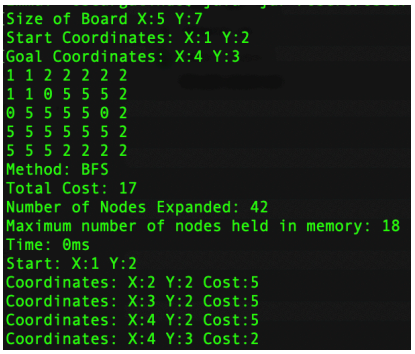
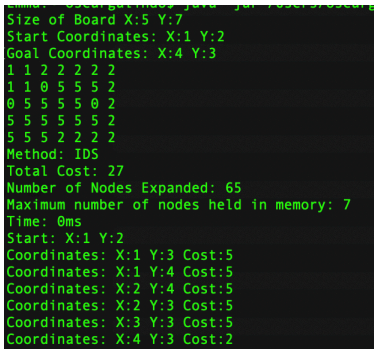
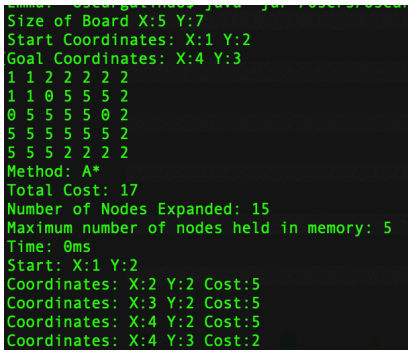
Oscar Galindo
Daniel Almeraz
HW 2 Results
Discussion

- Small size test case

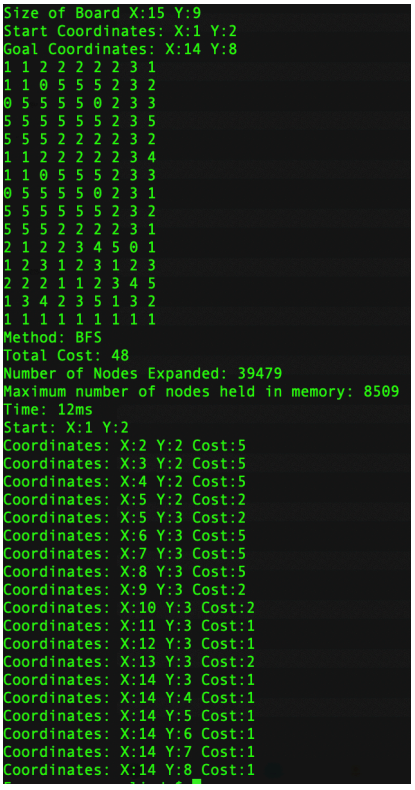


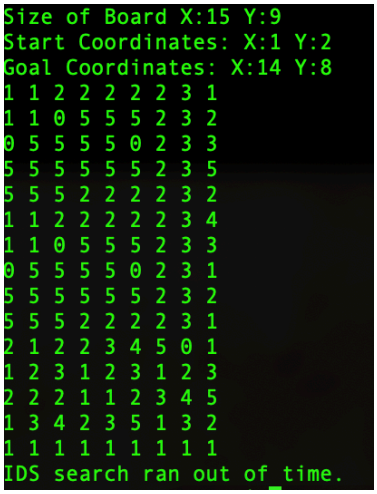


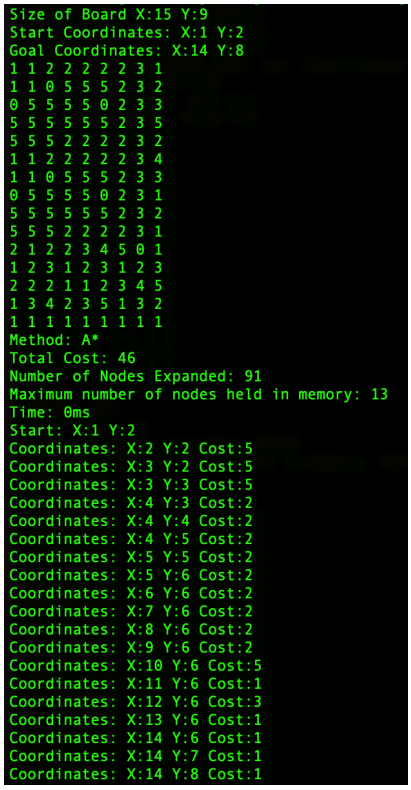


In this case the three algorithms performed quite similarly, this is due to the small size of the board and the considerably “straightforward” path that the nodes can travel from the origin to the goal. Furthermore, it is clear that BFS and A* produce a similar answer, with the advantage that A* expands less nodes in this specific case. Nevertheless, in the case of IDS the algorithm seemed to be inefficient and quite expensive in terms of the number of nodes expanded.

- Medium size test case

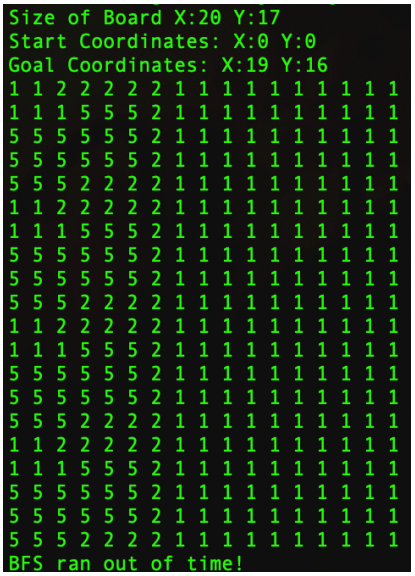


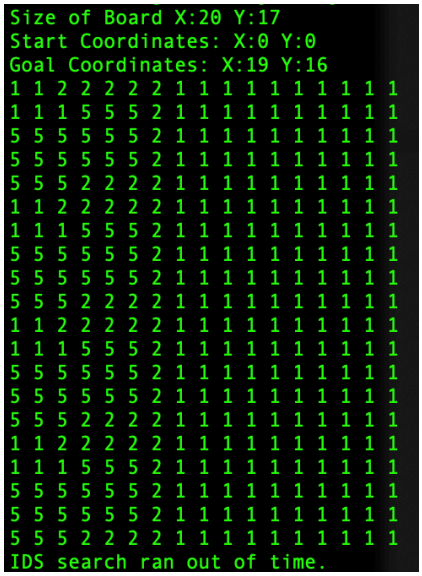


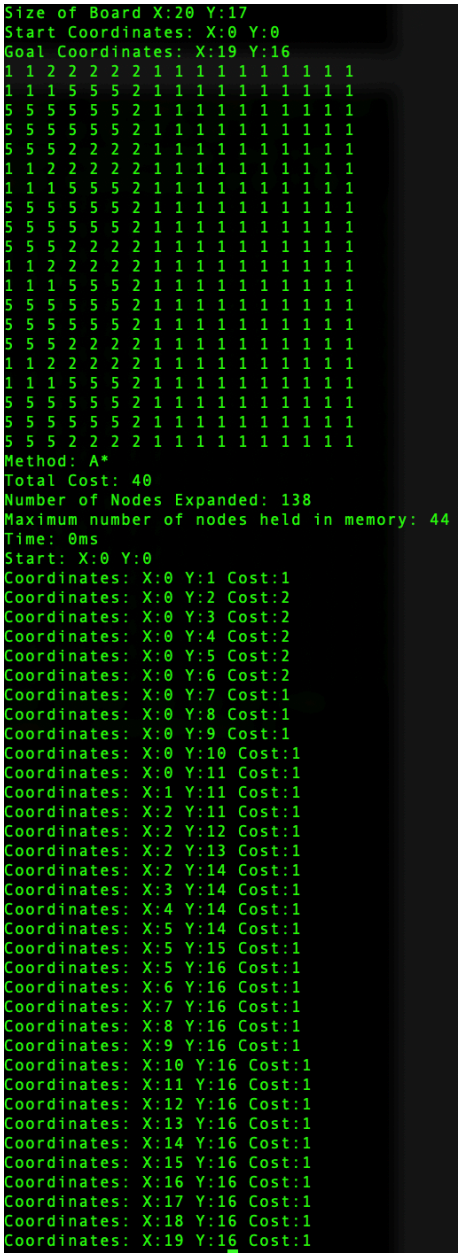


In the case of the medium size map, it is notable that IDS ran out of time while doing the experiment- after the three minutes mark. It is also important to indicate the clear difference in cost of memory. In comparison, A* utilizes only 91 expansion whereas BFS utilizes 39479 expansions. Furthermore, it becomes even more clear the difference in efficiency between both algorithms, since when it comes to time, A* utilizes 1/12 of the time BFS required. While A* guarantees optimality in the solution if enough time is provided, this notably contrasts with BFS, which provides an answer close to optimality but, nevertheless, not the optimal solution.

- Large size test case

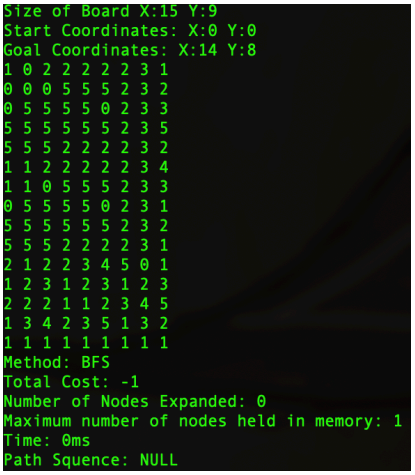


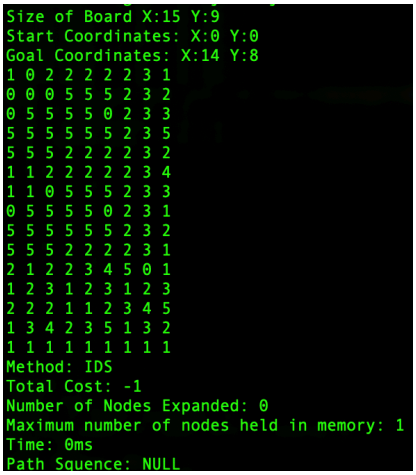


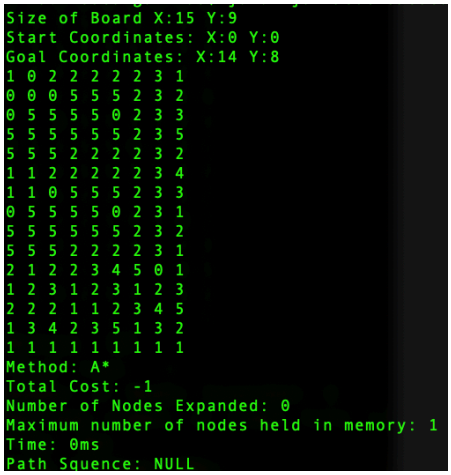


For this testing case, the differences mentioned in previous cases became more obvious. While BFS and IDS failed to encounter an answer, it is notable the efficiency in time and space presented by A*. This is the case due to the necessary recursive calls made in IDS and the exhaustive expansion of BFS. While this aforementioned algorithms approach the problem in an expansive manner, A* the Manhattan distance heuristic takes more efficient, more “intelligent”, and more measured attempts to reach the goal.

- Edge size test case







As a sanity test, we tested the set of three algorithms- BFS, IDS, and A*- with an impossible task. We started at a node that didn't have any surrounding node that was capable of being visited. As expected the search became "stuck" and so the execution displayed a failure in the command line.