

Worksheet 41 - Group 1

Worksheet Group 1 Members

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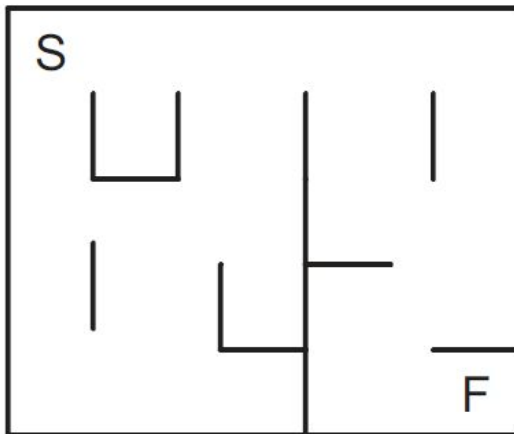
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Worksheet 41: Depth First and Breadth First Search

In this worksheet, we aim to model the depth first and breadth first search algorithms for the maze shown below:



We begin by modeling the depth first search. When we model this algorithm, we will be using a push order of South, East, North, and West; this is the order in which we will consider the neighbors of each graph node at which we arrive when pushing nodes to the stack. With this caveat out of the way, we show the steps in the table below:

Iteration	Stack (Bottom to Top)	Reachable
0	1	
1	6, 2	1
2	6, 7, 3	1, 2
3	6, 7, 8, 4	1, 2, 3
4	6, 7, 8, 5	1, 2, 3, 4
5	6, 7, 8, 9, 10	1, 2, 3, 4, 5
6	6, 7, 8, 9, 15	1, 2, 3, 4, 5, 10
7	6, 7, 8, 9, 20, 14	1, 2, 3, 4, 5, 10, 15
8	6, 7, 8, 9, 20, 19, 9	1, 2, 3, 4, 5, 10, 15, 14
9	6, 7, 8, 9, 20, 19	1, 2, 3, 4, 5, 10, 15, 14, 8
10	6, 7, 8, 9, 20, 24, 20	1, 2, 3, 4, 5, 10, 15, 14, 8, 19
11	6, 7, 8, 9, 20, 24	1, 2, 3, 4, 5, 10, 15, 14, 8, 19, 20
12	6, 7, 8, 9, 20, 25	1, 2, 3, 4, 5, 10, 15, 14, 8, 19, 20, 24
13	6, 7, 8, 9, 20	1, 2, 3, 4, 5, 10, 15, 14, 8, 19, 20, 24, 25

Next, we apply the breadth first search to the same maze. Again, when we model this algorithm, we will be using a push order of South, East, North, and West; this is the order in which we will consider the neighbors of each graph node at which we arrive when pushing nodes to the queue. The iterations for the breadth first search algorithm are shown below.

Iteration	Queue (Front to Back)	Reachable
0	1	
1	6, 2	1
2	2, 11	1, 6
3	11, 7, 3	1, 6, 2
4	7, 3, 16, 12	1, 6, 2, 11
5	3, 16, 12	1, 6, 2, 11, 7
6	16, 12, 8, 4	1, 6, 2, 11, 7, 3
7	12, 8, 4, 21	1, 6, 2, 11, 7, 3, 16
8	8, 4, 21, 17, 13	1, 6, 2, 11, 7, 3, 16, 12
9	4, 21, 17, 13	1, 6, 2, 11, 7, 3, 16, 12, 8
10	21, 17, 13, 9, 5	1, 6, 2, 11, 7, 3, 16, 12, 8, 4
11	17, 13, 9, 5, 22	1, 6, 2, 11, 7, 3, 16, 12, 8, 4, 21
12	13, 9, 5, 22	1, 6, 2, 11, 7, 3, 16, 12, 8, 4, 21, 17

13	9, 5, 22, 18	1, 6, 2, 11, 7, 3, 16, 12, 8, 4, 21, 17, 13
14	5, 22, 18, 14	1, 6, 2, 11, 7, 3, 16, 12, 8, 4, 21, 17, 13, 9
15	22, 18, 14, 10	1, 6, 2, 11, 7, 3, 16, 12, 8, 4, 21, 17, 13, 9, 5
16	18, 14, 10, 23	1, 6, 2, 11, 7, 3, 16, 12, 8, 4, 21, 17, 13, 9, 5, 22
17	14, 10, 23	1, 6, 2, 11, 7, 3, 16, 12, 8, 4, 21, 17, 13, 9, 5, 22, 18
18	10, 23, 15	1, 6, 2, 11, 7, 3, 16, 12, 8, 4, 21, 17, 13, 9, 5, 22, 18, 14
19	23, 15	1, 6, 2, 11, 7, 3, 16, 12, 8, 4, 21, 17, 13, 9, 5, 22, 18, 14, 10
20	15	1, 6, 2, 11, 7, 3, 16, 12, 8, 4, 21, 17, 13, 9, 5, 22, 18, 14, 10, 23
21	20	1, 6, 2, 11, 7, 3, 16, 12, 8, 4, 21, 17, 13, 9, 5, 22, 18, 14, 10, 23, 15
22	23	1, 6, 2, 11, 7, 3, 16, 12, 8, 4, 21, 17, 13, 9, 5, 22, 18, 14, 10, 23, 15, 20
23	24	1, 6, 2, 11, 7, 3, 16, 12, 8, 4, 21, 17, 13, 9, 5, 22, 18, 14, 10, 23, 15, 20, 23
24	25	1, 6, 2, 11, 7, 3, 16, 12, 8, 4, 21, 17, 13, 9, 5, 22, 18, 14, 10, 23, 15, 20, 23, 24

25		1, 6, 2, 11, 7, 5, 16, 12, 8, 4, 21, 17, 13, 9, 5, 22, 18, 14, 10, 23, 15, 20, 23, 24, 25
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Piazza Discussion

<https://piazza.com/class/ib2kus4hsie528?cid=317>