

Analyze area to open restaurant around office area in Bangkok

Surat Suntong
surat.s@vernalgreen.net

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1. Introduction

1.1. Background

Bangkok is the most population in Thailand, not just Thai people live in there but foreigner are also coming for travel, work and live here. For Thai people Bangkok is the most expensive living expenses and highest income city in Thailand that makes Bangkok be a central of businesses and economics of Thailand.

1.2 Problem

During the daytime, people who work in Bangkok must seeking for breakfast and lunch while the traffics is too heavy and time limit, the fast food near their office area must be a great choice. There are so many offices and restaurants in Bangkok downtown, but the place I have work before have no restaurant nearby, we have to walk about 100-150 meter to find some restaurant, and when we arrived there, they have no enough seat for us, so we have to wait for other customer finish their meal, bill, and exit the restaurant and then we got a seat. That became to this idea.

1.3 Interests

This analysis must fit to anyone who looking for a place to open restaurant in downtown of Bangkok, or office man who available to make a lunch box or some sandwich to sell in your office, this is a good opportunity to start food business.

2. Data

2.1. Data Sources

Data in this project having 2 parts office and restaurant location data, Bangkok geography data. Office and restaurant location data are integrated from Foursquare API and Bangkok Geography data is came from Wikipedia and Geojson is came from worldmap.haward.edu.

2.2. Data Cleaning

At a name of district of Bangkok some district name in Geojson file and Wiki table is not match so I have edited a name of district to map Geojson with visualize population number with choropleths map if the mapping of district name is not matching, the population in those district will be zero (not visualize).

2.3. Data Preparation

To analysis a neighborhood, first I have prepared an office and restaurant data from center of downtown in Bangkok, I choose a Pathumwan district as a center of this analysis because that the one of the most business area, contain Silom, Asoke, Sukhumvit, Siam. I have set my area to do this analysis with in 6 kilometers radius from center of Pathumwan district.

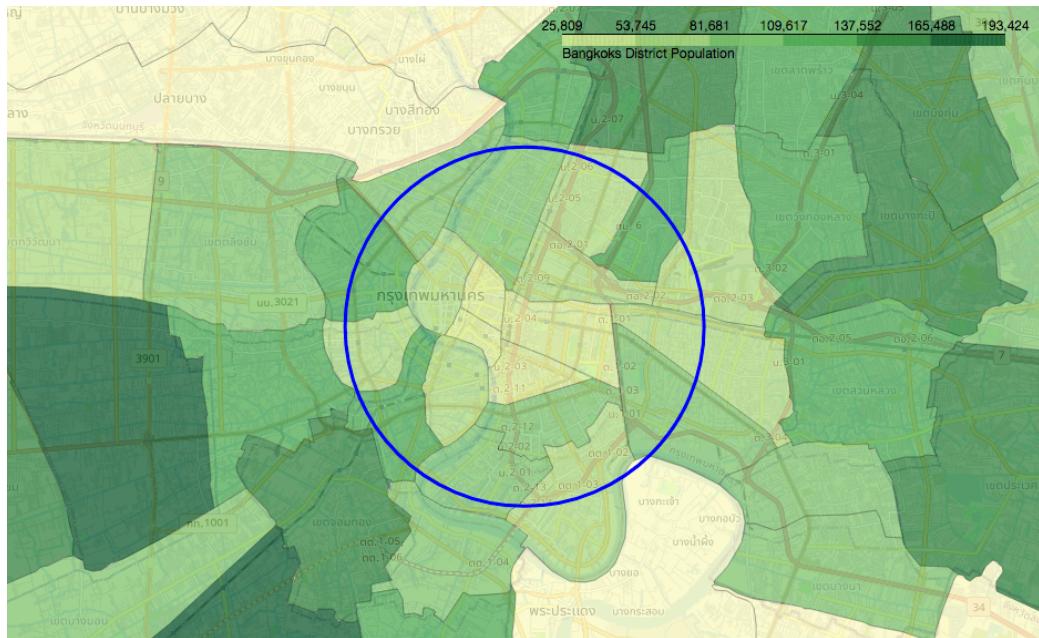


Figure 1. 6 kilometers radius from center of Pathumwan district

The Foursquare API is response with only top 100 recommended places data, so in that 6 kilometers radius I have to create co-ordinate area in there, the specification of coordinate area is 300 meters radius.

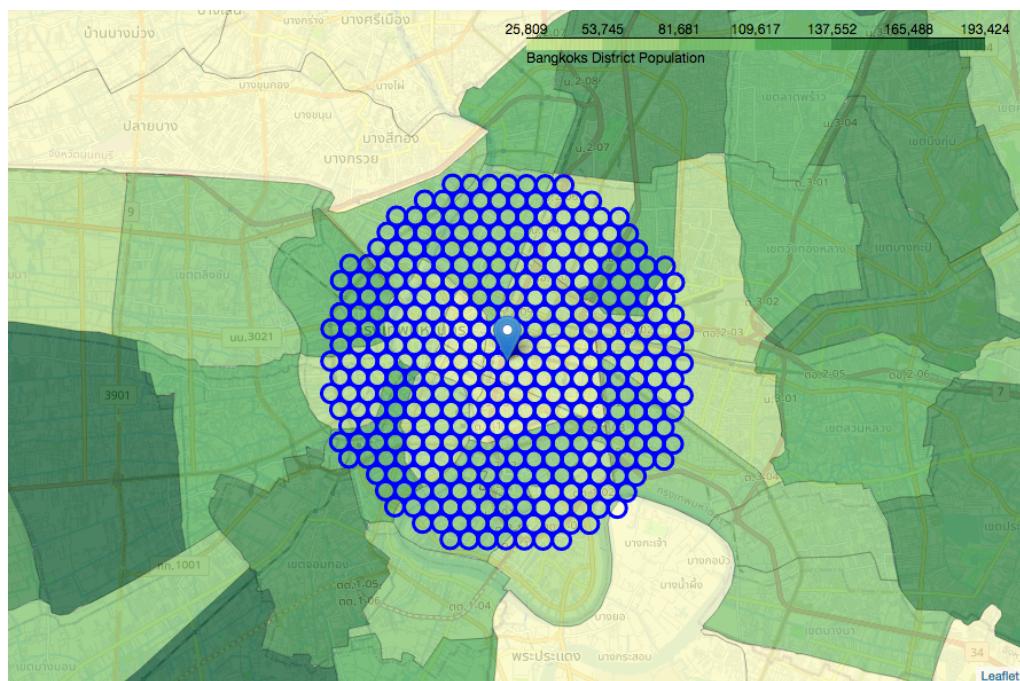


Figure 2. 300 meters radius coordinated area in 6 kilometers radius area

And then I request office and restaurant data from Foursquare for each area in **figure 2** then plot it into a map

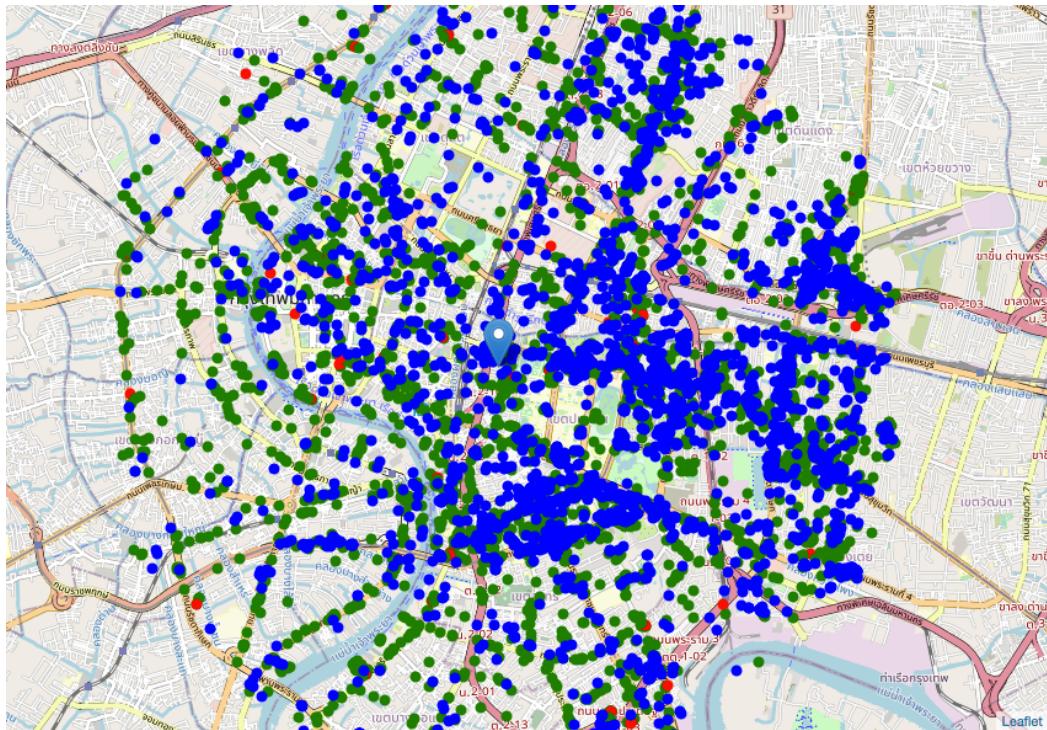


Figure 3. A plot of location of Office, Restaurant and Fast Food restaurant

In plot Blue dots are office, green dots are restaurant and red dots are fast food restaurant. With this data I will use it to find a distance to restaurant from each office but before that I have to reduce an area that need to put restaurant with assuming 3 offices per 1 restaurant in area with this ratio (3:1) can catch a less restaurant area.

3. Methodology

3.1. Finding focused area

Before doing analysis of a good area to open restaurant we having too many offices and restaurant that we have plotted in figure 3, I will finding for area that having less restaurant in that coordinate area with 3:1 ratio (3 offices per 1 restaurant)

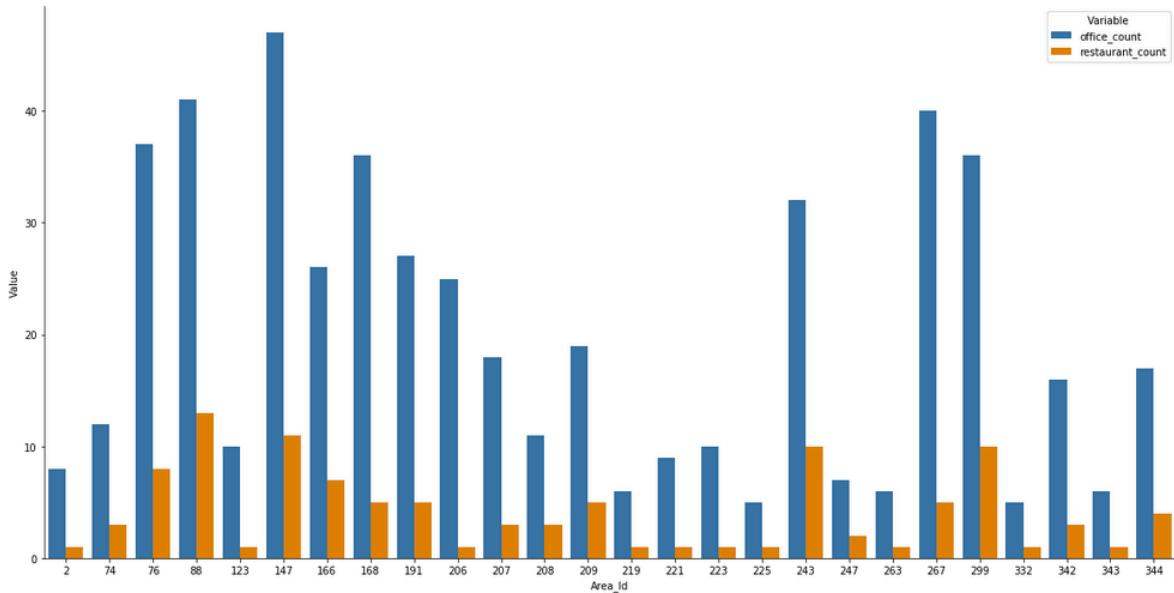


Figure 4. Bar chart of area that contain restaurant less than offices in 3:1 ratio

I got a focused area already in bar chart we see in those area have too less restaurant in area (300 meters radius). Plot those focused area into a map and see what we get.

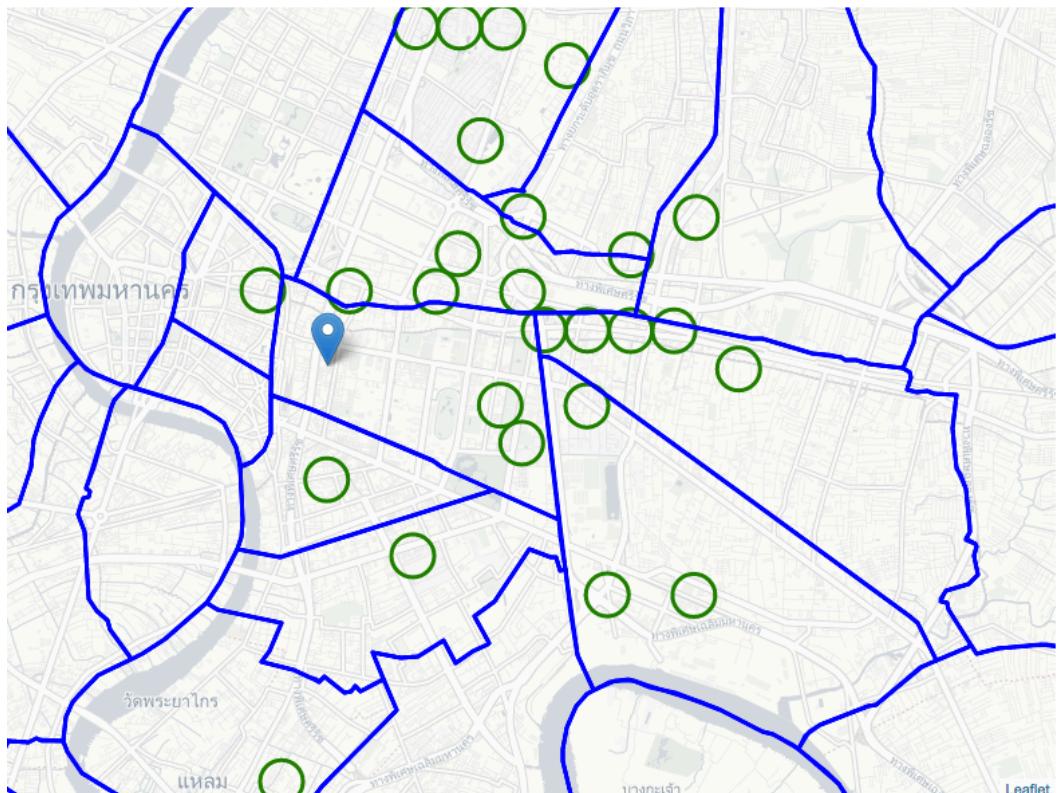


Figure 5. Focused area contain restaurant less than office within 3:1 ratio

3.2. Finding restaurant near office

After we assign focused area already, then I use office's latitude and longitude to plot and finding for nearby restaurant in 100 meters radius to find what we get from focused area so this is what we found

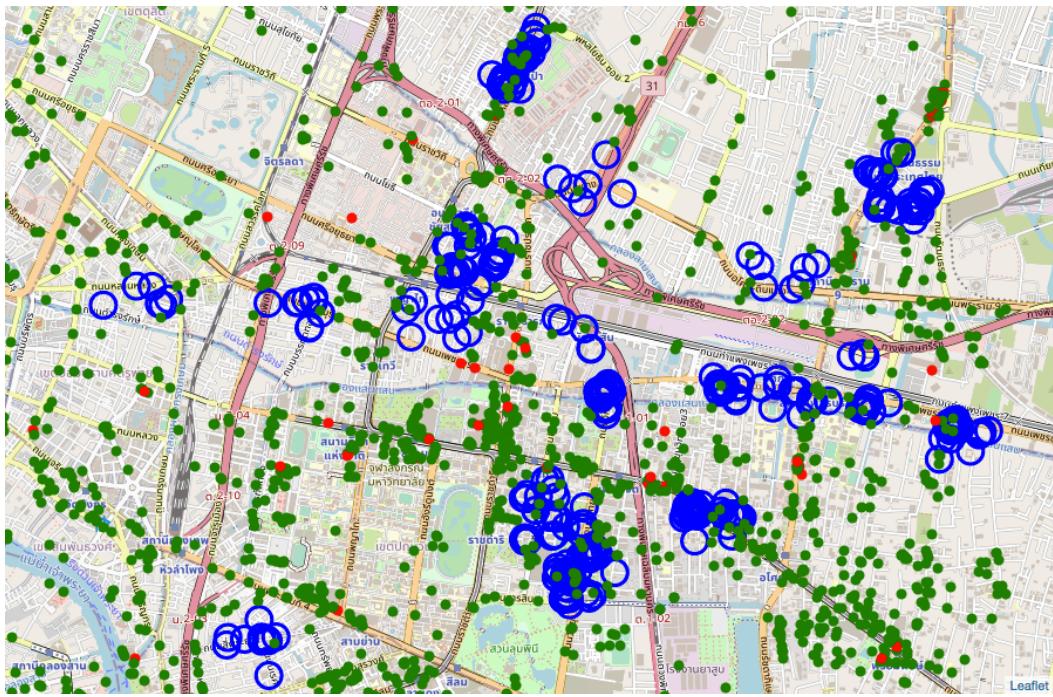


Figure 6. Example of restaurant near offices in focused area

As we see in figure 6 there're many offices in those area but they not have close enough restaurant to offices that will make a lack of seat in restaurant. After analysis let filter out office that have restaurant within 100 meters radius.

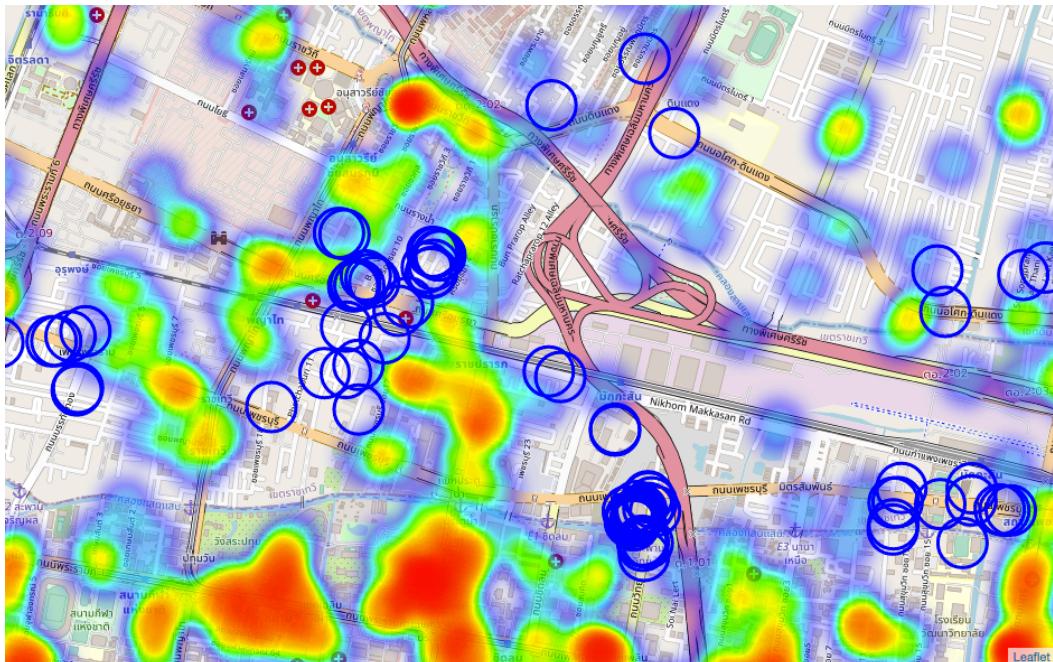


Figure 7. Example plot after filtered only office that not contain restaurant

3.3. Clustering offices group

Next step when we filtered out we will get a group of office that not have restaurant nearby we will use clustering to group those offices and then plot a cluster in 100 meters radius from center of cluster into map.

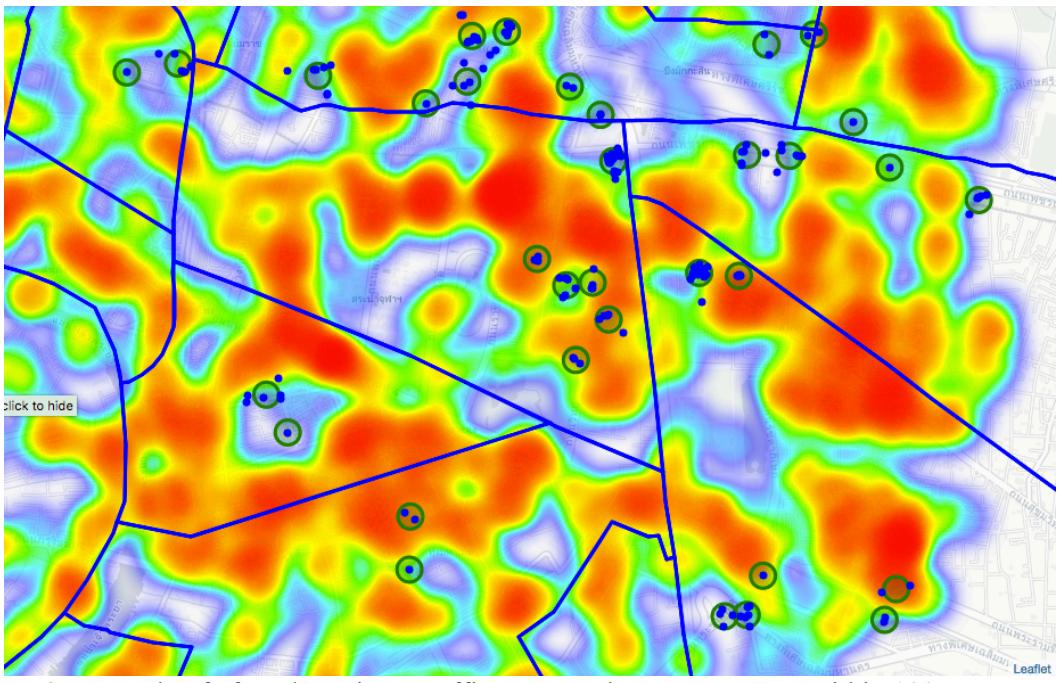


Figure 8. Example of after clustering an offices group that no restaurant within 100 meters radius

As we explore a cluster performing we see some cluster radius contain just 1 office in there but some offices are not in cluster radius so shall we filter the cluster that contain offices less than 3 offices as we assume 3 offices per 1 restaurant and see what we get.

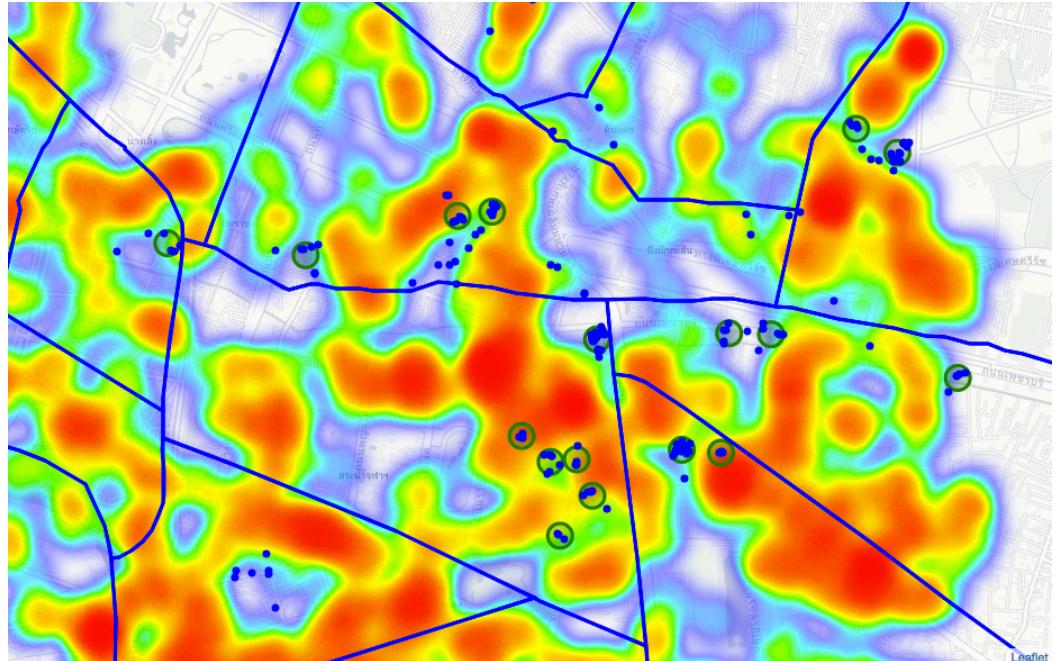


Figure 9. Example of applying a condition to filter cluster that contain 3 offices or more

3.4. Clustering evaluation

But do we get good enough model of clustering in this cluster? I have assign 50 cluster number. To find good enough cluster group I will try to increase number of clusters until a round number of all offices that no restaurant around it is 222 offices, so as 3 offices per 1 restaurant ratio I got 74 for maximum cluster number for this analysis. So, let's find top 10 of area where good

location to open restaurant nearby, before that we will evaluation model to find good number of clusters with average of offices in cluster in top 10 cluster area

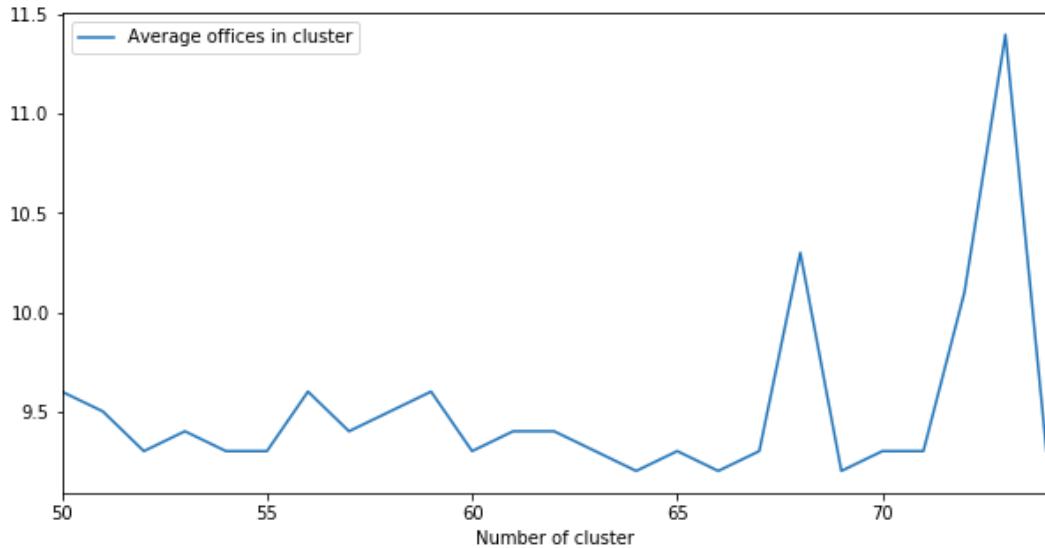


Figure 10. Average of offices in cluster in top 10 cluster in each number of clusters from 50 until 74

After we get the best average offices in cluster in Figure 10 is showing 73 number of clusters is giving the best average offices in top 10 clusters after cluster perform, I use 73 number of clusters to perform cluster again and then select top 10 that contain most offices in cluster and plot it into bar chart

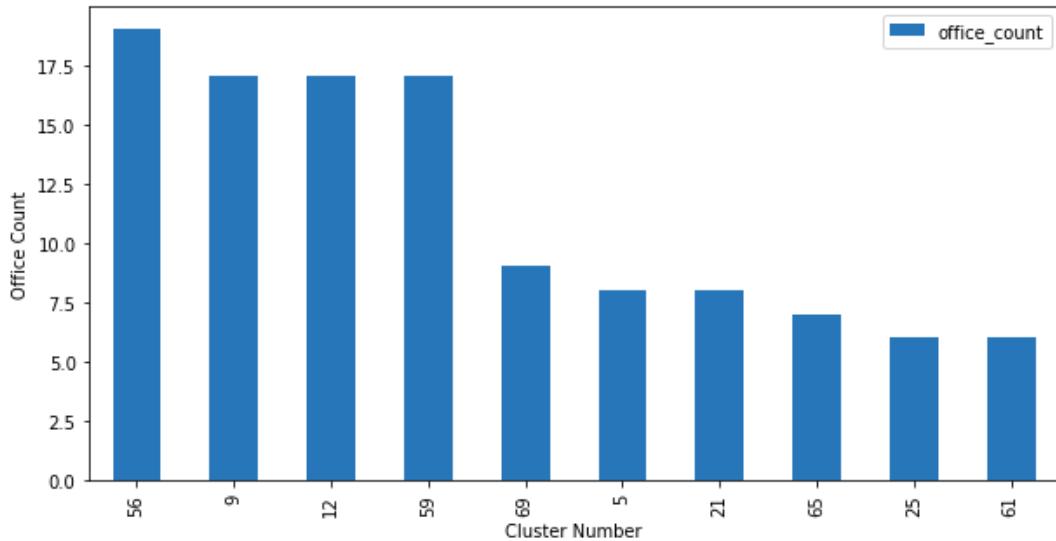


Figure 11. Number of offices in top 10 clusters

4. Result

After perform a clustering model that we used we get 10 areas to open restaurant, in each area having 100 meters radius from center of cluster (marker). Let's explore what we get.

Cluster No.	Address	Offices in cluster
56	1126/1-2 Phetchaburi Rd, Khwaeng Makkasan, Khet Ratchathewi	19
9	1126/2 Wanich Bld. 4th Floor, New Petchburi Rd., Khwaeng Makkasan, Khet Ratchathewi	17
12	140 Sukhumvit Rd, Khwaeng Khlong Toei, Khet Khlong Toei	17
59	212/22, Sukhumvit Plaza. 1st Floor, Sukhumvit Rd., Khwaeng Klongtoey, Khet Klongtoey	17
69	63/1 Thanon Walthana Tham, Khwaeng Huai Khwang, Khet Huai Khwang	9
5	63/1, Rama 9 Rd, Khwaeng Huai Khwang, Khet Huai Khwang	8
21	Bangkok Thai Tower, Khwaeng Thanon Phaya Thai, Khet Ratchathewi	8
65	57/6-7, Wireless Rd., Khwaeng Lumphini, Khet Pathum Wan	7
25	Unnamed Road, Khwaeng Din Daeng, Khet Din Daeng	6
61	10 Na Ranong Rd, Khwaeng Khlong Toei, Khet Khlong Toei	6

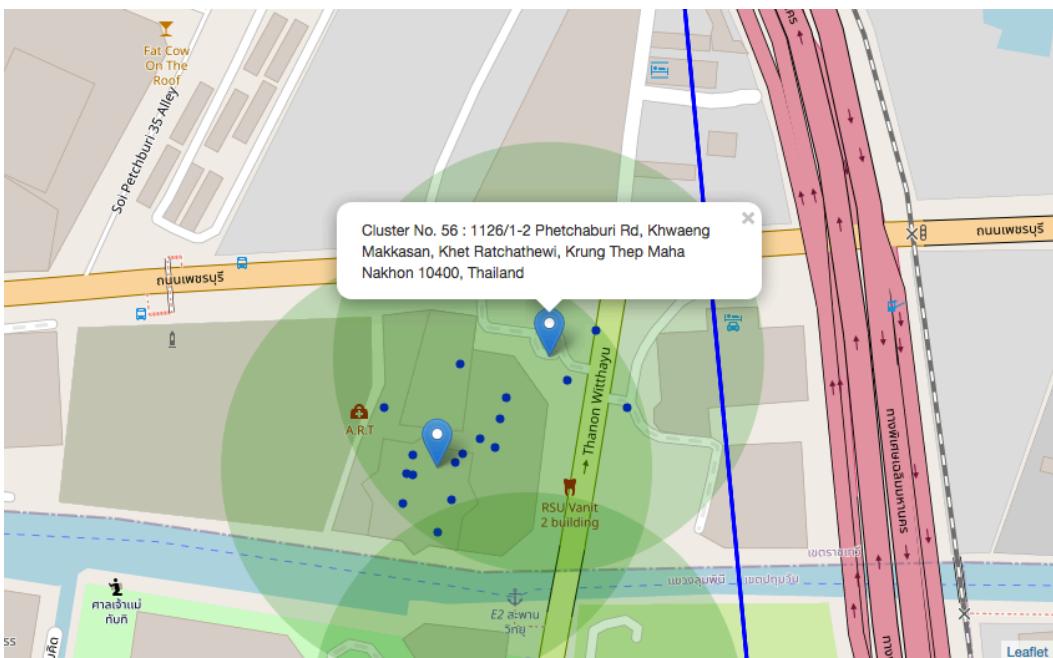


Figure 12. Cluster No. 56, 1126/1-2 Phetchaburi Rd, Khwaeng Makkasan, Khet Ratchathewi

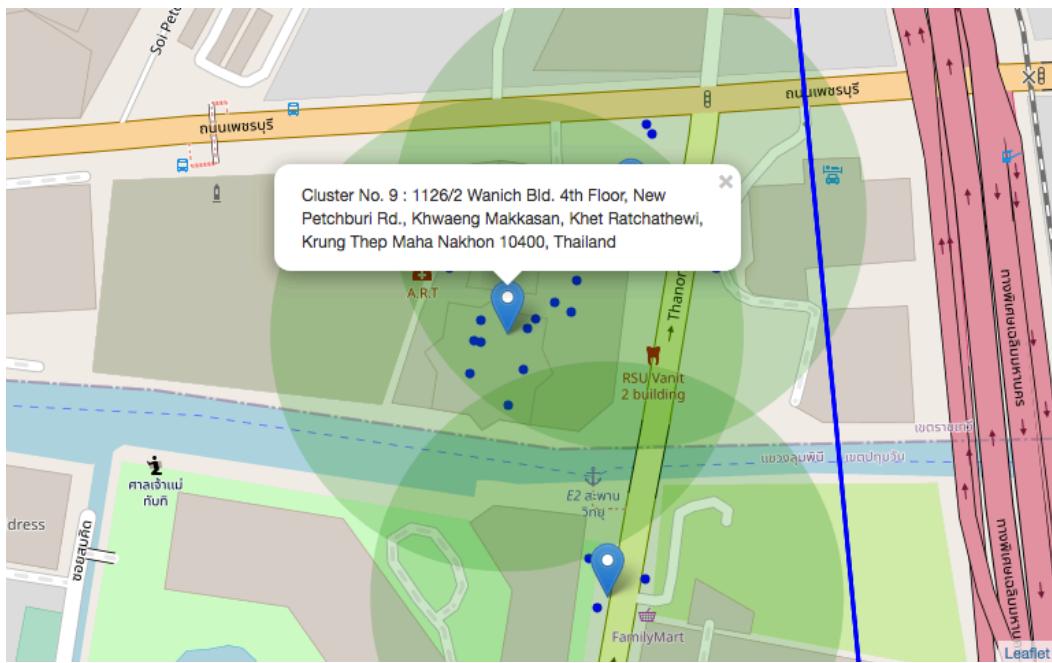


Figure 13. Cluster No. 9, 1126/2 Wanich Blvd. 4th Floor, New Petchburi Rd., Khwaeng Makkasan, Khet Ratchathewi

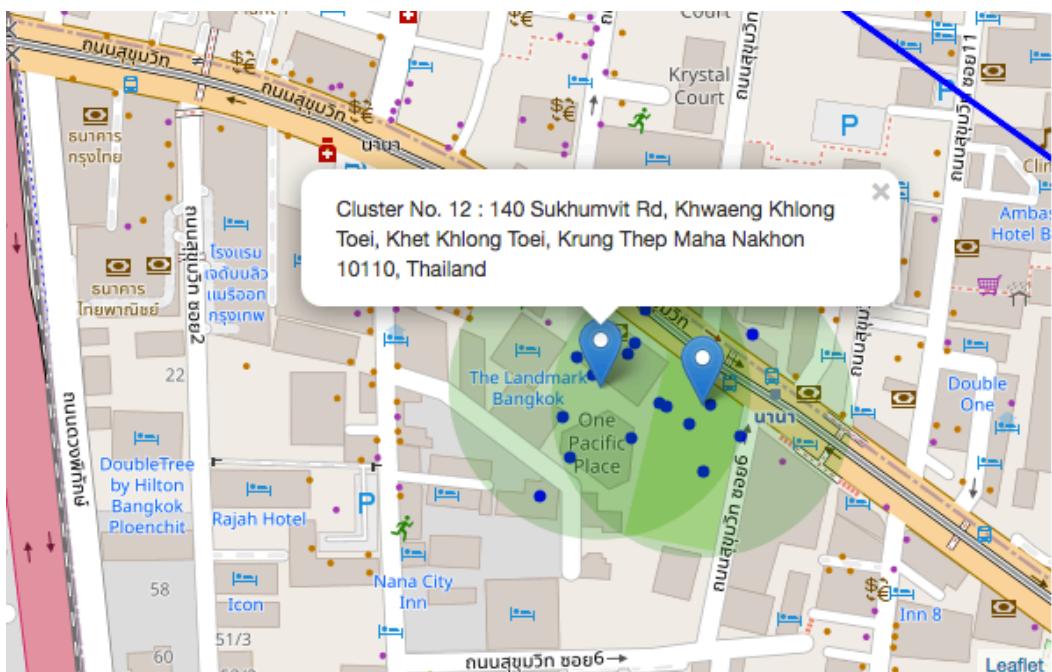


Figure 14. Cluster No. 12, 140 Sukhumvit Rd, Khwaeng Khlong Toei, Khet Khlong Toei

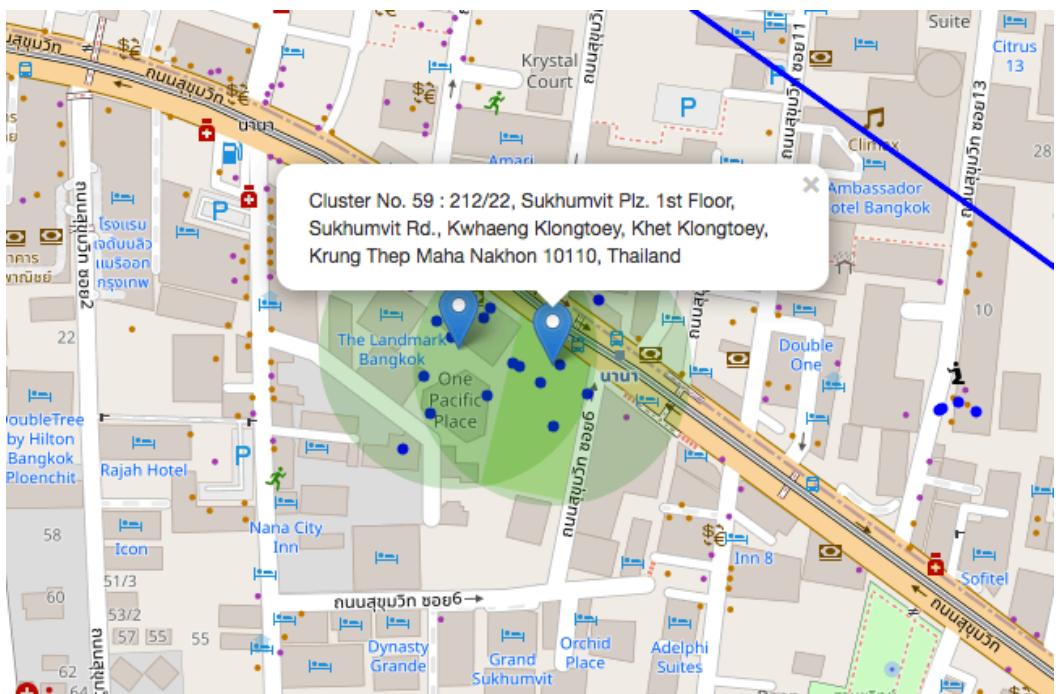


Figure 15. Cluster No. 59, 212/22, Sukhumvit Plz. 1st Floor, Sukhumvit Rd., Khaeng Klongtoey, Khet Klongtoey



Figure 16. Cluster No. 69, 63/1 Thanon Walthana Tham, Khwaeng Huai Khwang, Khet Huai Khwang

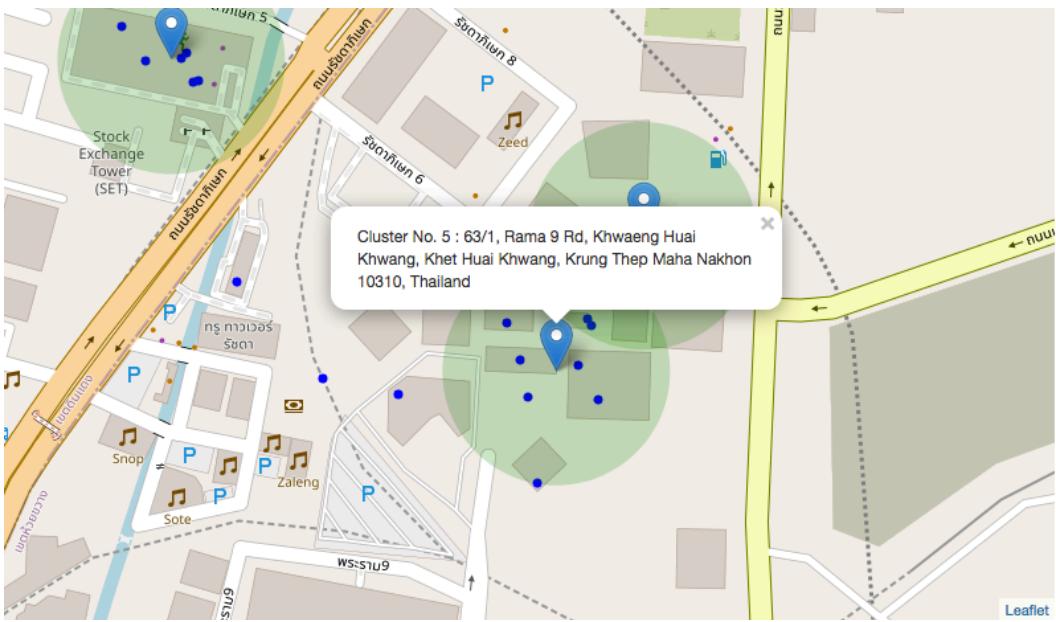


Figure 17. Cluster No. 5, 63/1, Rama 9 Rd, Khwaeng Huai Khwang, Khet Huai Khwang

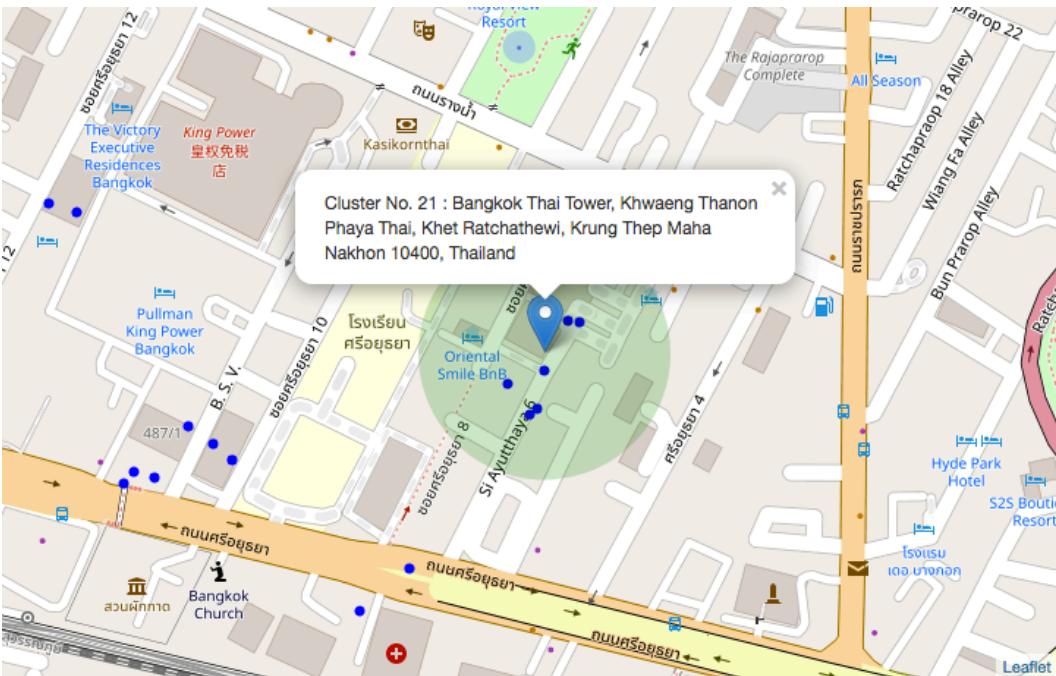


Figure 18. Cluster No. 21, Bangkok Thai Tower, Khwaeng Thanon Phaya Thai, Khet Ratchathewi

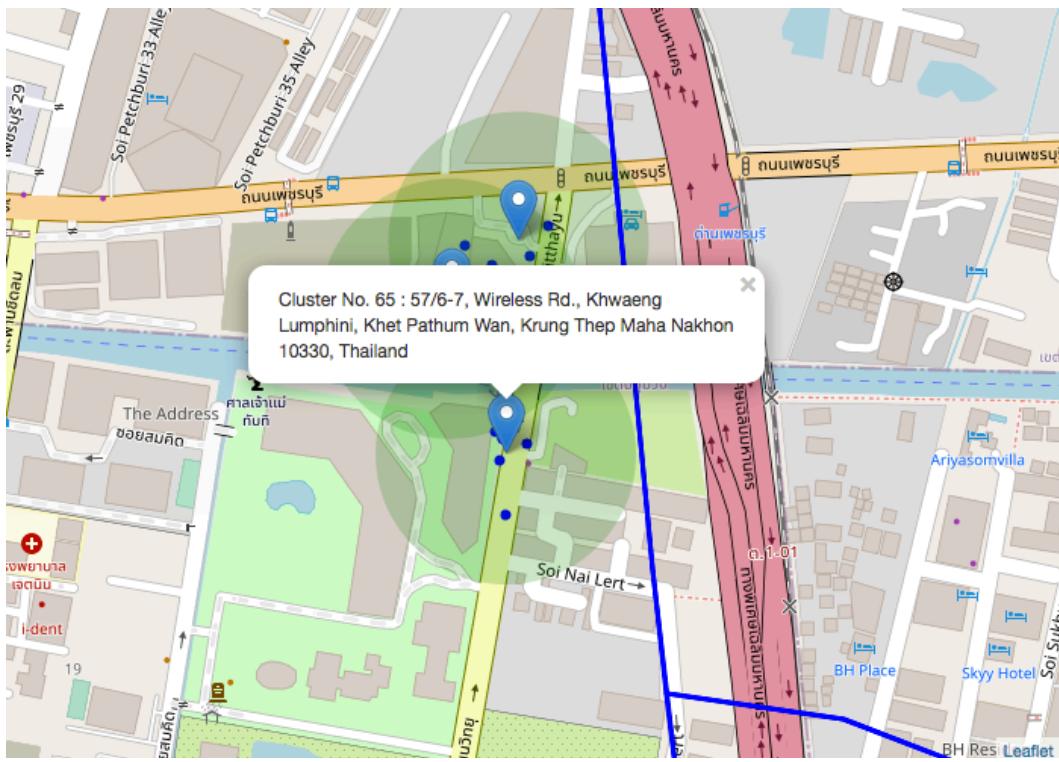


Figure 19. Cluster No. 65, 57/6-7, Wireless Rd., Khwaeng Lumphini, Khet Pathum Wan

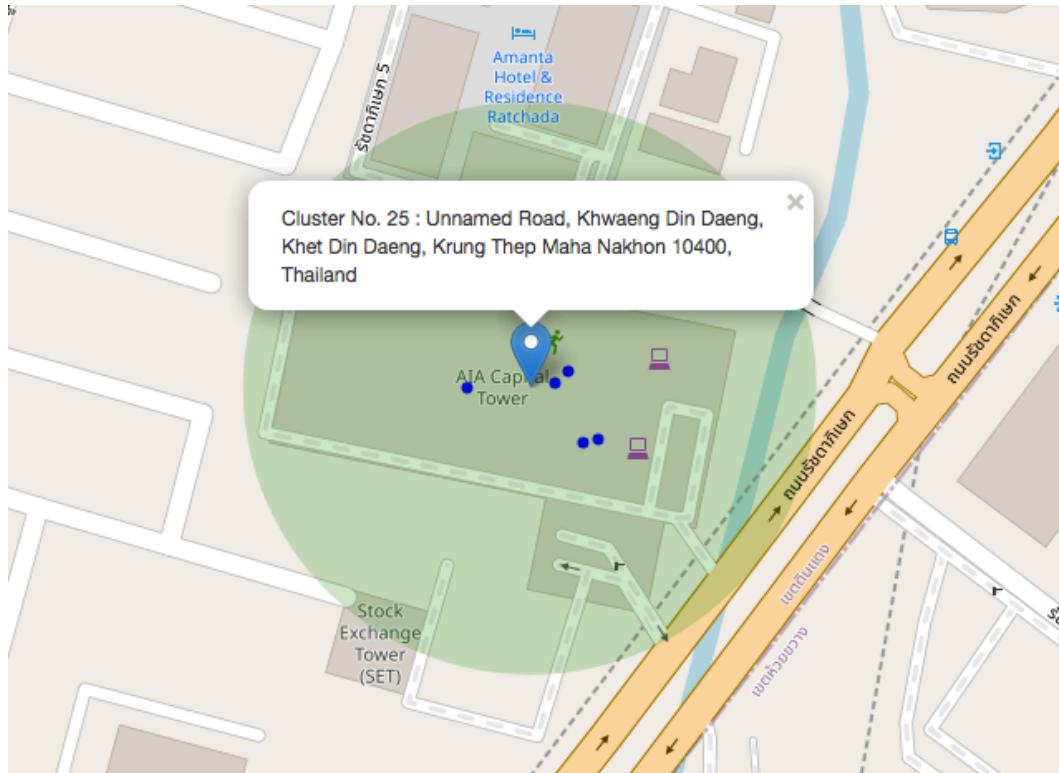


Figure 20. Cluster No. 25, Unnamed Road, Khwaeng Din Daeng, Khet Din Daeng

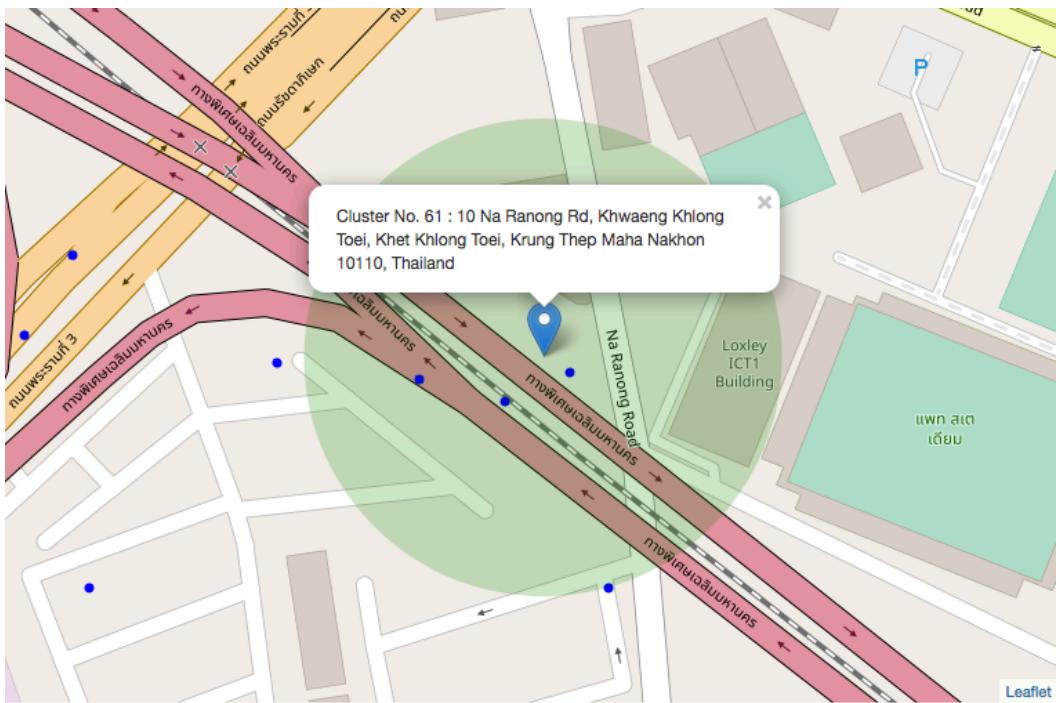


Figure 21. Cluster No. 61, 10 Na Ranong Rd, Khwaeng Khlong Toei, Khet Khlong Toei

5. Discussion

First, I was show there are many office and restaurant in Bangkok downtown area (from center of Pathumwan District until 6 kilometers radius) that I can catch from Foursquare API with create an area to get restaurant and office around each area because of limit of Foursquare API that returning with top 100 recommended place. After I get all of the places needed, I calculated a number of offices and restaurant in each area to find focusing area to do analysis to reduce unnecessary area to put more restaurant because they already have much more restaurant in there. So, I've set ratio for this analysis at 3 offices per 1 restaurant, it means if that area has 4 offices but only 1 restaurant then that will be our focused area. Then I made counting restaurant for each office within 100 meters radius from office and count and filter the office that having restaurant in 100 meters radius out from analysis so, that I will catch offices that have no restaurant nearby. Next step I group offices together with K-Mean clustering using center of cluster as center of office's group and then count an office in cluster area. The first try with 50 cluster is not good enough because there're many groups of offices are out of cluster so I try to make the best cluster model wishing to get most average office in cluster for top 10 that contain the most offices in there. After I get the best number of clusters, I go to cluster again with that number of cluster and get top 10 area that contain most office in there.

6. Conclusion

The purpose for this project is finding the best place to open restaurant around offices area that mean this project will find a group of offices that doesn't have restaurant nearby. By calculating and analysis the offices and restaurant data, reducing it with condition and clustering it until we get the top 10 best area to open a restaurant

But the final decision for an optimal location will be made by stakeholder based on offices size in cluster that we made, a characteristic of office man who work there, taking into consideration additional factors, etc., also if you aim to get more customer that not work around there you should define the place to put your restaurant based on proximity to major roads, real estate availability, prices, social and economic dynamics of every neighborhood