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	М	F	SUM	Age	М	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			
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40				41			
42				43			
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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			

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80		81		
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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

#### <u>FoursquareAPI</u>

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
ขาหมูบางหว้า	13.657136	100.395230	Thai Restaurant
Irashaimase Japanese Restaurant	13.658358	100.401403	Japanese Restaurant
ร้านต้นไม้ ริมถนนกาญจนาภิเษก	13.654098	100.405054	Garden Center
เจ้ใน้ ก๋วยเดี๋ยวเป็ดตุ๋น	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

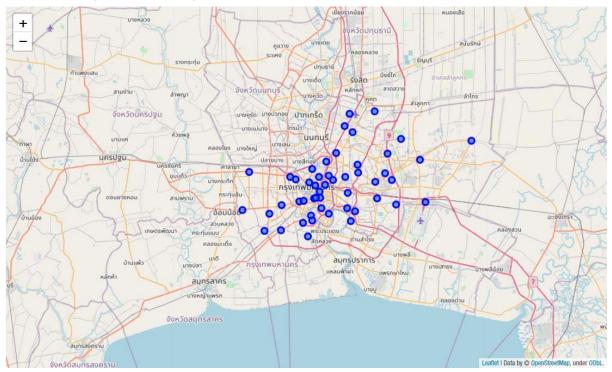
The data of number of population in each district of Bangkok group by age was pooled and clean and merge with the data from Wikipedia. There are 50 districts in Bangkok.

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

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 Yal         13,72278         100,4764         20839           12         Bueng Kurn         13,78628         100,6997         50305           14         Chom Thong         13,77722         100,4947         4,7742           15         Din Daeng         13,76972         100,5987         60739           16         Don Mueang         13,91361         100,5997         60739           17         Dusit         13,77694         100,5206         28227           18         Hual Khwang         13,77697         100,5794         29568           19         Khan Na Yao         13,8271         100,6743         28380           20         Khiong Sam Wa         13,85672         100,7042         67399           21         Khiong Sam Wa         13,85672         100,5789         33504           22         Khiong Toel         13,70806         100,5939         31062           23         Lak Krabang					
5         Bang Khun Thian         13,66083         100,4358         61456           6         Bang Na         13,68008         100,5918         29449           7         Bang Phlat         13,73939         100,505         27858           8         Bang Rak         13,73083         100,5242         10924           9         Bang Sue         13,80727         38954           10         Bengkok Nol         13,77087         100,4679         31408           11         Bangkok Yai         13,72278         100,4764         20839           12         Bueng Kun         13,76528         100,6862         44623           13         Chatuchak         13,82861         100,5597         50355           14         Chom Thong         13,67722         100,4847         47742           15         Din Daeng         13,76972         100,5582         36669           16         Den Museng         13,376972         100,5582         36669           16         Den Museng         13,376972         100,5082         286271           17         Dust         13,77697         100,5097         20415           18         Huia Khwang         13,7667 <td< td=""><td>3</td><td>Bang Khen</td><td>13.87389</td><td>100.5964</td><td>61167</td></td<>	3	Bang Khen	13.87389	100.5964	61167
6 Bang Na 13,68008 100,5918 29449 7 Bang Phiat 13,79389 100,505 27688 8 Bang Rak 13,73083 100,5242 10024 9 Bang Sue 13,80727 100,5372 38854 10 Bangkok Noi 13,77067 100,4779 31408 11 Bangkok Noi 13,77267 100,4744 20839 11 Bangkok Noi 13,72278 100,4744 20839 12 Bueng Kum 13,76528 100,6692 44623 13 Chatuchak 13,82861 100,5597 50305 14 Chom Thong 13,87722 100,4847 47742 15 Din Deeng 13,76727 100,5528 36699 16 Don Mueang 13,91361 100,5897 60739 17 Dusit 13,77667 100,5794 29568 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 Sam Wa 13,75028 100,5997 20415 22 Khlong Sam Wa 13,75028 100,5997 31662 23 Lak Si 13,7608 100,5997 31662 24 Lat Krabang 13,77028 100,5789 33504 24 Lat Krabang 13,72232 100,7597 60729 25 Lat Phrao 13,80361 100,6075 36377 26 Min Burl 13,81899 100,7481 45691 27 Nong Chok 13,85556 100,8625 50228 8 Nong Khaem 13,7444 100,5222 13543 30 Phasi Charoen 13,7444 100,522 13543 31 Phaya Thai 13,7444 100,522 13543 32 Phra Khanong 13,77694 100,6748 60739 33 Phra Nakhon 13,7694 100,648 22875 34 Phra Nakhon 13,7694 100,648 60688 35 Prawet 13,77694 100,648 60689 36 Rat Burana 13,7694 100,694 50959 37 Ratchathewi 13,7694 100,656 25149 38 Sail Mai 13,7694 100,6564 22466 40 Saphan Sung 13,77694 100,648 60690 39 Samphanthawong 13,77694 100,648 60690 30 Sail Mai 13,7694 100,657 31932 31 Chat Sunana 13,7694 100,657 31932 32 Hak Surana 13,7694 100,657 31932 33 Phra Nakhon 13,77694 100,658 60690 34 Phawi Wathana 13,77694 100,657 31932 34 Phra Wathana 13,77694 100,657 31932 35 Hawi Wathana 13,77694 100,657 31932 36 Hawi 13,77694 100,657 31932 37 Ratchathewi 13,77694 100,657 31932 38 Sail Mai 13,9717 100,6687 31932 39 Samphanthawong 13,77694 100,658 60690 30 Sail Mai 13,77694 100,658 60690	4	Bang Kho Laem	13.69333	100.5025	25477
7         Bang Phlet         13,79388         100,505         27858           8         Bang Rak         13,73083         100,5242         10924           9         Bang Sue         13,80072         100,5372         38954           10         Bangkok Noi         13,772878         100,4679         31408           11         Bangkok Noi         13,72278         100,4764         20838           12         Bueng Kum         13,78281         100,6692         44623           13         Chaluchak         13,82861         100,5697         50305           14         Chom Thong         13,67722         100,4847         47742           15         Din Daeng         13,76972         100,5528         36699           16         Don Musang         13,378672         100,5528         36699           17         Dusit         13,77694         100,5006         28227           18         Huai Khwang         13,77694         100,5006         28227           19         Khan Na Yao         13,8271         100,6743         28368           20         Khlong Sam Wa         13,85972         100,7042         67499           21         Khlong Toei	5	Bang Khun Thian	13.66083	100.4358	61456
8 Bang Rak 13,73083 100,5242 10924 9 Bang Sue 13,80972 100,5372 38954 10 Bangkok Noi 13,77067 100,4679 31408 111 Bangkok Yai 13,72276 100,4679 31408 112 Bueng Kum 13,78528 100,6692 46623 113 Chetuchak 13,82861 100,5697 50305 114 Chom Thong 13,76722 100,4447 47742 115 Din Daeng 13,76972 100,5528 36669 116 Don Mueang 13,91361 100,5997 60739 117 Dusit 13,77694 100,5006 28227 118 Huai Khwang 13,77697 100,5794 29568 119 Khan Na Yao 13,8271 100,6743 28308 120 Khlong Sam Wa 13,85972 100,7042 67499 121 Khlong San 13,73028 100,5997 20415 122 Khlong Toel 13,73080 100,5997 20415 123 Lak Si 13,8875 100,5797 20415 124 Lat Kritahang 13,72232 100,7697 60729 125 Lat Phrao 13,83874 100,6783 33504 126 Min Buri 13,83856 100,6787 60729 127 Nong Chok 13,85566 100,8625 59228 128 Nong Khaem 13,74494 100,5222 13543 130 Phasi Charon 13,74494 100,5222 13543 130 Phasi Charon 13,74494 100,5222 13543 130 Phasi Charon 13,74644 100,4992 13393 131 Phaya Thai 13,788 100,548 2867 131 Phaya Thai 13,788 100,548 2867 132 Phra Khanong 13,7692 100,6817 29333 133 Phra Nakhon 13,76844 100,6944 59059 134 Panya Thai 13,788 100,544 2867 135 Prewet 13,71694 100,6817 29333 136 Rat Burana 13,6822 100,5666 25149 137 Ratchathewi 13,7689 100,544 59059 138 Sai Mai 13,9197 100,6847 39844 141 Sathon 13,7680 100,584 22426 142 Suan Luang 13,7794 100,4867 31932 144 Thawi Watthana 13,77894 100,6847 39844 145 Thawi Watthana 13,77894 100,4868 66690 146 Thung Khru 13,7694 100,4868 39891 147 Wang Thonglang 13,7792 100,4868 39891 147 Wang Thonglang 13,7792 100,4868 39891 147 Wang Thonglang 13,77422 100,4868 39891 147 Wang Thonglang 13,77422 100,4868 39891 147 Wang Thonglang 13,77422 100,4868 398991 148 Wetthana 13,74422 100,4868 398991	6	Bang Na	13.68008	100.5918	29449
9 Bang Sue 13,80972 100,5372 38954 10 Bangkok Noi 13,77087 100,4679 31408 111 Bangkok Yai 13,72278 100,4764 20839 112 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 36668 16 Don Mueang 13,31861 100,5997 60739 17 Dusit 13,77697 100,5528 36668 18 Huai Khwang 13,77667 100,5794 29568 19 Khan Na Yao 13,8271 100,6743 28308 20 Khiong Sam Wa 13,85972 100,7042 67490 21 Khiong Sam Wa 13,78060 100,5339 31062 22 Khiong Toei 13,70806 100,5339 31062 23 Lak Si 13,8876 100,5799 60729 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 13,85565 100,8625 59228 28 Nong Khaerm 13,74494 100,522 13634 30 Phasi Charon 13,7424 100,5472 40079 31 Phaya Thai 13,7644 100,5428 22875 32 Pathum Wan 13,7494 100,5428 22875 33 Phra Nakhon 13,7644 100,5428 22875 34 Para Khanong 13,7644 100,5428 22875 35 Prawet 13,76980 100,5344 21066 36 Rat Burana 13,7680 100,544 50959 37 Ratchasthewi 13,7680 100,544 50959 38 San Mai 13,7694 100,645 5066 39 Samphanthawong 13,77694 100,645 5066 39 Samphanthawong 13,77694 100,6467 30939 31 Phaya Thai 13,7680 100,544 50959 32 Suan Luang 13,77694 100,6467 30939 33 Phra Nakhon 13,76444 100,6492 13291 34 Pom Prap Sattru Phai 13,76806 100,544 20666 39 Samphanthawong 13,77690 100,544 1484 41 Sathon 13,7696 100,5664 24265 42 Suan Luang 13,7664 100,6676 31934	7	Bang Phlat	13.79389	100.505	27858
10   Bangkok Noi	8	Bang Rak	13.73083	100.5242	10924
11 Bangkok Yai 13.7278 100.4764 20839 12 Bueng Kum 13.78528 100.6692 44623 13 Chatuchak 13.82861 100.6597 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 22527 18 Huai Khwang 13.77667 100.6794 295868 19 Khan Na Yao 13.8271 100.6743 28368 19 Khiong Sam Wa 13.85972 100.7042 67490 20 Khiong Sam Wa 13.85972 100.7042 67490 21 Khiong Sam 13.73028 100.5097 20415 22 Khiong Toel 13.7066 100.5839 31062 23 Lak Si 13.8876 100.6789 3504 24 Lat Krabang 13.72232 100.7597 60729 25 Lat Phrao 13.80361 100.6075 36377 26 Min Buri 13.83556 100.6075 36377 27 Nong Chok 13.85556 100.6625 59228 28 Nong Khaem 13.70472 100.3489 50783 29 Pathum Wan 13.74494 100.5222 13543 30 Phasi Charoen 13.74494 100.5222 13543 30 Phasi Charoen 13.74644 100.4922 13291 31 Phaya Thai 13.748 100.6428 22875 32 Phra Khanong 13.70222 100.00677 29393 33 Phra Nakhon 13.74694 100.5428 22875 34 Pom Prap Sattru Phal 13.75899 100.544 59059 36 Rat Burna 13.8622 100.6064 59059 37 Ratchathewi 13.77694 100.5648 66690 39 Samphanthawong 13.77694 100.6645 59059 38 Sai Mai 13.91917 100.6458 66690 39 Samphanthawong 13.73928 100.5644 59059 39 Samphanthawong 13.73928 100.5644 1484 41 Thaw Watthana 13.7694 100.4567 39991 44 Thaw Watthana 13.7684 100.4667 39991 44 Thaw Watthana 13.7684 100.4688 39591 44 Thaw Watthana 13.7684 100.4667 39991 44 Thaw Watthana 13.7684 100.4667 39991 44 Wang Thonglang 13.7022 100.4658 39991	9	Bang Sue	13.80972	100.5372	38954
12         Bueng Kum         13.76528         100.6692         44623           13         Chatuchak         13.82661         100.5597         50305           14         Chom Thong         13.67722         100.4847         47742           15         Din Daeng         13.76972         100.5528         36668           16         Don Mueang         13.91361         100.5997         60739           17         Dusit         13.77694         100.5206         28227           18         Hual Kiwang         13.77697         100.5794         29568           19         Khan Na Yao         13.8271         100.6743         28308           20         Krilong San         13.73028         100.5097         20415           21         Krilong San         13.73028         100.5097         20415           22         Krilong Toel         13.70806         100.5839         31062           23         Lak Si         13.80875         100.5789         33504           24         Lat Krabang         13.72232         100.7597         60729           25         Lat Pirao         13.80361         100.6075         36377           26         Min Buri	10	Bangkok Noi	13.77087	100.4679	31408
13         Chatuchak         13.82861         100.5697         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         13.77667         100.5906         28227           18         Hual Khwang         13.77667         100.5794         29568           19         Khan Na Yao         13.8271         100.6743         28308           20         Kthlong Sam Wa         13.85972         100.7042         67490           21         Khlong San         13.73086         100.5097         20415           22         Khlong Toel         13.70906         100.6393         31062           23         Lak Si         13.8975         100.5789         33604           24         Lat Krabang         13.72232         100.7597         60729           25         Lat Phrao         13.80361         10.06075         36377           26         Min Buri         13.81389         100.7481         45691           27         Nong Chok	11	Bangkok Yai	13.72278	100.4764	20839
14         Chorn Thong         13.67722         100.4847         47742           15         Din Deeng         13.76972         100.5528         36669           16         Don Mueang         13.91361         100.5897         60739           17         Dusit         13.77694         100.5206         28227           18         Hual Khwang         13.77667         100.6743         29588           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 Toel         13.70606         100.6393         31062           23         Lak Si         13.8875         100.6799         33504           24         Lat Krabang         13.72232         100.7697         60729           25         Lat Phrao         13.80361         100.6075         36377           26         Min Buri         13.81389         100.7481         45691           27         Nong Chok         13.85566         100.6025         59228           28         Nong Khaem	12	Bueng Kum	13.78528	100.6692	44623
15         Din Daeng         13.76972         100.5528         36669           16         Don Mueang         13.91361         100.5997         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         100.5997         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         13.85566         100.8625         59228           28         Nong Khaem         13.70422         100.3489         50733           29         Pathum Wan	13	Chatuchak	13.82861	100.5597	50305
16         Don Mueang         13.91361         100.5997         60739           17         Dusit         13.77694         100.5206         26227           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 Toel         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	14	Chom Thong	13.67722	100.4847	47742
17         Dusit         13,77694         100,5206         28227           18         Hual 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 Toel         13,70806         100,5839         31062           23         Lak Si         13,8875         100,5799         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         13,85566         100,8625         59228           28         Nong Khaem         13,70472         100,3489         50733           29         Pathum Wan         13,74494         100,5222         13543           30         Phasi Charoen         13,71472         100,4372         40079           31         Phaya Thai	15	Din Daeng	13.76972	100.5528	36669
18         Huai Khwang         13.77667         100.5794         29588           19         Khan Na Yao         13.8271         100.6743         28308           20         Khiong Sam Wa         13.85972         100.7042         67490           21         Khiong San         13.73028         100.5097         20415           22         Khiong Toei         13.70806         100.5839         31062           23         Lak Si         13.8875         100.5769         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         13.76         100.6017         29333           32         Phra Khanong	16	Don Mueang	13.91361	100.5897	60739
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         100.5769         33504           24         Lat Krabang         13.72232         100.7597         60729           25         Lat Phrao         13.80361         100.6075         36377           26         Min Burl         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 Sathu Phai </td <td>17</td> <td>Dusit</td> <td>13.77694</td> <td>100.5206</td> <td>28227</td>	17	Dusit	13.77694	100.5206	28227
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         100.5422         13543           30         Phasi Charoen         13.77472         100.4372         40079           31         Phaya Thai         13.78         100.5428         22875           32         Phra Khanong         13.70222         100.6017         29333           33         Phra Nakhon         13.7644         100.4992         13291           34         Pom Prap Sattru P	18	Huai Khwang	13.77667	100.5794	29568
Rhiong San   13.73028   100.5097   20415	19	Khan Na Yao	13.8271	100.6743	28308
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 <td>20</td> <td>Khlong Sam Wa</td> <td>13.85972</td> <td>100.7042</td> <td>67490</td>	20	Khlong Sam Wa	13.85972	100.7042	67490
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	21	Khlong San	13.73028	100.5097	20415
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       13.76806       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       Samphanthawon	22	Khlong Toei	13.70806	100.5839	31062
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         50763           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         Samphanthawo	23	Lak Si	13.8875	100.5789	33504
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       13.70806       100.5264       22426         42       Suan Luan	24	Lat Krabang	13.72232	100.7597	60729
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       13.77026       100.6847       30840         41       Sathon       13.70806       100.5264       22426         42       Suan Luang<	25	Lat Phrao	13.80361	100.6075	36377
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       13.70806       100.5264       22426         42       Suan Luang       13.70806       100.5264       22426         42       Suan Luang       13.77694       100.4567       31932         44       Thawi	26	Min Buri	13.81389	100.7481	45691
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 Wattha	27	Nong Chok	13.85556	100.8625	59228
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 13.7822 100.5858 20433	28	Nong Khaem	13.70472	100.3489	50783
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       100.6614       41484         43       Taling Chan       13.77694       100.4567       31932         44       Thawi Watthana       13.7878       100.4858       33565         46       Thung Khru       13.6472       100.4958       3991         47       Wang Thonglang	29	Pathum Wan	13.74494	100.5222	13543
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       100.4858       33565         46       Thung Khru       13.6472       100.4958       3991         47       Wang Thonglang       13.7864       100.6087       3994         48       Watthana<	30	Phasi Charoen	13.71472	100.4372	40079
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 13.6472 100.4858 39991 47 Wang Thonglang 13.7864 100.6087 33944 48 Watthana 13.7864 100.6087 33944	31	Phaya Thai	13.78	100.5428	22875
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       3991         47       Wang Thonglang       13.74222       100.5858       20433	32	Phra Khanong	13.70222	100.6017	29393
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	33	Phra Nakhon	13.76444	100.4992	13291
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       3991         47       Wang Thonglang       13.7864       100.6087       33944         48       Watthana       13.74222       100.5858       20433	34	Pom Prap Sattru Phai	13.75806	100.5131	11602
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	35	Prawet	13.71694	100.6944	59059
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	36	Rat Burana	13.68222	100.5056	25149
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	37	Ratchathewi	13.75889	100.5344	21085
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	38	Sai Mai	13.91917	100.6458	66690
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	39	Samphanthawong	13.73139	100.5142	6068
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	40	Saphan Sung	13.77	100.6847	30840
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	41	Sathon	13.70806	100.5264	22426
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	42	Suan Luang	13.73028	100.6514	41484
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	43	Taling Chan	13.77694	100.4567	31932
46     Thung Khru     13.6472     100.4958     39991       47     Wang Thonglang     13.7864     100.6087     33944       48     Watthana     13.74222     100.5858     20433	44	Thawi Watthana	13.7878	100.3638	24147
47     Wang Thonglang     13.7864     100.6087     33944       48     Watthana     13.74222     100.5858     20433	45	Thon Buri	13.725	100.4858	33565
48 Watthana 13.74222 100.5858 20433	46	Thung Khru	13.6472	100.4958	39991
	47	Wang Thonglang	13.7864	100.6087	33944
49 Yan Nawa 13.69694 100.5431 24005	48	Watthana	13.74222	100.5858	20433
	49	Yan Nawa	13.69694	100.5431	24005

# The map of Bangkok districts using Folium



Statistics information of population age 18-40 each district:

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

And then selected only district with number of population age 18-40 above average

# Stage 2

Use data from Foursquare API, limited only 200 venues, within radius 1500 m from center of each district Selected only venues with 'Coffee shop' category and show number of coffee shops in each district

Table: number of coffee shops in each district

	District	
0	Bang Bon	3

2 Bang Khae 3 Bang Khen 4 Bang Kho Laem 5 Bang Khun Thian 6 Bang Na 7 Bang Phlat 8 Bang Rak 9 Bang Sue 10 Bangkok Noi 11 Bangkok Yai 12 Bueng Kum 13 Chatuchak 1	0 2 4 9 0 4 5 6 3 4
3 Bang Khen 4 Bang Kho Laem 5 Bang Khun Thian 6 Bang Na 7 Bang Phlat 8 Bang Rak 9 Bang Sue 10 Bangkok Noi 11 Bangkok Yai 12 Bueng Kum 13 Chatuchak 1	4 9 0 4 5 6 3 4 3
4 Bang Kho Laem 5 Bang Khun Thian 1 6 Bang Na 7 Bang Phlat 8 Bang Rak 9 Bang Sue 10 Bangkok Noi 11 Bangkok Yai 12 Bueng Kum 13 Chatuchak 1	9 0 4 5 6 3 4
5 Bang Khun Thian 1 6 Bang Na 7 Bang Phlat 8 Bang Rak 9 Bang Sue 10 Bangkok Noi 11 Bangkok Yai 12 Bueng Kum 13 Chatuchak 1	0 4 5 6 3 4
6 Bang Na 7 Bang Phlat 8 Bang Rak 9 Bang Sue 10 Bangkok Noi 11 Bangkok Yai 12 Bueng Kum 13 Chatuchak 1	4 5 6 3 4 3
7 Bang Phlat 8 Bang Rak 9 Bang Sue 10 Bangkok Noi 11 Bangkok Yai 12 Bueng Kum 13 Chatuchak 1	5 6 3 4
8 Bang Rak 9 Bang Sue 10 Bangkok Noi 11 Bangkok Yai 12 Bueng Kum 13 Chatuchak 1	6 3 4 3
9 Bang Sue 10 Bangkok Noi 11 Bangkok Yai 12 Bueng Kum 13 Chatuchak	3 4 3
10 Bangkok Noi 11 Bangkok Yai 12 Bueng Kum 13 Chatuchak 1	4
11 Bangkok Yai  12 Bueng Kum  13 Chatuchak  1	3
12 Bueng Kum 13 Chatuchak 1	
13 Chatuchak 1	
	5
	3
14 Chom Thong	3
15 Din Daeng	9
	0
17 Dusit	7
18 Huai Khwang	4
19 Khan Na Yao	5
20 Khlong Sam Wa	3
21 Khlong San	4
22 Khlong Toei 1	4
23 Lak Si 1	1
24 Lat Krabang	0
25 Lat Phrao 1	0
26 Min Buri	3
27 Nong Chok	4
28 Nong Khaem	1
29 Pathum Wan	4
30 Phasi Charoen	5
31 Phaya Thai 1	0
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	48 Watthana	
49	Yan Nawa	5
	Sum	288

Statistics information of number of coffee shops each district:

count50.000000mean5.760000std3.323141min0.00000025%3.00000050%5.00000075%9.000000max14.000000

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	Venue	Venue Latitude	Venue Longitude	Venue Ostegory
0	Bang Bon	13.6592	100.3991	ขาหมูบางหว้า	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	ร้านต้นไม้ ริมถนนกาญจนาภิเษก	13.654098	100.405054	Garden Center
8	Bang Bon	13.6592	100.3991	เจ้ใน้ ก๋วยเตี๋ยวเป็ดตุ๋น	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 <u>link</u>

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

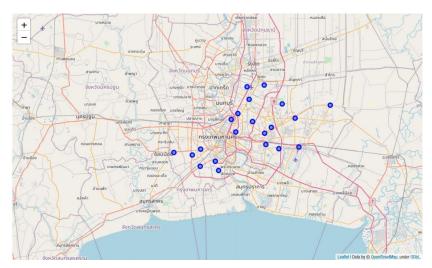
Finally, the district(s) that met all criteria will be selected as a result

# Results

1)

Table: Population age 18-40 above average

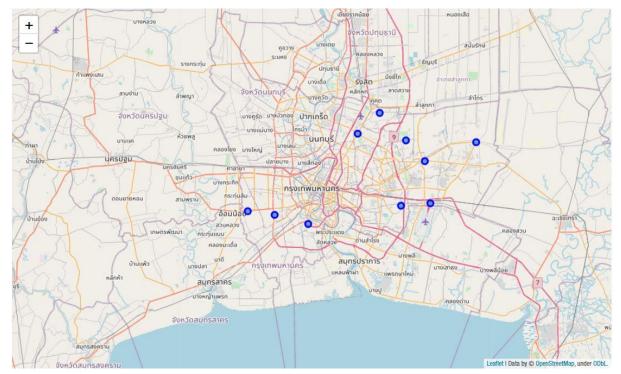
	District	Population18_40
1	Bang Kapi	46041
2	Bang Khae	62257
3	Bang Khen	61167
4	Bang Khun Thian	61456
5	Bang Sue	38954
6	Bueng Kum	44623
7	Chatuchak	50305
8	Chom Thong	47742
9	Din Daeng	36669
10	Don Mueang	60739
11	Khlong Sam Wa	67490
12	Lat Krabang	60729
13	Lat Phrao	36377
14	Min Buri	45691
15	Nong 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

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

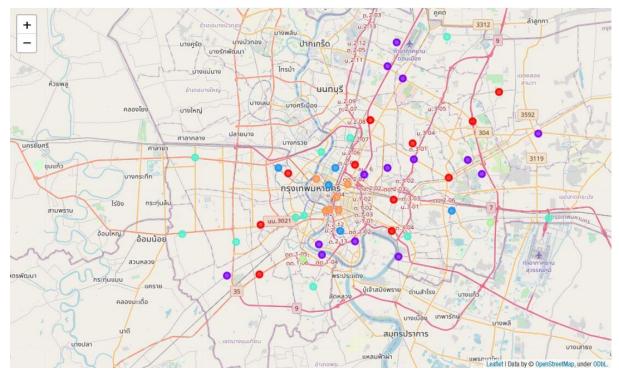
	District	Population18_40	Coffee shop	Including her	Per Person
1	Lat Krabang	60729	0	1	60729
2	Prawet	59059	0	1	59059
3	Sai Mai	66690	1	2	33345
4	Nong Khaem	50783	1	2	25391.5
5	Bang Khae	62257	2	3	20752.33
6	Khlong Sam Wa	67490	3	4	16872.5
7	Bang Khen	61167	4	5	12233.4
8	Chom Thong	47742	3	4	11935.5
9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

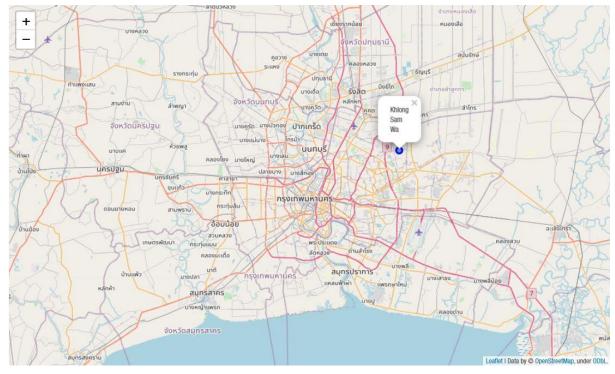
The map shows result after clustering Bangkok districts into 6 clusters



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 'Khlong 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 'Khlong 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.