CS 225 Extra Credit log

November 12 2023

Goals
1. Finish coding convertogrid function (to convert the grid from .txt file to a grid of format vector<vector<int>> (completed)
2. Started working on Astar (write the pseudo code) (partially completed)
3. Rewrite the grid generation code so that it is easy to understand and find additional Astar test data for Astar on graph

Tasks complete
1. Work together on converttogrid function. This function passed our written test cases
2. We found the additional test data for graph together

Problems
1. Although we know how to implement Astar on the grid, we do not have so many ideas about how to implement Astar on graph data structures
2. For the test dataset we found, we do not know how to find the best heuristic function for Astar since we do not know Euclidean distance between two nodes in graph

Plan
1. Finish Astar function and get neighbor function on grid next week

November 18, 2023

Goals
1. Finish get neighbor function
2. Finish Astar function
3. Decide on the heuristic function and implement it

Tasks complete
1. Work together to finish get neighbor function. This function passes the test cases
2. Complete Astar function and test the correctness of the function

3. Figured out how to use Cmake and finish makefile
4. Implement appropriate heuristic function

Problems
1. Our Astar function is not giving us the most optimal path from the starting point to ending point due to diagonal movement and our heuristic function.
2. Heuristic function miscalculating h because there is no mechanism to take into account the walls in the grid.

Plan
1. Implement BFS and compare the runtime between Astar function and BFS.
2. Fix Astar function so that it will give us the most optimal path from the starting point to the ending point.
3. Write more test cases to test the Astar function on different data sizes.

November 26, 2023

Goals
1. Implement BFS and compare the runtime between Astar function and BFS.
2. Fix Astar and the heuristic function so that we get the most optimal path
3. Add one more data set (Extreme(2000+)) to get 5 datasets of varying magnitude.

Tasks Complete
1. Finish generating grids of Extreme size (2000 - 20000) in dimensions.
2. Implement BFS

Problems
1. The runtime of Astar function is slower than that of BFS, which should not be correct according to the idea of the Astar.
2. The idea of the Astar Search Algorithm is not fully implemented.

Plan
1. Figure out the reason why Astar function is slower than BFS and how we should change the Astar function to ensure it is faster than BFS
2. Change the Astar function so that it fully matches the ideas of the Astar Search Algorithm

December 3, 2023

Goals

1. Integrate the heuristic function in the Astar algorithm using the formula f = g + h.
2. Test the correctness of our algorithm to check if it returns the most optimal path.

Task Complete

1. Successfully implement the Astar function that fully matches the ideas of the Astar Search Algorithm
2. Understand the reason why the previous function is slower and the correct Astar function is inaccurate, since we traverse diagonal nodes. BFS will consider the distance between current node and diagonal node as 1, which should not be true for our heuristic function and in real applications. We try to solve this by removing diagonal nodes in our algorithm and tests using BFS.