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PPD631 GIS for Public Policy, Planning, and Development

24th April 2016

Site suggestions for new police stations

1. Define the problem

Currently, the populated Dongdaemun district is in a sheer need of more police stations to respond to increasing crime rates and other problems. The question I am seeking for this project is finding out where would be the best optimal location to build more police stations.

2. Background

Dongdaemun district is one of the most complicated and busiest areas in Seoul, Korea, with myriad commercial buildings, tourist attractions, and office buildings. As a result, the crime rate in this area is higher than any other districts in Seoul. However, due to the relatively low number of residents who actually live there, there are not so many police stations in the area; furthermore, the speed of construction and legislative implementation for new police stations are not able to keep up with the speed of increasing crime rate.

When the government determines the location for new police stations, there is a need for statistical facts, such as crime distribution and population. To be an efficient dispatch, lessening the time to respond to emergency calls is important as it directly impacts victims' lives, as well

as crucial for arresting suspects and securing evidence on time. Therefore, the government should consider not only on population data but also on crime distribution and dispatching time when searching new locations for police stations. What I want to find out through this GIS project is to find the location where police stations are most needed, which are high-crime areas.

3. Data information

1) The location of existing police stations

The data was derived from gis.seoul.go.kr which is the official homepage of the Seoul Metropolitan Government for establishing GIS environments in Korea. The data are provided as a shapefile, therefore enabled easy access and opening through ArcGIS.

2) Crime location

The data was derived from the same website and formatted as a shapefile. In the existing map, the crime data only appeared as categories (i.e. robbery, drugs, arson) which made it difficult to discern which areas had more serious types of crimes. I reorganized all different types of crime into a simpler category of felonies and misdemeanors, as defined by the Korean National Police Agency. Serious felonies such as rape, armed robbery, drugs, arson, and murder are shown in red; misdemeanors as petty theft and assault are shown in blue.

3) Boundaries of sub-districts and populations

The data was derived from the same website and formatted as a shapefile and numerical data. I joined the data with the existing map and symbolized it with Graduated colors based on the number of population. I thought this data could be weighted to find the best location since it

was commonly perceived that police stations should be located in neighborhoods with high density. However, after interviewing a policeman working in the Dongdaemun district, I found out that density was not the determining factor where they were located. The policeman said that Dongdaemun is one of the most ‘Downtown Hollowing Out’ areas, which means there are not so many people who actually reside in the area; in other words, being where the floating population is high mattered more to the station’s location.

4. Procedures

① I joined the population data with boundaries of Dongdaemun district’s map, and then symbolized Graduated colors based on the number of population. Now, the population of each neighborhood in Dongdaemun district can be seen in a glance.

② I overlaid three maps, existing police stations, crime areas, and neighborhoods to analyze the relationships among them.

③ I used the Buffer tool with one kilometer-range, based on the existing police stations

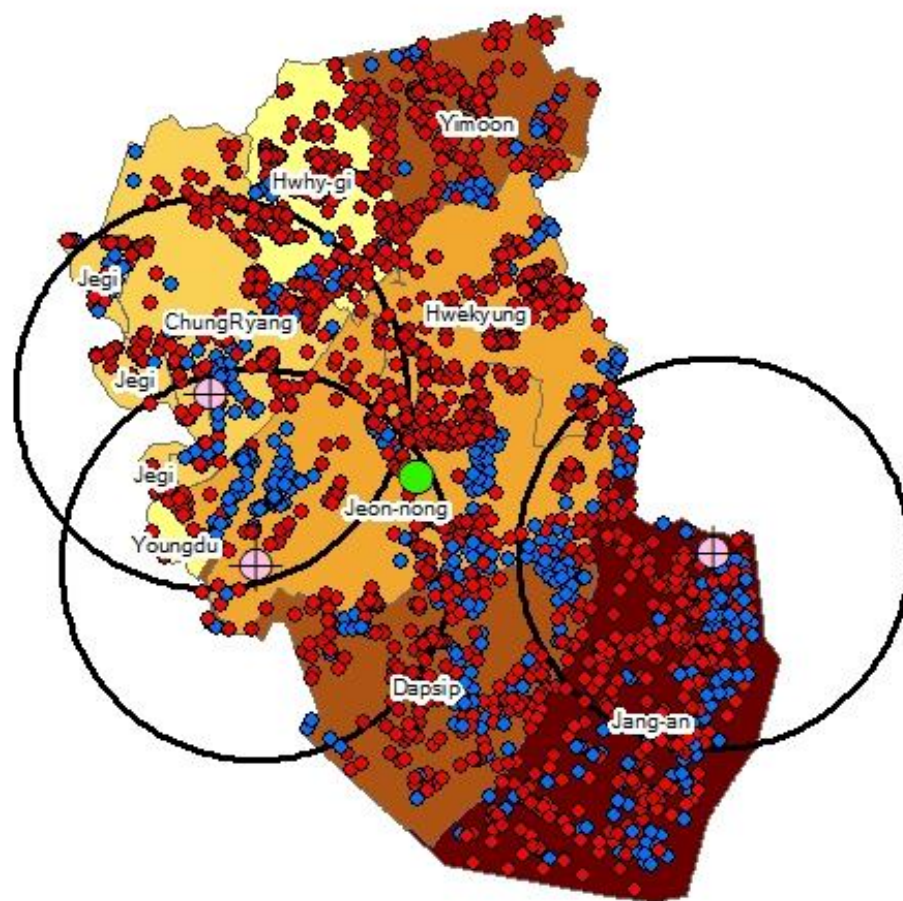
: In Korea, it is ideal to respond within three minutes, which the police officers try to do in reality. However, there are no official guidelines on how much a distance police officers could be to get to the crime area in three minutes. The time to get to the site heavily depends on traffic congestions, road conditions, and the officers’ depth of knowledge of the neighborhoods. Therefore, I asked one of the police officers in Dongdaemun about the estimated average distances in order to get to the spot in three minutes, considering the particular aforementioned

characteristics of Dongdaemun. The officer responded that it heavily depended on the traffic, but that in most cases (except rush hour) if within one-kilometer from the police station it could be reached in three minutes. Based on his response, I buffered the map in a one-kilometer range. Relying solely on personal estimates may be the limitation of this project, however because there is no official guideline, this was the only given option for me to create this map.

④ After buffering, I wanted to know where the crime areas were beyond the buffered area (hereafter as “out-of-boundary” areas). In order to distinguish the crimes that are happening in and outside of the buffered area, I erased all crime data within the buffered area using the ‘Erase’ tool.

⑤ I designated the neighborhoods of Dongdaemun district as upper areas and lower areas by dividing the total size of the district.

: First, I aimed to figure out where the best location for a new police station would be to serve the out-of-boundary neighborhoods. However, such crime areas are located too sparsely throughout the entire district, and as a result the best location appeared in the center of Dongdaemun. To reiterate, as shown in the map below, the green dot in the center is the best location when calculating how spread out the crime areas were.



However, if buffered around the new spot, it cannot effectively cover all the out-of-boundary crime areas; as shown in the map, a good majority of the crimes happen in the southern and northern part of the district. To overcome this limitation, I divided Dongdaemun district into two areas – the upper area and lower area – to figure out two new locations to place a police station. Since effective dispatching time heavily relies on the distance from the crime area, I made sure both upper and lower areas were similar in size. The upper area contains Yimoon,

Hwhy-gi, ChungRyang, and Hwekyung and the lower area contains Jeon-nong, Dapsip, and Jang-an.

⑥ Using the Clip tool on the out-of-boundary crimes with a Clip Feature of ‘upper neighborhood area layer’, I figured out where the out-of-boundary crimes were happening in the upper area.

⑦ Using the Erase tool on out-of-boundary crimes with an Erase Feature of ‘upper neighborhood area layer’, I figured out where the out-of-boundary crimes were happening on lower area.

⑧ While every crime deserves an equal investigation, it is very difficult to do so due to limited human resources, time, budget, and so on. In order to maximize neighborhood protection with these limited resources, it would be helpful to have a police station where the most felonies are happening, as felonies generally can lead to other serious crimes. Therefore, it is reasonable to weigh in on felonies when considering the new locations for Dongdaemun’s police station.

⑨ Using the ‘Mean Center’ tool, I figured out the best locations of the two new police stations each in the upper and lower area.

5. Limitations

When I registered for PPD 631, I hoped that I would be able to use the GIS program and its implications when doing research back home in Korea which is why I decided to use Korean data. However, it was not easy to overcome various hurdles and limitations. In terms of data

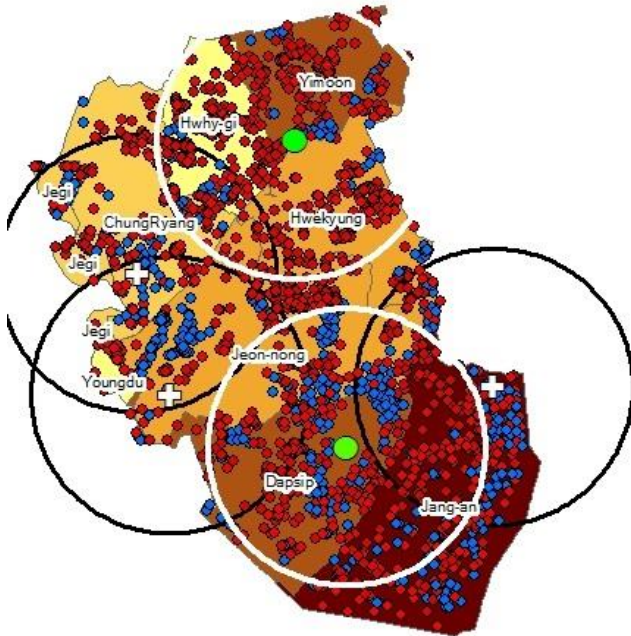
themselves, there was not enough information on when crimes occurred, street addresses of crime areas, and the jurisdictional boundaries of the police stations, although that did not have negative impact on my results. However, having more abundant information made available could be helpful for other research projects in Korea in the future. Through this project, I realized that infrastructure for GIS environment is still not well-established in Korea. In terms of carrying out my project, the most significant limitation was defining the buffering distance in the absence of official guidelines, as I mentioned above. To overcome this limitation, I asked the police officer, who has been working in Dongdaemun for five years, since his experiences could estimate the approximate distance to arrive in a crime area in three minutes. While I acknowledge the shortcomings of defining the buffering distance based on his personal opinion, his response provided meaningful insight into where we could place new police stations in the future.

6. Conclusion

Timing is crucial for police officers when arresting suspects, securing evidence, and saving lives. The Korean National Police Agency has an unofficial “guideline” that dispatching time should be within three minutes after notification. However, the three-minute guideline could be very difficult to achieve in reality, especially when heavy traffic is taking place and when there is too much floating population for a single police station to cover.

Dongdaemun is one of the busiest districts in Seoul; with only three existing police stations, they are not enough to control all crimes happening in the area. If a new police station is built in the center as originally indicated by the data, myriad crimes happening in the northern and southern part of the district cannot be controlled under the three-minute response “guideline”.

Hence, in order to make that three-minute “guideline” possible, we need two new police stations in each part.



The two white boundaries indicated on the map (left) are the areas which could be covered by the new police stations. If two police stations can be constructed in each boundary, considerable locations can be covered. Even though I did not use the population data to determine the best location for the new police stations, I left the population factor with graduated colors to show that there is

no significant causal relationship between the two data (population and crime location) in this area.

In conclusion, GIS analysis shows that at least two police stations are needed and should be located in both the northern upper area and the southern lower area of the Dongdaemun district to effectively dispatch police officers in a timely manner. I suggest that if potential construction plans focus on high-crime areas, rather than dense neighborhoods, and keep in mind of the district’s characteristics, then both neighborhood security and work effectiveness of the police officers could be achieved.

Where to Construct New Police Stations Dongdaemun District, 2016

