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ECE 368

Project 3

Milestone 1

The goal of the project is to find the shortest path with a map given. We will implement Dijkstra's shortest path algorithm for the weighted undirected graphs. We will be given two files, one is the map another one is the given query. The map file will be given the number of vertices and edges. It also provide the connected path. We could read in the map and store all the vertices and edges using graph so that we could connect all the connected node with the given edges. To read in the input file, first, we read in the first line which gives the number of node and edges. With the number of node, we could tell that the next N line will be the node and its coordinates. We could store each node line by line using a loop until it reach the end of N line, then the rest of them will be the edges. We could also read them line by line and use it to connect each node and finally to construct the whole map. We could use graphs with fits the project perfectly to construct the map.

Then, to find the shortest path on map between two points, we use Dijkstra's algorithm to approach it. Dijkstra's algorithm is an algorithm for finding the shortest paths between nodes in a graph. To find the shortest path, it picks the unvisited vertex with the lowest distance and calculate the distance through it to each unvisited neighbor and updates the neighbor's distance if smaller. We set the number of node as V and number of edges as E, and the worst case for the Dijkstra's algorithm is $O(E+V\log V)$.

We need to write a code to find the adjacent nodes of each node and put them in a list. Also a file to setup the graph structure and store all input and to construct the map. Finally a file to setup Dijkstra's algorithm to find the shortest path with the given input node.