

CS325: Homework 7

1. Write BFS and DFS for graph

For BFS: A, B, D, F, G, E, C

For DFS: A, B, F, C, D, E, G

2. Apply BFS/DFS to solve problem

- Implemented and on gradescope
- The time complexity is: for this problem since it is a 2d array and used heap operations, it is $O(\text{row} * \text{col} \log(\text{row} * \text{col}))$

3. Analyze dijkstra with negative edges

Q3: looking at this graph, we can see 4 nodes and 4 edges. We want to traverse from A to D with the shortest path. If using dijkstra's greedy bfs algo, if we got -2 as SP it would not be correct. Imagine point A is your house + point D is OSU, we cannot have a negative distance. Secondly, as dijkstra's algo assumes that the distance to a vertex is finalized once it's removed from queue, it wouldn't reconsider another path. All in all, since dijkstra's algo is not equipped to deal w/ negative weights, it can produce the wrong answer which would affect results.

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graph LR; A((A)) -- 2 --> B((B)); A -- 2 --> C((C)); B -- -4 --> D((D)); C -- 3 --> D;
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4. Extra credit: what would be BFS/DFS traversal in the puzzle. Start at node A.

BFS: A, B, C, D, E, G, F, I, H, J

DFS: A, B, C, D, G, I, J, H, F, E