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Project Proposal

Due to the unforeseen impact of COVID-19 on society in the U.S.A, I have been interested in the availability of internet connectivity in communities. Now that class sessions are being held remotely it is essential that students have access to affordable and reliable internet connection. I am particularly interested in collecting data regarding the amount of networks in a region and analyze that data to see how the amount of wireless networks in an area correlates to some arbitrary variables such as income, average age or availability of schools. Although I am still unsure of what analysis tools, I will utilize I do want to perform a cosine similarity to determine how alike two areas are with respect to number of networks in that region.

Gathering the data:

1. To collect data, I would like to use a Raspberry Pi along with an dual band Wi-Fi antenna. This device has the capacity to read networks in the area and I would like to attach a stronger dual band (2.4 & 5.0) antenna to make sure I am able to collect as much networks detected as possible.
2. I will program the hardware to scan for Wi-fi networks approximately every 3 seconds. The program will then store the network name and MAC address to a log. The Raspberry Pi will have a software named "Kismet" that will be able to monitor networks for names and MAC-addresses.
3. I will collect data in three locations in Michigan, to accomplish this, I wish to drive around for 3 miles in residential areas. The residential area where the data will be collected will be chosen with regard to income level in that area. (I would like to choose each location based on low, median, and high income with respect to that states income which is available at census.gov)

Note: Although I have not finalized the location yet, the following counties appear to have low, median, and high incomes respectively, with regard to the state of Michigan as a whole.

Counties:

1. Lake County ($19,012 per capita income 2014-2018)
2. Eaton County ($31,982 per capita income 2014-2018)
3. Oakland County ($42,760 per capita income 2014-2018)

After recording the data which consists of MAC address, network name and location I will have to analyze the data. What I expect to find is that areas with higher income per capita will have more network connections in that region compared to regions with lower income. Also, since dual band Wi-fi is still relatively new I expect for wealthier neighborhoods to contain more 5Ghz networks due to their higher cost.

Tasks To Complete:

1. Attain Raspberry Pi and dual band antenna for receiving Wi-fi signals.
2. Modify kismet software so that Raspberry Pi can network scan every 3 seconds and log the entry into a CSV file.
3. Generate 3 random 3-mile paths through each of the populated residential areas in the three above counties.
4. Drive through generated paths and collect network data with Raspberry Pi.
5. Prepare/Clean data attained and analyze.

[1]

"U.S. Census Bureau QuickFacts: Michigan."
https://www.census.gov/quickfacts/fact/map/lakecountymichigan,MI/INC910218 (accessed Oct. 10, 2020).