Team 15 - Assignment 1

ECE457a

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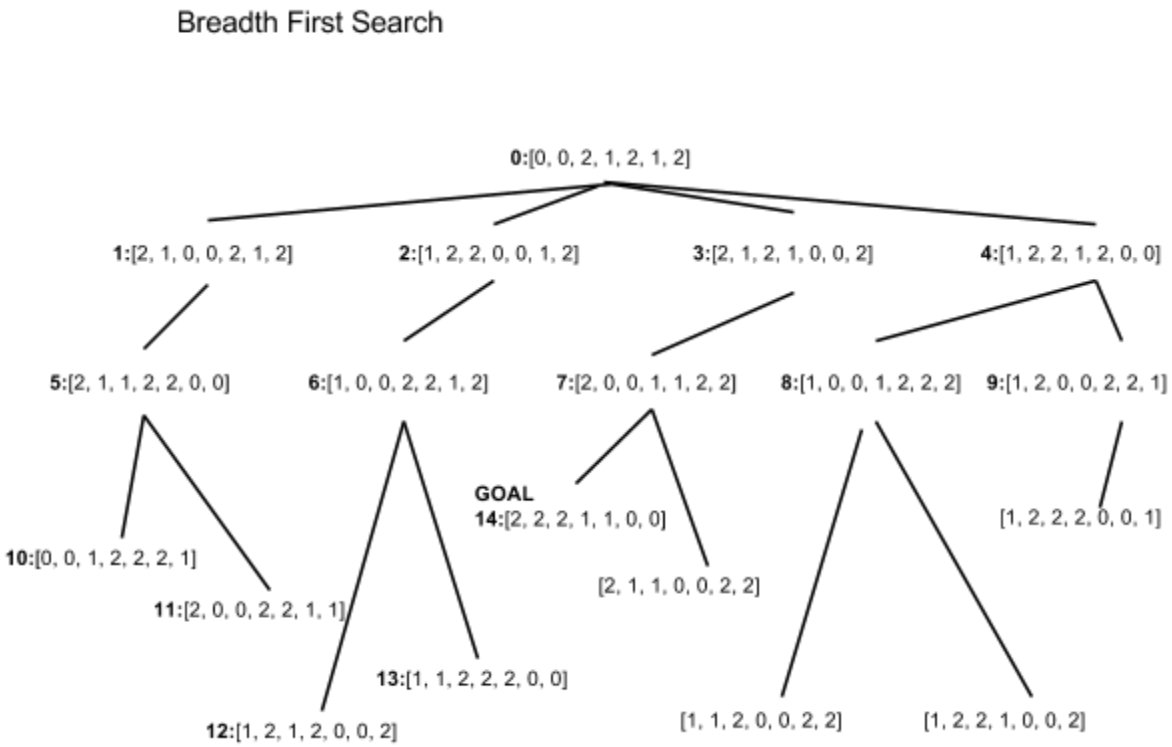
1.

a) The set of all possible moves can be described as any swap of two adjacent coins into the two blank squares. If the grid of coins is described as an array, with the index of the spaces being x and y respectively, then a valid state transition would be:

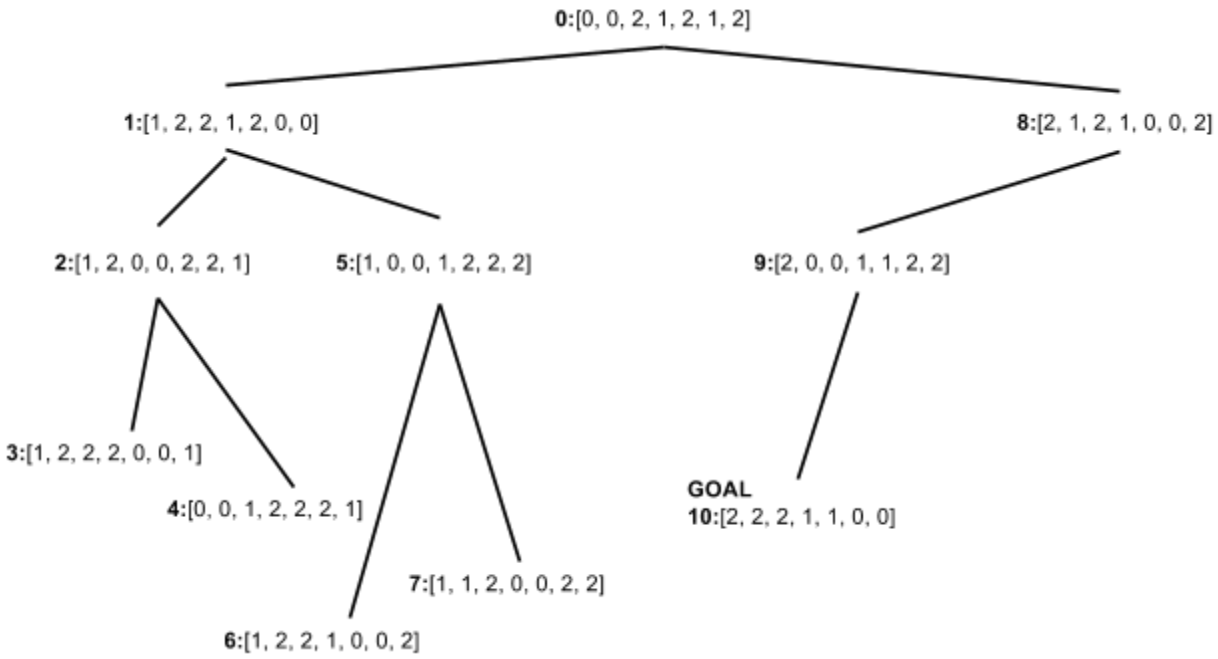
grid[x] = grid[i]
grid[x+1] = grid[i+1]
grid[i] = empty
grid[i+1] = empty

where x != i

b) For each diagram, a node is represented by #: [2,2,2,1,1,0,0] where # is the number of the node by order of expansion, 2 represents a black coin, 1 represents a white coin, and 0 represents an empty space. Note that repeated nodes are not added.

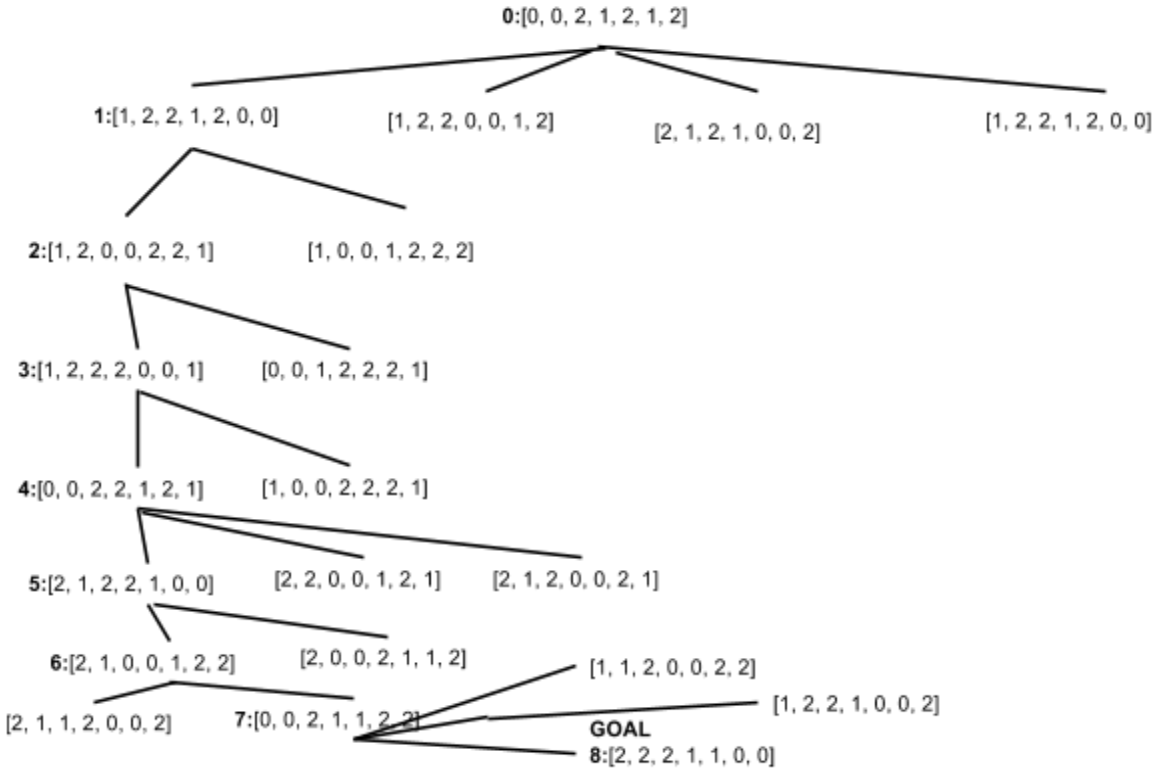


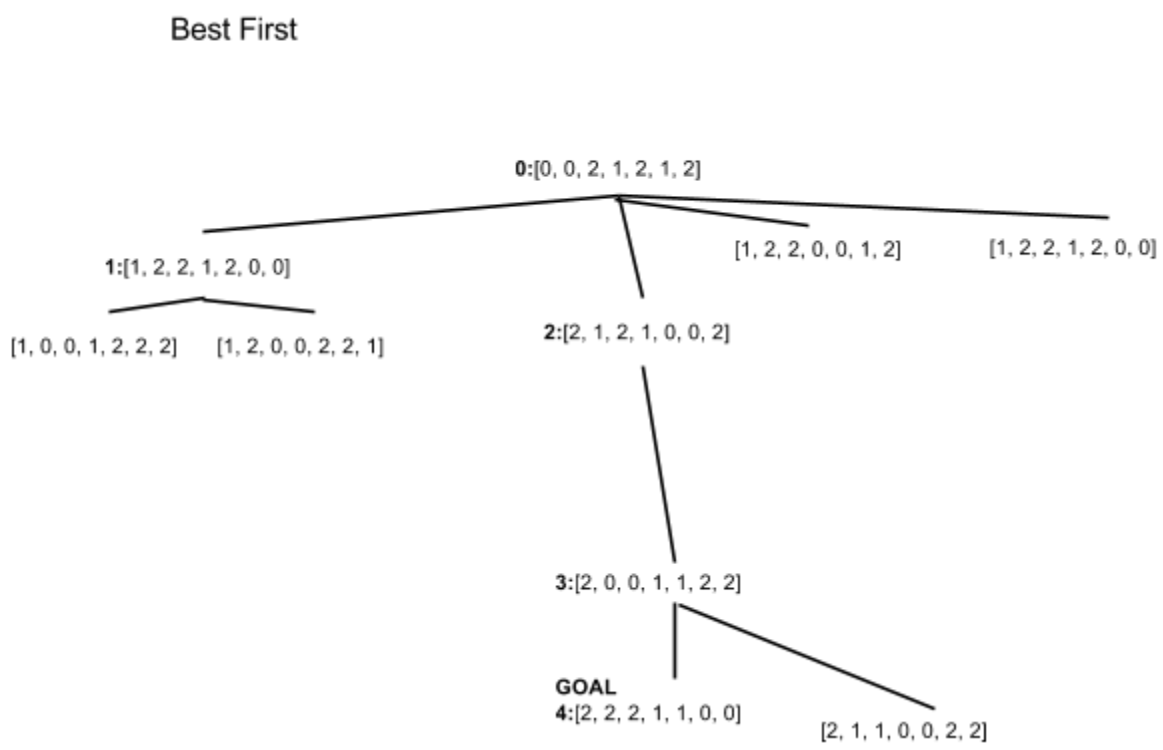
Depth First Search



For the hill climbing and best first search approaches, the heuristic used was the number of coins in the correct position. For example, [2,2,2,1,1,0,0] would have the optimal score of 7, where [2,0,0,1,1,2,2] would have a score of 5. The bigger score is better.

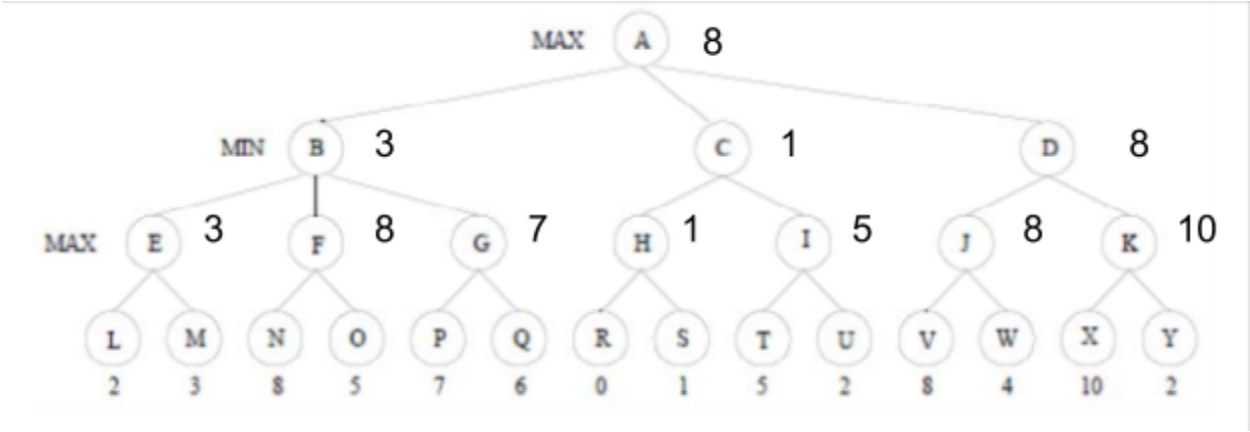
Hill Climbing



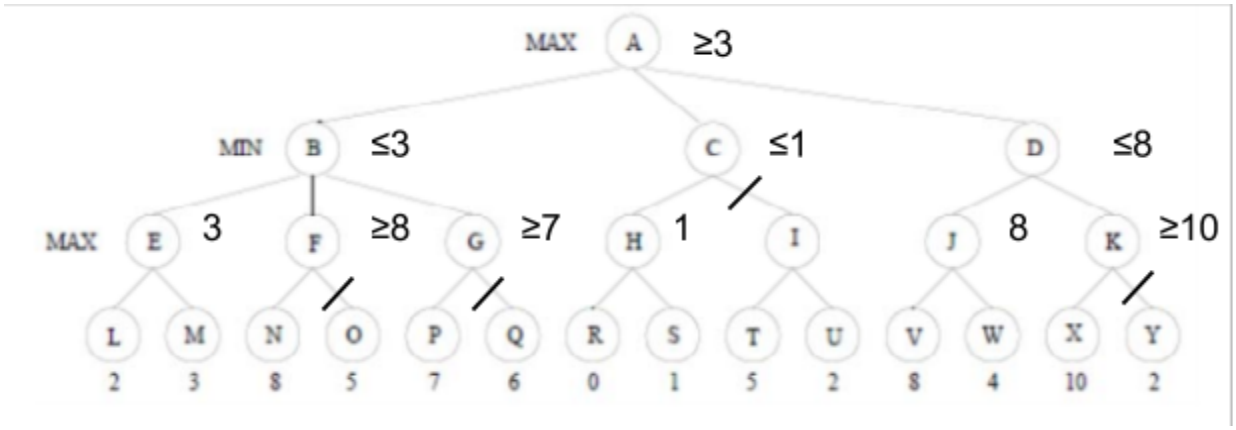


v) In terms of the number of nodes generated, best first generated the smallest number of nodes.

2.



a) The minimax value computed at the root node is 8.
b) MAX should choose D since 8 results from there.



c) O, Q, I, and Y are not examined.
d) If D came before B and C, those two can be pruned out. The nodes under B, C, and D are already optimized - the first node searched is the optimal one.