Project 3 (Map Routing), ECE368

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Overall approach to the problem:

The main purpose of this program is to find the shortest path between two points in each map. First, I try to save the information of the point in the given data. Since all the names of the points is numbers start from 0. I use two arrays to save the x and y positions of the point. The index of the array can also be the name of the point. After saving the point, I also use two arrays to save the path. One saves the start point. Another save the end of the path. Before finding the shortest path, I choose to calculate the length of each path and save them in a new array. After all these done, just follow the way described in Dijkstra's algorithm to find the ways.

The problem I must solve to get the definitive answer:

1. Since the graph is undirected path, I must search not only the start point array but also the end array. By doing this, I can get all the point connect to the target.
2. We also need to know the previous point is which one, so when we search the next target we can ignore it. I use an array called 'visited' to show if I have visited the point.
3. I also use a array to save the the shortest path. It is called pre. Since the name of the point is number, so I can use it as pre [7] = 9(which means the previous point of point 7 is point 9). When I finish the search, I can just print them out one by one from the end of the path.
4. Sometimes, the searching program will go into some circle way, and we will get a infinite loop. To get this, I set the program that if all the possible out points have been visited, the program will return (I use the recursion), and go to the next shortest way of the previous point. So, the target point will move back from the circle way and get another way.
5. For some special condition, I set if the program have run all the point from the start point and can't find the target point. It will show INF. If the start is same with end. It will print: at the original position.

Limitation of my code:

1. I used to much array and recursion. These made my code very space consume.
2. For the way I deal the circle path and INF case, it will spend a lot of time since it need to walk through most of the point in the map.