GIS PROJECT: UBER HUBS PLANNING

GEOB 270 Wednesday Lab L2D, 2017W

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TABLE OF CONTENTS

ABSTRACT

Later this year, Uber will possibly be officially launching in Vancouver, providing transportation networks throughout the lower mainland. Since Uber is coming to Vancouver, the purpose of our project is to examine and locate 15 top optimal hubzones for Uber drivers. Within our project, we have defined hubzones as locations for Uber pickups to occur. Based on a set of conditions and restrictions, we were able to come to conclude 15 ideal locations for Uber hubzones to be implemented. In order to find our results, different datasets on activities, such as attractions, liquor primary establishments, as well as population density, were mapped onto a map of Vancouver. By analyzing the map, we were able to conclude different trends that helped determine the placement of Uber pickup hubs. From our findings, we were able to determine a high population density in Downtown Vancouver, in positive correlation to the high density of liquor/bars and attractions present within the area. By taking into consideration of the following trends, our group was able to pinpoint 15 optimal Uber pickup hubs, which could accommodate attractions and liquor primary businesses.

DESCRIPTION OF PROJECT, STUDY AREA AND DATA

This project shall provide 15 top hubzones for Uber drivers in the City of Vancouver. The purpose of the project is to locate ideal pickup hubs for Uber drivers based on population density, attractions, and liquor primary establishments. In order to complete the project, we will acquire data from DataBC regarding attractions and liquor primary establishment information. With previous geographical data from our geographical information sciences course, we would use the VancouverMask layer as our base map for the project, alongside population data from Census Tract. Along with skytrain and Canada Line transportation data garnered from our geographical information sciences course database, the data information would allow us to restrict placement for hubzones near them. From the data, it would aim to determine which neighbourhoods in Vancouver have the greatest population density, as well as where most of the cities liquor establishments are located. Greater population density neighbourhoods would

lead to the assumption of more cars and traffic, which would be ideal for Uber drivers to pick and drop off customers. Furthermore, the data would help determine the proximity of liquor establishments to skytrain and Canada Line stations as well as its proximity to population densities in varying neighbourhoods. The assumption that liquor primary establishments are primarily located within highly populated locations would mean that different public transportation networks would be present. By taking into consideration of both conditions, it would provide optimal information in locating the best places for Uber hubzones to be placed through the city. Through the project, it can help educate and provide valid information for taxi drivers and or tourists concerning transportation accessibility throughout the city of Vancouver.

METHODOLOGY OF ANALYSIS

The purpose of our project was to provide 15 favourable hubzones throughout the city of Vancouver for Uber drivers. For our Census Data, we chose to work with the data from 2011, which was the last updated census done Canada wide, providing the most accurate information. For our project, one map was created to showcase the information. By combining two time frames (day and night), the different activities we want to focus on were merged onto one map, in locating 15 optimal hubzones which could serve for both time frames. In order to create our map, 15 Proposed Uber Hub Locations in Vancouver, we combined different variables onto a singular map. Rather than having three separate maps in describing Vancouver's population density, location of liquor primary establishments and attractions, as well as liquor primary establishments and attractions overlap buffer zones, we decided to combine the three in providing a simple and readable map. With the different series of variables and qualities from each step, we believe that it would help determine the best hubzones for Vancouver.

Since our topic pertained to the idea of finding hubzones within Vancouver based on day and night activities, specifically attractions and liquor primary establishments, we had to download data files from the B.C Provincial Government Data Catalogue. The database file for HelloBC Activities and Attractions Listing provided a shape file for all attractions and activities within the

province from 2016. With the secondary dependent variable, the database file for liquor primary establishments was provided in the form of an Excel spreadsheet, with a record of all the present businesses providing licensed liquor establishments, updated in 2017. By using Google's Geocoding to generate each businesses longitude and latitude, we were able to convey the Excel file into shape file. Furthermore, for our restricting variable on skytrains and Canada Line station locations, we obtained the shape file from our Geographical Information Sciences course data base within the G Drive. For our population density data, the population data was obtained from the University of Toronto CHASS Data Centre, whereas our census tract was obtained from UBC's Abacus Dataverse Network. We performed a join to link the population data to the census tracks, then used natural breaks and normalized by the shape area to display population density. As we put all the variables together on ArcGIS, we clipped all the variables to match with our Vancouver Mask layer, as we only focus on the city of Vancouver. In order to analyze where ideal locations for hubzones could reside, we created 4 total buffers, where attractions and licensed liquor establishments were set with 150m in distance, and skytrain and Canada Line stations with 100m in buffer distance (as our restricting space to place Uber hubs). Furthermore, we intersected the 2 activity based buffers zones, and based on the results, we were able to come to decide the best Uber hubzones from the resulting intersect. On the map, the following blue buffer zones represent the liquor and attraction overlap zones, which were the results from the intersection made between the two separate buffers.

In our 15 Proposed Uber Hub Locations in Vancouver map, it showcases the total 15 Uber hubzones that we decided to place throughout the city. Through the process of manually placing points on the map, which would be the most ideal locations for hubs, we took into consideration of the resulting liquor and attraction overlap buffer zones, as well as population density levels. By placing consideration for population density minimally required to be above 42490000 in shape area (medium population density), as well as heavy Liquor and Attraction overlap, we were able to come to conclude 15 Uber hubzones which we believed to be optimal in meeting the needs for users and drivers.

DISCUSSION AND RESULTS

In creating this map, we imagined that we were working for Uber, on an assignment to locate the 15 best locations for hubs in the city of Vancouver. The number 15 was decided upon arbitrarily; we simply decided to imagine that that was the amount Uber was willing to place in Vancouver. Next we had to determine what exactly a "good" location for a hub would be. We had to consider for what purposes people of Vancouver might want to use Uber. We figured that ultimately, a good location would be one where lots of people live, and where there are many things to do. We decided that in the daytime, Uber would be mostly used to get to and from different tourist attractions in Vancouver, and in the night time, the service would most likely be used moreso for heading to bars, pubs, and clubs, i.e. liquor primary establishments. So to create all-encompassing hubs that could be used for day and night-time purposes, we had to find areas where liquor primary establishments intersected with attractions, and did so using a buffer of 150m. We chose 150m because this translates to a minute and a half of walking, which we decided is close enough together to be used for both. Another feature important to consider was how populated an area was. We did not think placing hubs in areas with low population density was a good idea. We agreed upon placing the hubs in Census Tracts that displayed population density of medium level or higher. As well, in order to make sure that people would actually use Uber rather than taking transit, we wanted to ensure that our hubs were not located too close to transit stations. We agreed to keep the hubs at least a minute's walk away from transit stations. This translates to 100m in distance, thus we used a 100m buffer and marked these in red to clearly show we wanted to avoid placing hubs in these spots.

Once we finished adding all of our layers to the map, it came time to select the hubzone locations, one by one. Based on our decided definition of what a good location would be for a hubzone, we had three criteria for selecting the hubs: had to be in a zone of overlap of daytime attractions and night time liquor primary establishments; had to be in an area of medium level population density or higher; and could not be within 100m of a skytrain or Canada Line station. So we went ahead and started placing the hubzones on the map. This step involved

subjective decision-making on our part, and we ended up not following the criteria at times because we made executive decisions that it would be best not to. For example, we have placed a hub zone in the UBC area, although the population density is denoted as “very low” on the map, but the other two criteria have been met. We decided to put one here because based on our knowledge of living in Vancouver, we know that UBC is a highly visited area even though not many people actually permanently reside there. Similarly, we have placed a hub in the PNE area (Easternmost part of map) despite the “low” population density because the other two criteria have been met, and we thought it would be a good idea to have at least one hub in East Vancouver.

For the downtown area, it is evident on the map that there is a lot of overlap of the attractions and liquor primary establishments, as we had anticipated. And all of the downtown area has at least medium level population density. So we had to manually decide where within the overlap zones we would place hubs, while making sure not to place them too close to one another, and avoiding the transit stations. Accomplishing this turned out to be easier than we thought. We wanted to try and make sure that most of the downtown core would be easily accessible by Uber and believe we have accomplished this. The majority of our proposed hubs are located in downtown Vancouver, (ten out of the 15 total), and this makes sense considering the highest population densities are in downtown Vancouver.

There are a few areas on the map that satisfied our three criteria, but we did not place hubs in these spots. This is because we were trying to find the best 15 hubs out of all the possible areas. So because we had a couple exceptions to our criteria, those being the hubs we decided to place in UBC and at the PNE, this meant we would have a few spots left that satisfied the criteria but where we would not place any. Since we only had 15 hubs to place, we could not use every single location that would fit the criteria. This meant using our discretion and knowledge of Vancouver to select the 15 best possible spots, and leaving out potential good spots based on our decisions of what we consider best. We concluded as a group that we thought it was definitely most important that the downtown area of Vancouver be substantially covered by Uber hubs. The majority of the attractions and liquor primary

establishments are located downtown, as well as the majority of inhabitants of Vancouver. Establishing Uber in Downtown Vancouver is key to getting Uber established throughout all of Vancouver as a great means of transportation.

Looking at our final map, there is clearly a trend in the data. Most of the hubs are found in the Northern part of Vancouver, which corresponds with the higher population density and density of activities also located in the Northern parts of Vancouver, specifically downtown. The central and Southern parts of the city contain no hubzones, because they do not contain areas where daytime attractions and liquor primary zones intersect. There might be one or the other, but no intersection points, so there would be no great spots for all-day hubs, which is what we are looking to place. Downtown Vancouver is where hubs are needed most. Throughout most of the rest of the city, residential areas dominate. If someone who is located in a residential area wants to take an Uber, they can just give the driver their address and will be picked up easily. However, downtown, when at a bar or a tourist attraction, it is less simple to direct the driver to exactly where you are located, due to congestion of the streets downtown at all times of day, and enormous density of people. So having ten dedicated hubs downtown specifically for Uber customers to wait to be picked up is very advantageous for both Uber drivers and customers, and will contribute to the use of Uber services. Having hubs located in residential areas is less important, as they would be used much less due to the smaller amount of people and activities, as well as they might be considered ineffective.

ERROR AND UNCERTAINTY

The purpose of our research is to direct our Uber customers to the closest and the most convenient spot to be picked up by our drivers. In order to generalize our findings, we have chosen attractions as our day time location and liquor primary businesses as our evening activities and we have combined the two in order to create a generalized version of the map. There are many potential errors and uncertainty in our research and we have divided them into a few categories. The first category is our data selection. We have chosen different data sets

and hope that they can help us determine the optimal hubzone locations, and they are attraction sites, liquor primary businesses, transit stations, and population density. A potential error that can affect our analysis is our population data. The reason is that after we have input our population density layer into our map, we can see places such as UBC having low population density compared to other locations. Therefore, this may affect our analysis as population density is based off of individual homes. This will result in us unable to pinpoint hubzone location in these low population density areas because our condition was to select zones that have higher population density. Therefore, we needed other census data, for instance, the flow of people in Vancouver in order to better aid our analysis. The second category of error is our selection of data and decision. An error we have is our decision to only select hubzones that are within both the proximity of an attraction and a liquor business. This can be problematic because we neglected areas that might be a popular tour attraction spot, which, we would not have put a hubzone location there because it does not intersect with a liquor primary business and the same can be said about popular pubs/bars. Moreover, there can also be a potential problem in choosing the best hubzone locations within an intersected area. For instance, our map found intersected areas beside a transit station. We wanted to avoid transit station in order to encourage our customers to call an Uber. Therefore, it might be difficult to determine the proximity of transit stations that we should use. Adding on, an uncertainty in our data layers is that whether a data is used as a condition or a restriction. An example is our transit stations that was chosen by us to be used as an restriction to hubzones, however, this data layer can potentially be an uncertainty to our research. The reason is that we argued that we wanted to encourage our customers to choose Uber as their form of transportation by avoiding other transit systems. However, a question was raised about whether people actually choose to use Uber once they leave a station in order to get to other locations which can be a tourist attraction. Therefore, these errors and uncertainty will affect the overall accuracy of our chosen hubzone locations.

FURTHER RESEARCH/RECOMMENDATIONS:

We believe this research has great potentials and there are many improvements we can implement in order to make our analysis as accurate as possible. There are a few factors that can increase our accuracy. First, because there are different activities taking place around different time periods, we cannot generalize our map into one as these hubzones will change with the time of day. Therefore, we need to divide the time frame into night and day. In addition, in order to determine the best hubzones, we would need to include much more data and increase our restrictions in order to reduce the large amount of possible results. For instance, account for the most popular activities among Uber users during daytime and nighttime. Second, the data we use needs to be specific and that it either has to be a condition or a restriction for the hubzones which transit stations might not have been a good restrictions as stated previously. Thus, we need clear restrictions that can reduce our possible results, and a good example restriction could be to avoid residential areas. Another potential improvement we can make is implementing a survey or interview to our research in order to gain important opinions that may influence our decisions. We came up with the buffer distances as a group. However, this might not reflect what the general public's perspective is. For instance, our idea of the buffer distance for tour attractions is within walking distance. Therefore, it may be helpful to see what others think in terms of the average walking distance. Overall, there are numerous data collecting to be done and improvements to implement to our map in order to accurately pinpoint the perfect Uber hubzones.

APPENDIX:

i) BIBLIOGRAPHY

REFERENCES:

Lee-Young, J. and Shaw, R. (2017). Uber Vancouver: B.C. government announces support for ride-hailing services. [online] Vancouver Sun. Available at: http://vancouversun.com/news/local-news/uber-vancouver-bc-government-announces-support-for-ride-sharing [Accessed 12 Apr. 2017].

Wikipedia. (2017). Walking. [online] Available at: https://en.wikipedia.org/wiki/Walking.

LIST OF DATA SOURCES:

Activities and Attractions Data Set

https://catalogue.data.gov.bc.ca/dataset/

Licensed Liquor Establishments Excel File

https://catalogue.data.gov.bc.ca/dataset/

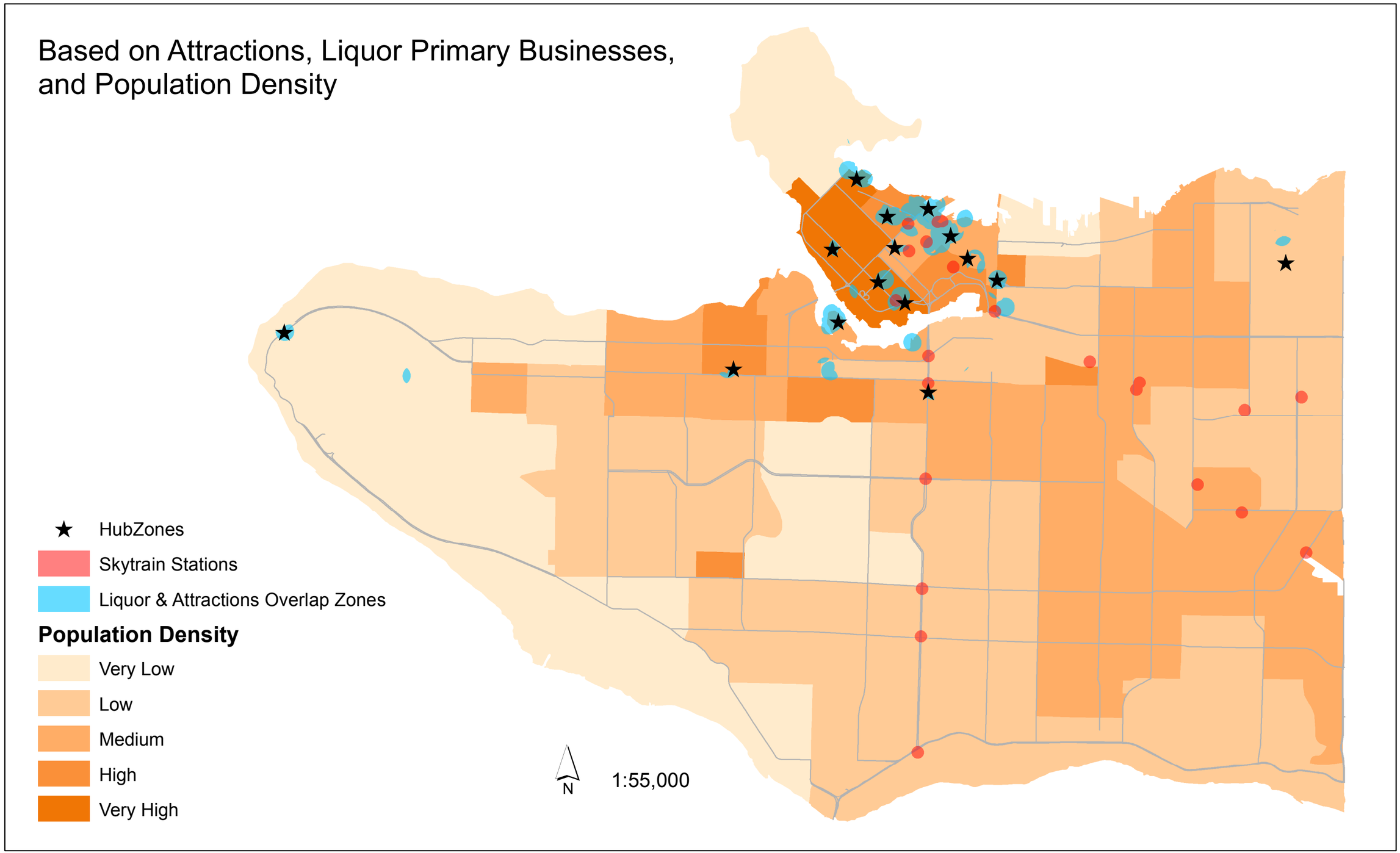
Population Density Dataset

http://datacentre.chass.utoronto.ca/

Census Tract

http://dvn.library.ubc.ca/dvn/

15 Proposed Uber Hub Locations in Vancouver



iii) FLOWCHART

UBER | Hubs GIS Flowchart

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