Report Date: 09/15/2022
To: ematson@purdue.edu, ahsmith@purdue.edu and lee3450@purdue.edu
From: Chasing Fox

- Daye Kim (rlaek4793@khu.ac.kr)
- Hyun Roh (yeshyun@khu.ac.kr)
- Heewon Jeong (jhjmo0719h@chungbuk.ac.kr)
- Jihu Yang (zihooy@handong.ac.kr)
- Juwon Baek (21700340@handong.ac.kr)

Summary
We set the project in detail, and researched some related papers.
Based on those papers, we collected more than 70 million cases of crime data and 11 types of city facility data which include latitude and longitude.
Also, we decided the stack of the Front-end and finished setting the development environment.

What Chasing Fox completed this week:

- **Project Setting**
  - We set our topic, set our goal and made some plans in detail.
  - The final goal of our project is as follows.
    - Develop *Graph Search Algorithm* that avoids dangerous area
    - Research *AI model* that predicts dangerous area
    - Make an *Application* routing to the safest way and alerts you when you are in a dangerous area.
  - We planned several steps to accomplish our project as follows.
    - Find both city facility data and crime data in Chicago as much as possible.
    - Analyze which city facility (=independent feature) affects the density of crime data(=dependent feature) through correlation analysis and find the feature importance of Machine learning models which predict density of crime using sharp value.
    - After we choose the important feature data and crime data, we would make a graph that has nodes and edges.
    - Make a developed graph search algorithm, which aims to search safest and shortest routes.
    - Develop an application for service.

- **Research Related Papers**
  - We researched related papers and shared them with each other.
  - Urban navigation beyond shortest route: The case of safe paths [1]
    - Evaluate the edge(street) dangerousness in Chicago and Philadelphia through Kernel Density Estimation.
    - Introduce Path recommendation algorithm with max risk, which is evaluated by the highest risk of the edge, and total risk, which is evaluated by sum of the risk of all edges in the path.
  - Predicting Secure and Safe Route for Women using Google Maps [2]
    - If you want to develop an optimal crime prevention path, you should design the path based on the shortest path algorithm(Dijkstra) but using the crime-record function.
  - Risk Assessment Inference Approach Based on Geographical Danger Points Using Student Survey Data for Safe Routes to School [3]

        - The risk index can be predicted by using LSTM, RNN. And with GEO coordinate(GEO dataset), it will be hard to use because of the series of float values. So this paper recommends we should use a geohash converter.

- **Dataset Collecting**
    - We decided to use both Crime and City Facility Data to analyze the correlation between them.
    - Below is the dataset list we found. We collected all the data from Chicago Data Portal.
    - Crime [4]
        - Crime dataset of Chicago in 2001~Recent (everyday updated)
    - Safety
        - Dataset related to Homeless in Chicago [5]–[6]
            - Service Request: Vacant and Abandoned Building
            - Family and Support Services Delegate Agencies
        - Dataset related to Darkness in Chicago [7]
            - Service Requests: Street Lights - All Out - No Duplicates
        - Dataset related to Sanitation in Chicago [8]–[9]
            - Service Requests: Sanitation Code Complaints - Historical
            - Service Requests: Graffiti Removal - No Duplicates
        - Dataset related to Victims in Chicago [10]
            - Victims of Homicides and Non-Fatal Shootings
        - Dataset related to Gunshots in Chicago [11]
            - Shotspotter Alerts
        - Dataset related to City Facilities in Chicago [12]–[15]
            - Bus stops name and coordinate
            - Police stations name and coordinate
            - Fire stations name and coordinate
            - Public schools name, student's race statistics and coordinate

- **Development Environment Setting**
    - We decided to use both Google Map API and React-Native-Map library to create navigation applications.
    - I tried to set React-Native environment using Xcode and Android Studio in advance for API testing.
    - For a stable development environment, the development environment was set as below.
        - Xcode: 13.3.1
        - react-native-cli: 7.0.4
        - type-script: 6.10.4
        - react-native: 0.68.2
        - Home brew: 3.6.1
        - nvm: 0.39.1
        - node: 16.10.0
        - watchman: 2022.09.12
        - cocoapods: 1.11.3
        - JDK(Java): 11
        - ffi

Things to do by next week

- Dataset collection will be discussed with Dr.Matson.

- We will analyze correlation between dangerous(density of crime) and city facility features using all of the dataset we collected this week. Also, We will find the feature importance through calculating shap value.
- We will research and summarize more papers that are related to our project.
- We will set a Back-end development environment.

Problems or challenges:

- We could not know what city facility features impact the density of crime. So we tried to find as much data as possible.
- There was already a paper similar to our topic, so it was challenging to contemplate our own method different from that.
- React-Native version is highly fluid, so setting a development environment was too difficult.
- The Purdue student in our team had COVID-19, so there was a difficulty in communication because we could not meet her in person. However, it was solved through a virtual meeting.

References

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