

ECE 368 Project 3 Milestone 1 – Ethan Glaser

The goal of this project is to identify the shortest distance between two coordinates on a map provided to use with various connections between points. This project is related to route calculation that is done in modern map applications, as it determines the fastest/shortest path from point A to point B.

The first step is to read in the map text file that contains the number of points (cities), the number of edges/connections (roads). It also contains the location of each point in the form of an XY coordinate and the IDs of the two points that are connected by each edge. This first text file allows for the construction of the map, which will then be used for the optimization process.

This optimization will be based on the Dijkstra's Algorithm, which identifies routes from the initial point to the destination without returning to a point that has already been passed through. I plan to implement a recursive type of system to accomplish this task, that identifies a route and then if another route exceeds that distance before reaching the destination it will be cancelled.

The second text file will also be read in to identify the paths that need to be formed between points. The algorithm will take in these two points, determine the coordinates of each and begin the process of generating all of the potential paths connecting the two points, returning the shortest distance and all points that connect the input and destination. This process will repeat for each of the pairs of points in the second text file. This problem looks very interesting and relevant as it involves a lot of complex logic necessary to compare various paths. It also looks very challenging, especially on the high complexity cases involving thousands of points and paths. This will involve some higher complexity data structures to optimize the pathing, including arrays to track which points have already been accessed on a given path calculation. Additionally, the information representing the coordinates and which points connect to what will also be used in a data structure to allow for the most efficient determination of which connections must be made to find the shortest route between two points. The distance travelled will be determined based on the distance between adjacent points on the path, and the sum of these distances will be the overall distance, which will be compared across different paths to determine the shortest length.