

Lab-7

DA5300: Data Structures for Data Science

September 18, 2024

1 Graph

Store a $n \times n$ grid in a graph data structure. Try the following three variants:

- Create graph data structure with vertex and edge lists.
- Create graph data structure with vertex and adjacency lists.
- Create graph data structure with adjacency matrix.

Note that for the breadth first search and depth first search algorithms, we need to be able to query children of a given node, i.e., adjacent vertices of a given vertex.

Place blockages in the grid.

2 Breadth First Search

Implement (i) search tree, (ii) frontier in the form of a queue. Try the following two variants :

- Tree search (no explored list). Print out the search tree and the frontier in each iteration.
- Graph Search (explored list). Print out the search tree and the frontier and the explored list in each iteration.

Also show the explored, frontier and unexplored parts in the graph (either by coloring the grids or by using 0: explored ,1: unexplored, 2: frontier encoding.

3 Depth First Search

Implement (i) search tree, (ii) frontier in the form of a stack. Try the following two variants :

- Tree search (no explored list). Print out the search tree and the frontier in each iteration.

- Graph Search (explored list). Print out the search tree and the frontier and the explored list in each iteration.

Also show the explored, frontier and unexplored parts in the graph (either by coloring the grids or by using 0: explored ,1: unexplored, 2: frontier encoding.

4 Heuristic Search

Use the Manhattan distance between the current location and the GOAL as Heuristics. Perform heuristic search via

- Tree search (no explored list).
- Graph Search (explored list).

Show the explored, frontier and unexplored parts in the graph (either by coloring the grids or by using 0: explored ,1: unexplored, 2: frontier encoding.