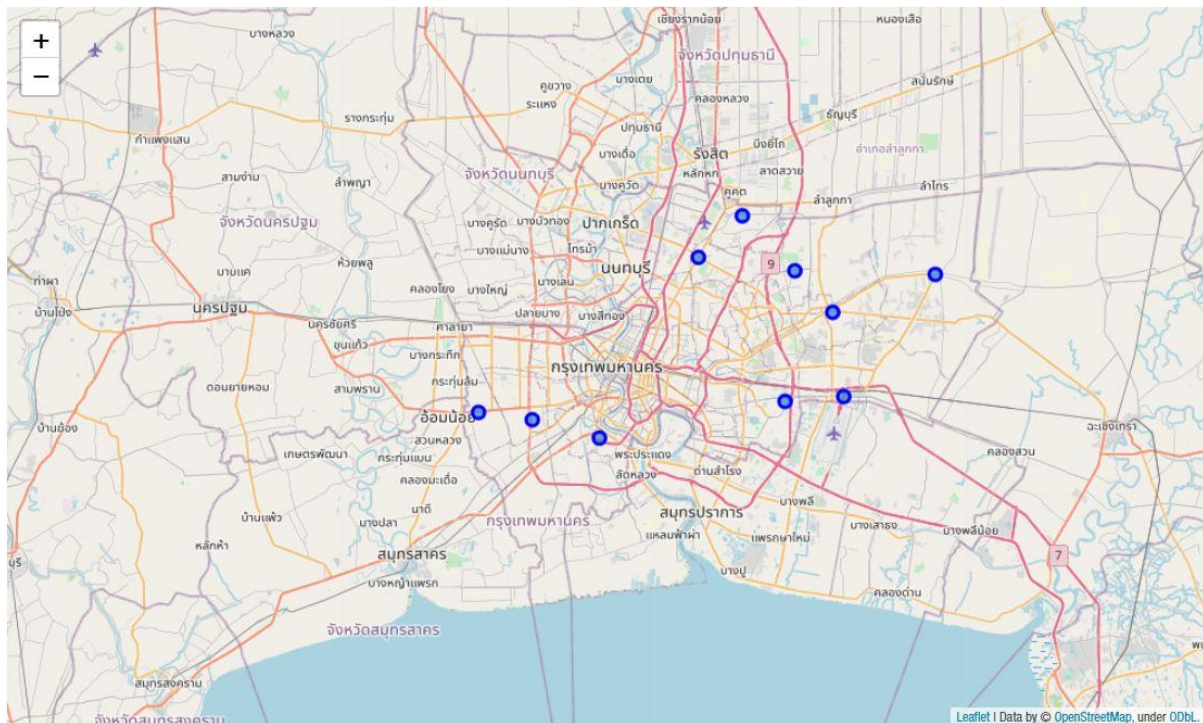


Location of districts which have above average population

2)

Table : Top 10 Population age 18-40 per coffee shop including her one

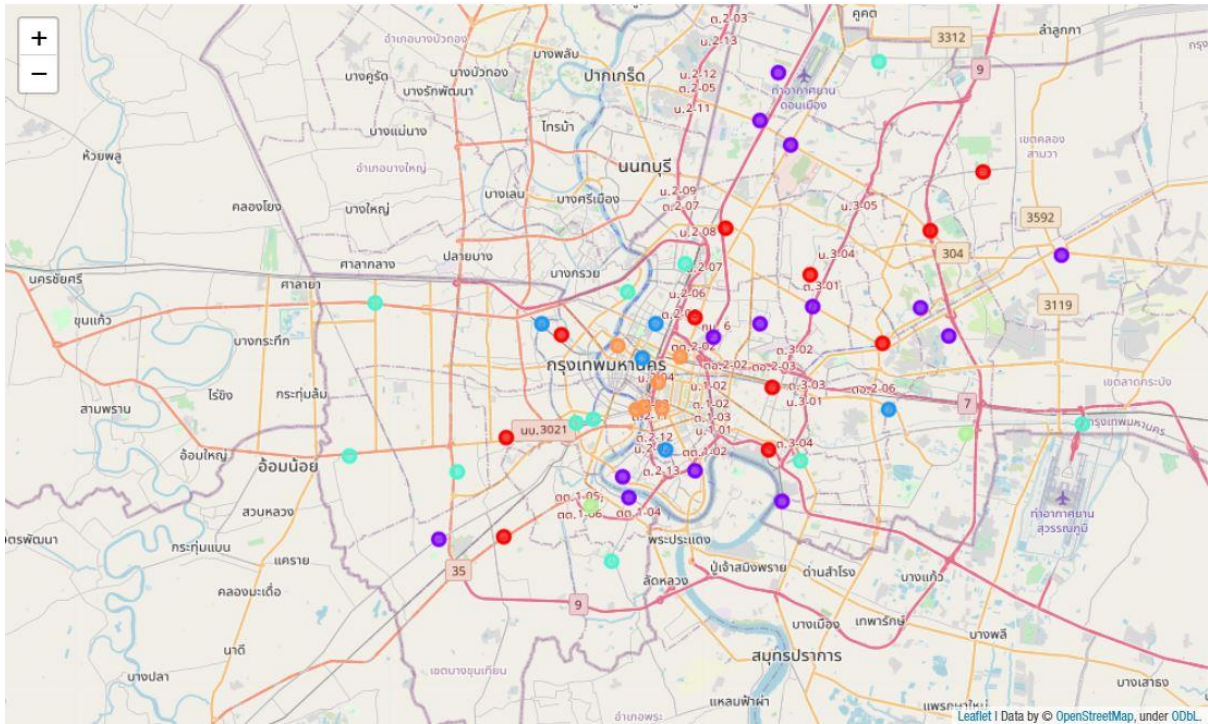
	District	Population18_40	Coffee shop	Including her	Per Person
1	Lat Krabang	60729	0	1	60729
2	Prawet	59059	0	1	59059
3	Sai Mai	66690	1	2	33345
4	Nong Khaem	50783	1	2	25391.5
5	Bang Khae	62257	2	3	20752.33
6	Khlong Sam Wa	67490	3	4	16872.5
7	Bang Khen	61167	4	5	12233.4
8	Chom Thong	47742	3	4	11935.5
9	Nong Chok	59228	4	5	11845.6
10	Min Buri	45691	3	4	11422.75



Location of district with top 10 Population age 18-40 per coffee shop including her one

3)

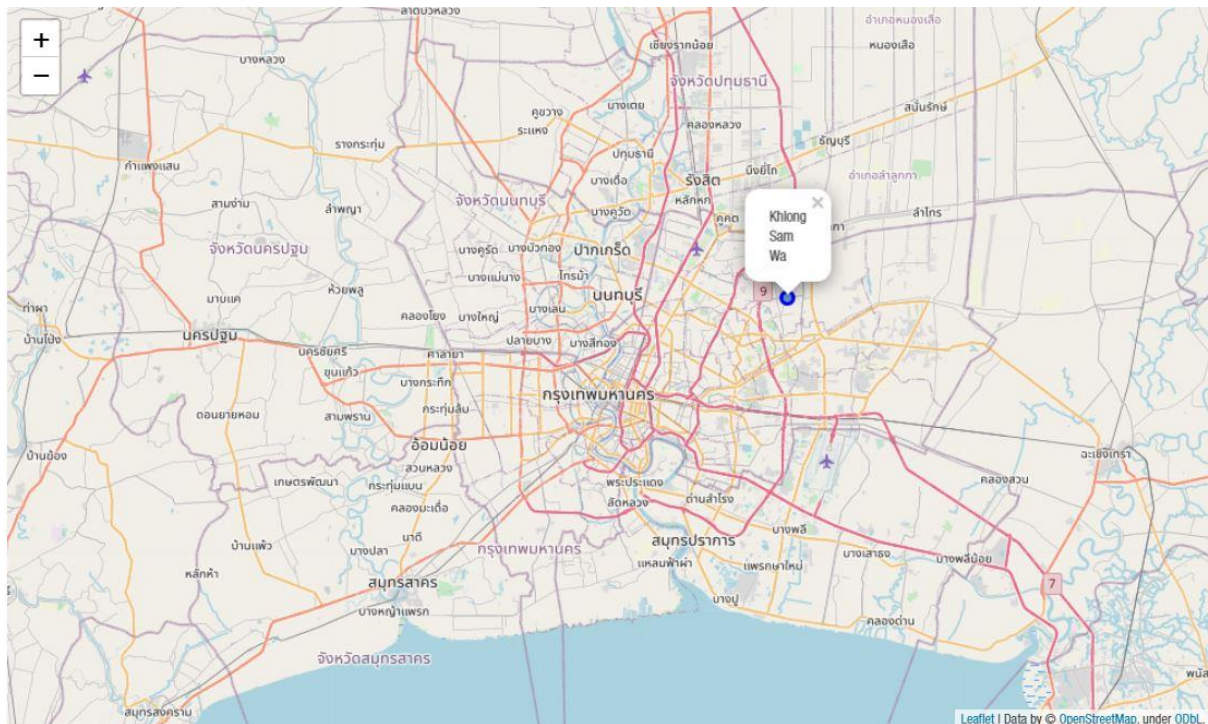
The map shows result after clustering Bangkok districts into 6 clusters



Phaya Thai is in cluster label 1.

The districts in cluster label 1 are Bang Kapi, Bangkok Noi, Chatuchak, Khan Na Yao, Khlong Sam Wa, Khlong Toei, Lat Phrao, Phasi Charoen, Phaya Thai, and Watthana

The district that met all criteria is 'Khlong Sam Wa'



Discussion

From the results, the following recommendations can be made:

- There is only 1 district that fits all criteria, that is 'Khlomg Sam Wa', with a population of 67490, 3 already existing coffee shops, 16872.50 people per coffee shop including hers, and cluster label 1. Hence, it is the recommended location for this client
- Other choices to consider are Lat Krabang and Prawet since these 2 have no already existing coffee shop in this data frame
- From the observation, the districts with more population and less already existed coffee shops are mostly situated at outskirts of Bangkok

There are some points to concern of when using this data and study

- The data from foursquareAPI is limited to only 200 venues per district and only within a radius of 1500 metres.
- There is no data on coffee carts which are common in bangkok.
- Seeing that there are many types of coffee shops and a wide range of prices per 1 cup, the next evaluation should include the price of location, GDP, and more information of each district.
- This study was created during the COVID-19 crisis and it affects economics around the world including Bangkok, leading to a change in the number of shops and venues in Bangkok. Thus, the study should be performed again after this situation subsides.

Conclusion

The best location for this client's next coffee shop branch is 'Khlomg Sam Wa' based on population, coffee shops and other venues of each district. Next appropriate choices are Lat Krabang and Prawet.

This study is limited due to some reasons and it should be performed again to follow the trend of economics around the world.