

Project 3 (Map Routing), ECE368

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* Explain your overall approach to the problem and a short general summary of your solution and code.

My approach to this problem was to start with a vanilla implementation, then make it more and more complex as I got familiar with the algorithm and code. Firstly I ran search for shortest distance and candidate vertices by searching through the entire list of vertices. This provided me with correct results, however did not lead to a fast implementation. I then tried to figure out how to reduce the time of these searches. I created a data structure called "candidates" and only added candidates to it that were on the edge of the current boundary of points whose lengths were determined. This reduced the run time considerably. I was about to implement a min heap to make the min calculations. But before this I tried to determine whether it would be necessary. For the USA text file, I found that at 1 point in time, the number of candidate vertices rarely exceeded 200, therefore I decided to stick with the simpler implementation assuming that this would balance out with the constant factors of the min heap implementation for most cases.

* Known bugs / limitations of your program / assumptions made.

My code works for all the provided test cases in terms of length of the path, but I am not sure whether the actual path printed is correct. It seems to take less space than sample binary. It takes less than 1 second for running usa100.txt test case. If the input is not the correct format, it could lead to segmentation faults.

* List whatever help (if any) that you received.

I utilized Stanford University algorithms lecture videos to understand the algorithm. Besides that, I read the algorithm description from the lecture slides and the book – introduction to algorithms by Cormen, Leiserson, Rivest, and Stein.

* Describe any serious problems you encountered.

The only serious problem I encountered was determining when my while loop should complete. I decided to end my while loop when all the candidate vertices were explored rather than run for as many times as there were edges or vertices. It took me a while to figure out that this was the issue I was dealing with when I was not passing one of the queries from the USA10.txt file.

* List any other comments/feedback here (e.g., whether you enjoyed doing the exercise, it was too easy/tough, etc.).

I enjoyed working on this problem. It was slightly challenging. I would be more confident with my submission if we had more test cases.