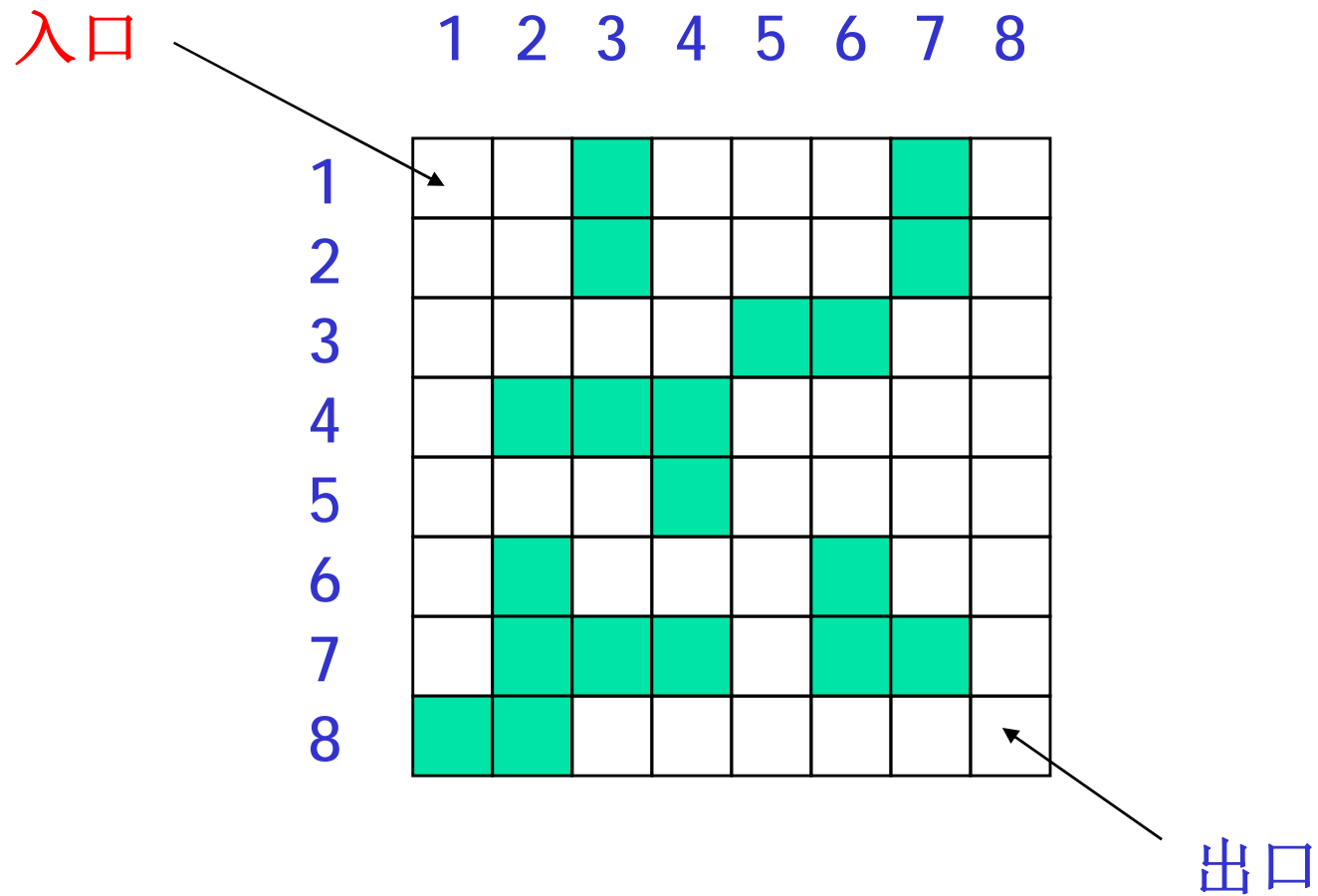


迷宫问题

作者：屠添翼

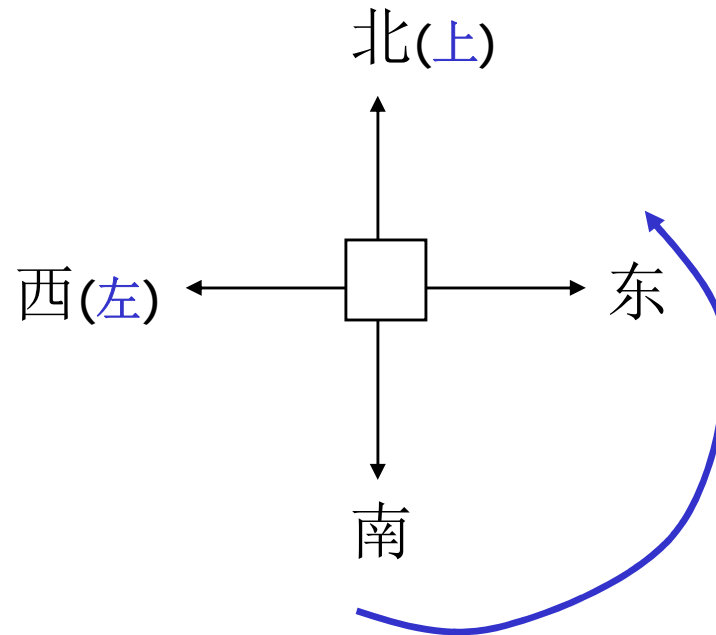
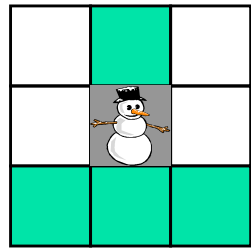
迷宫问题

- 寻找一条从入口到出口的通路



迷宫问题(续)

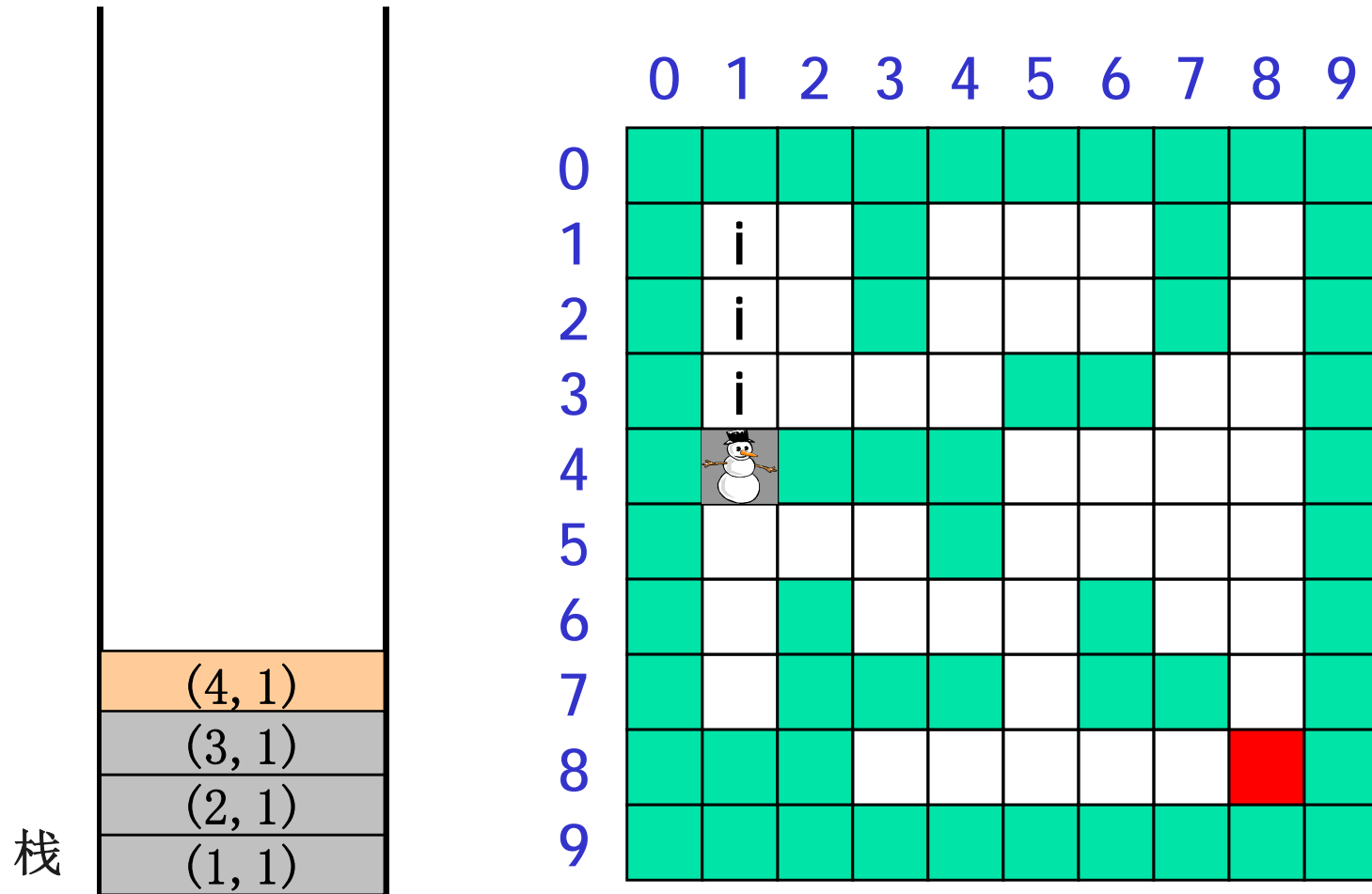
- 前进方向：上(北)、下(南)、左(西)、右(东)



- 首先从下方开始，按照逆时针方向搜索下一步可能前进的位置

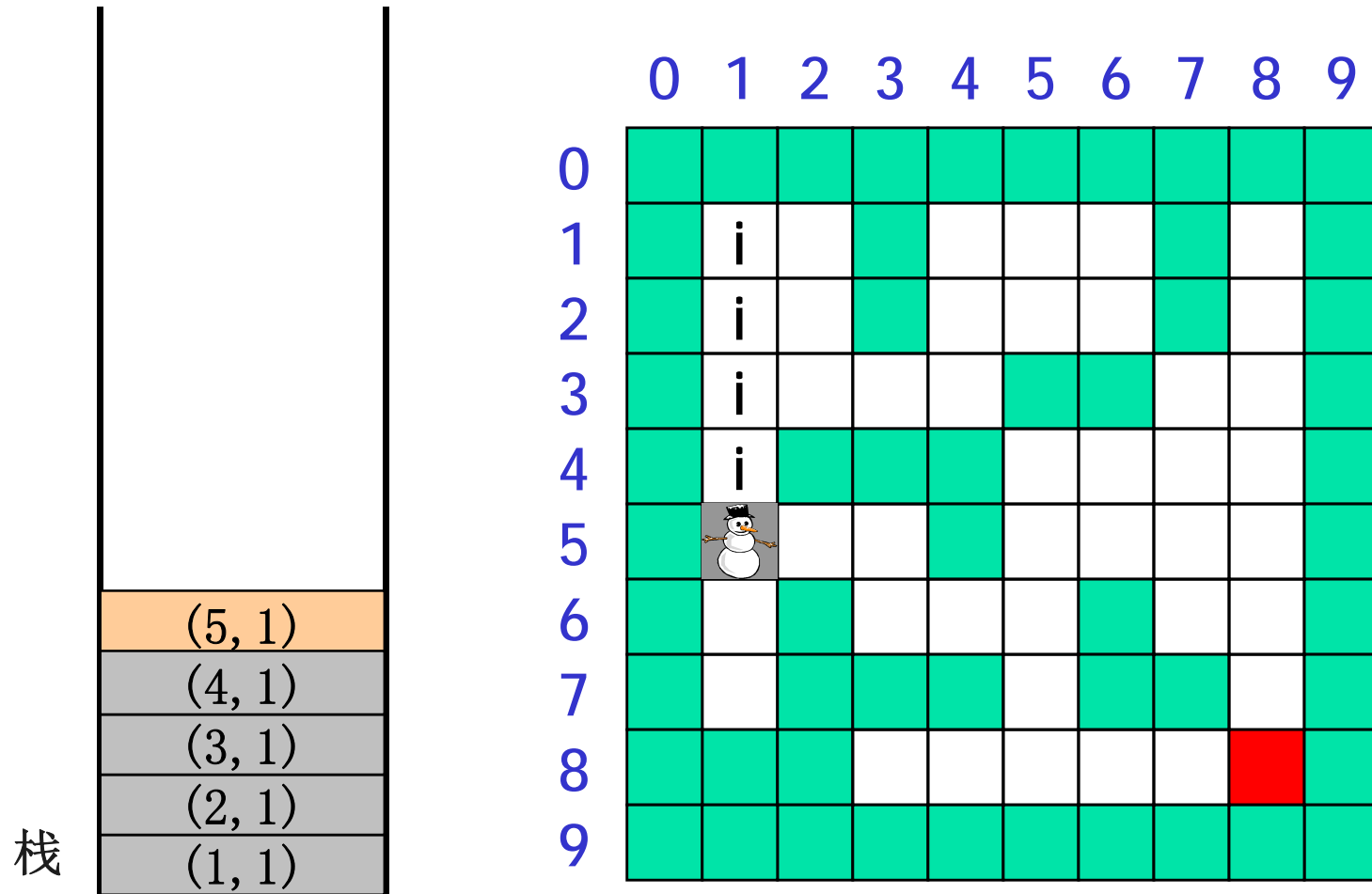
迷宫问题(续)

- 向下方前进一步



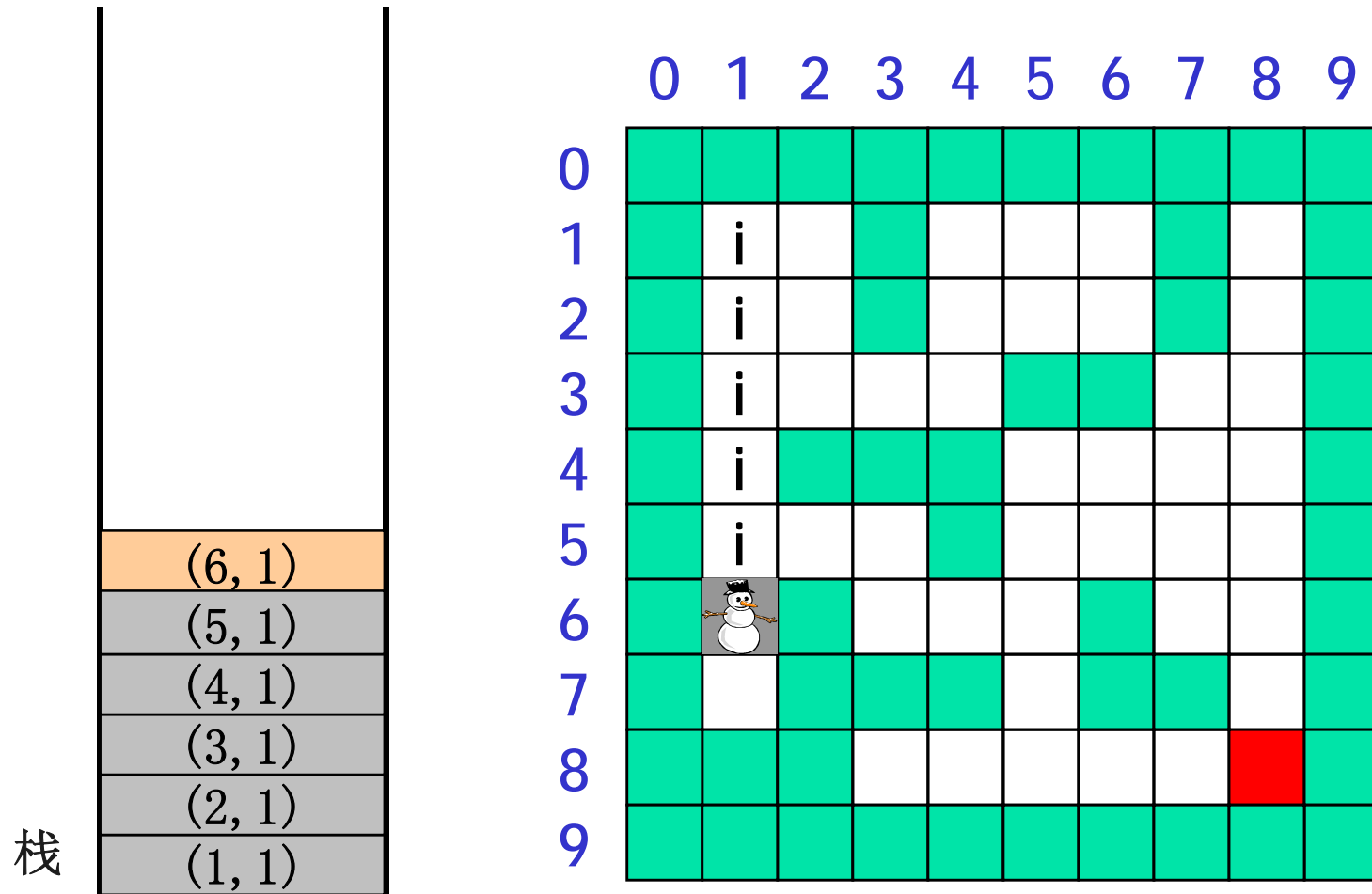
迷宫问题(续)

- 向下方前进一步



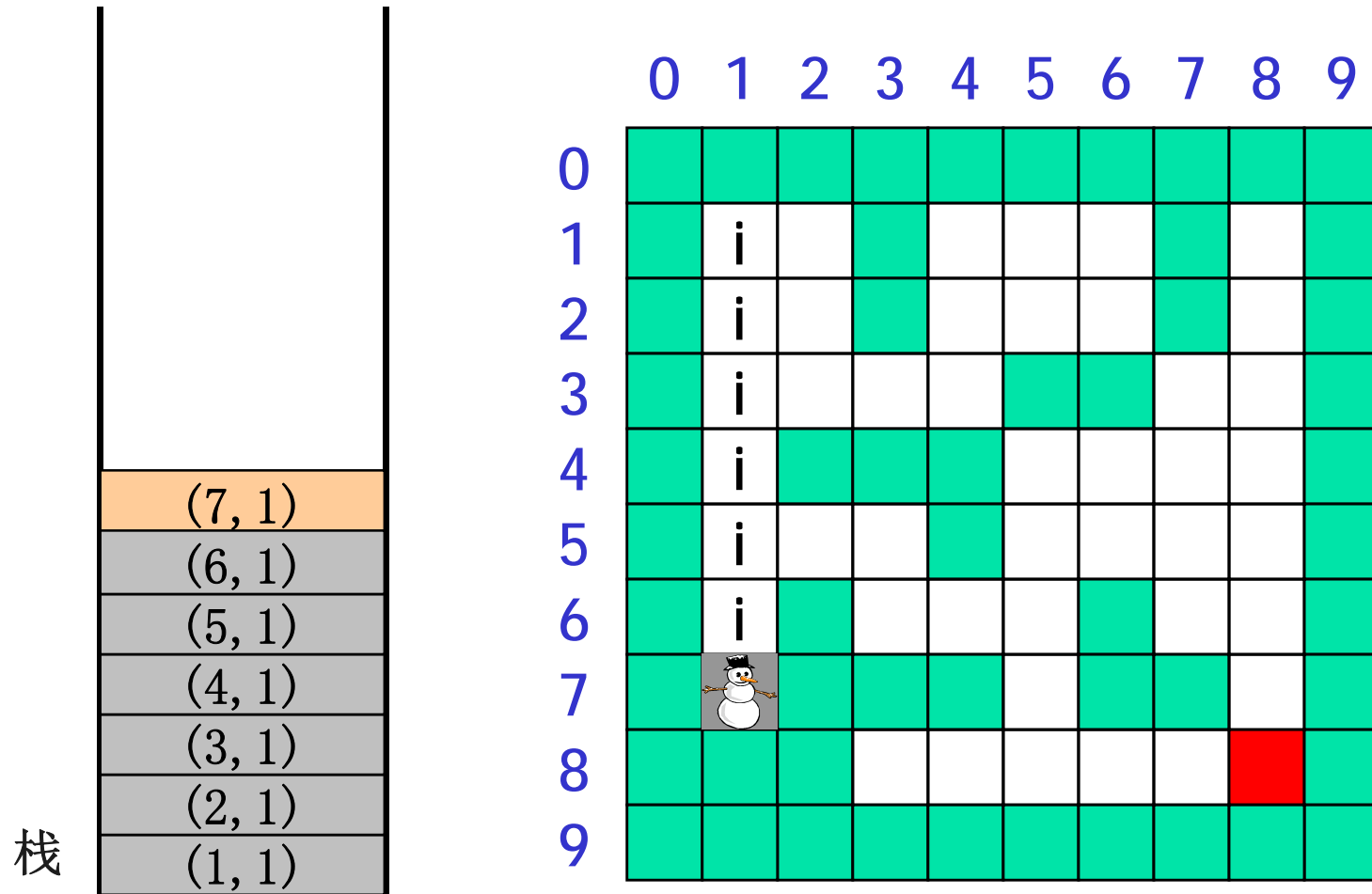
迷宫问题(续)

- 向下方前进一步



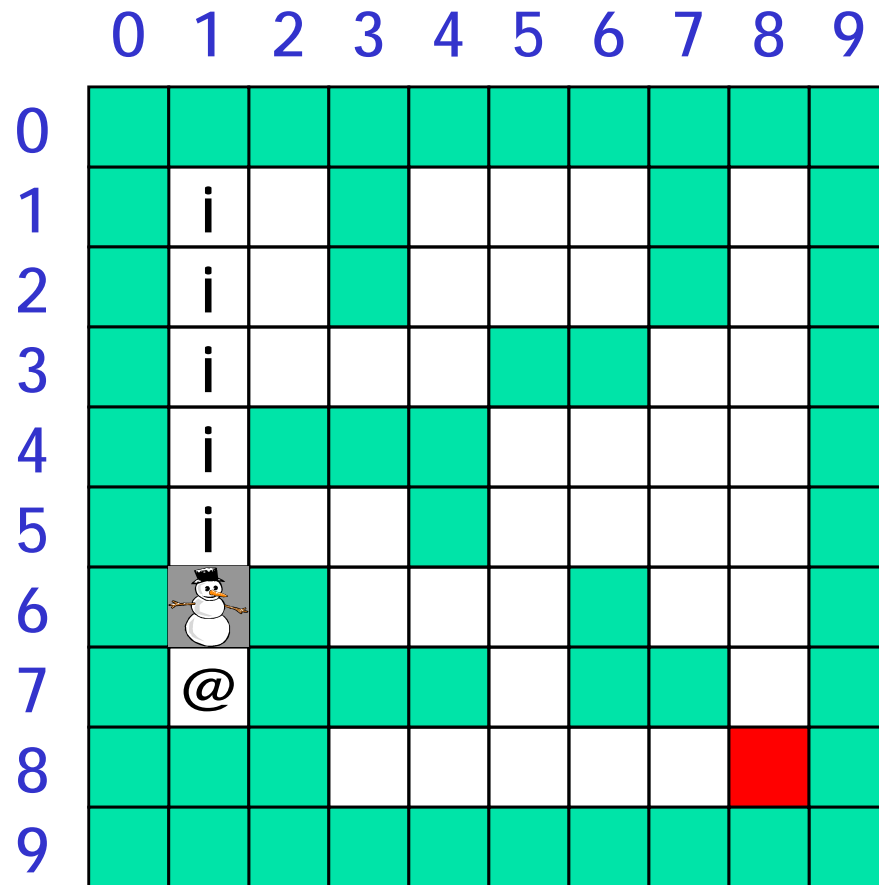
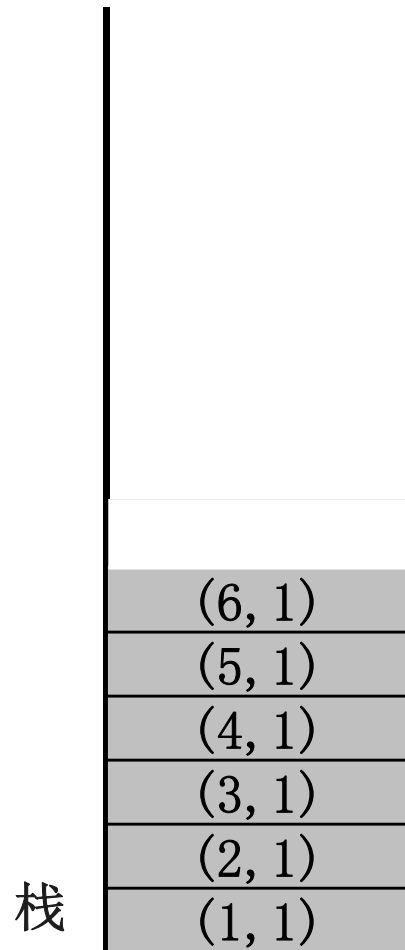
迷宫问题(续)

- 向下方前进一步



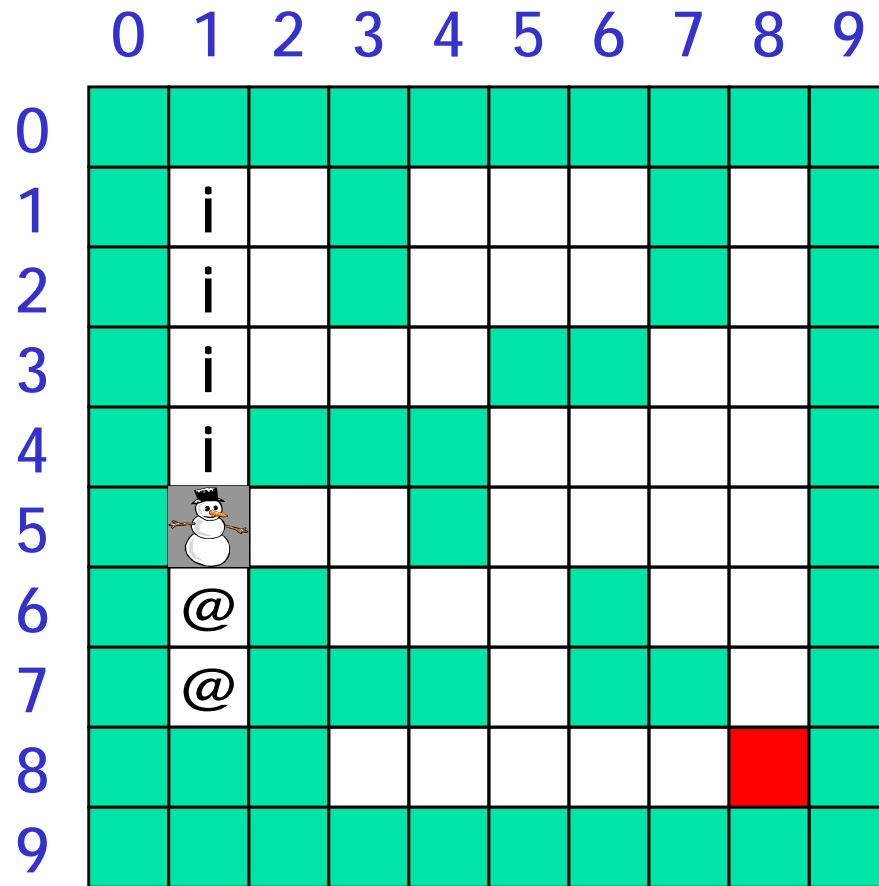
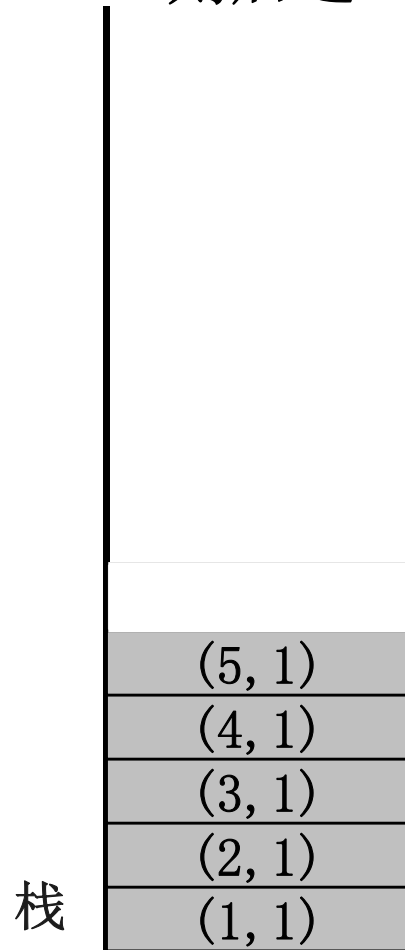
迷宫问题(续)

- 向下方、右方、左方均不能前进，上方是来路，则后退



迷宫问题(续)

- 向右方、左方均不能前进，下方路不通，上方是来路，则后退




迷宫问题(续)

- 向右方前进一步

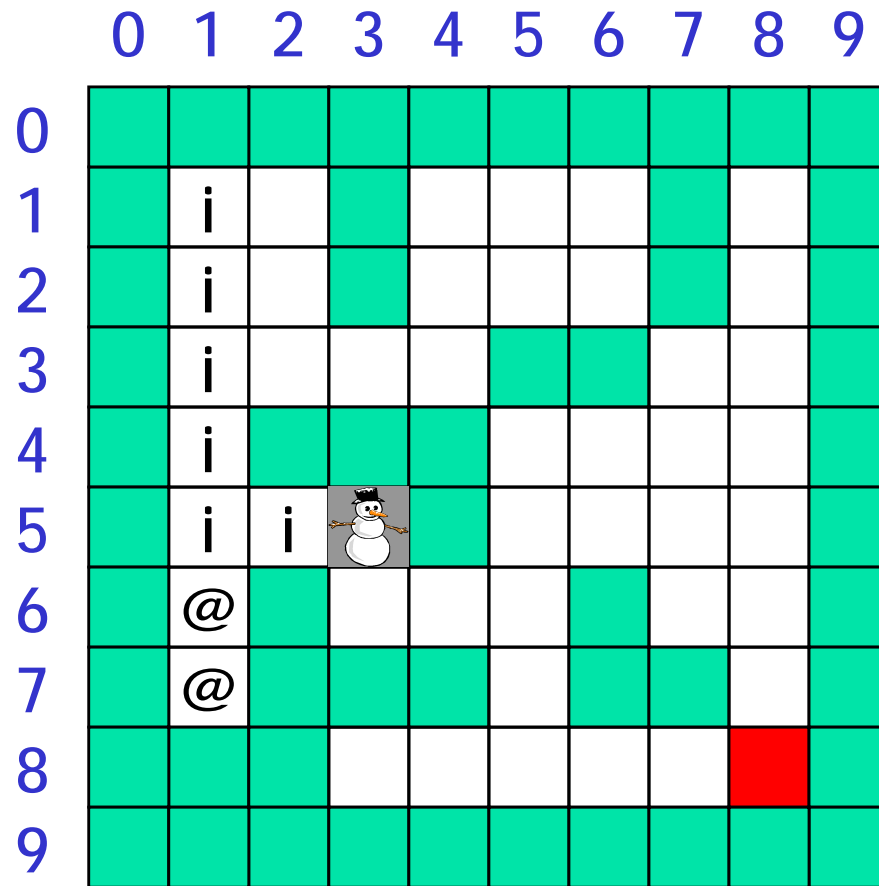
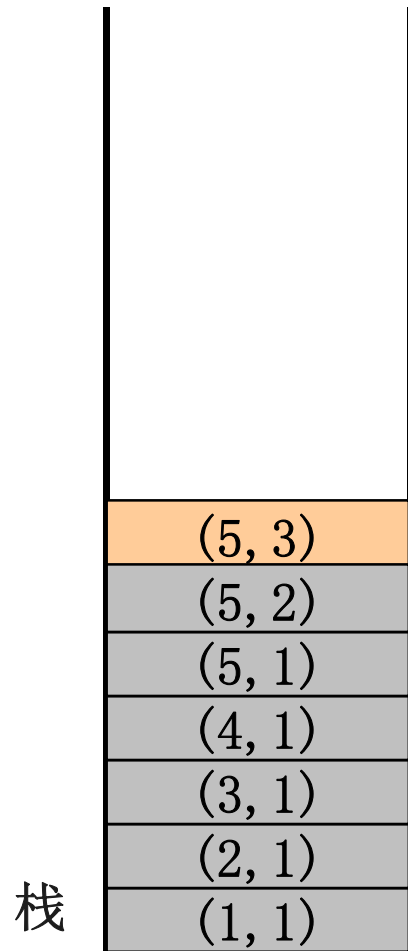
栈

(5, 2)
(5, 1)
(4, 1)
(3, 1)
(2, 1)
(1, 1)

	0	1	2	3	4	5	6	7	8	9
0										
1		i								
2		i								
3		i								
4		i								
5		i								
6		@								
7		@								
8										
9										

迷宫问题(续)

- 下方路不通，向右方前进一步




迷宫问题(续)

- 向下方前进一步

栈

(6, 1)
(5, 3)
(5, 2)
(5, 1)
(4, 1)
(3, 1)
(2, 1)
(1, 1)


	0	1	2	3	4	5	6	7	8	9
0										
1		i								
2		i								
3		i								
4		i								
5		i	i	i						
6		@								
7		@								
8										
9										

迷宫问题(续)

- 下方路不通，向右方前进一步

栈

(6, 4)
(6, 3)
(5, 3)
(5, 2)
(5, 1)
(4, 1)
(3, 1)
(2, 1)
(1, 1)


	0	1	2	3	4	5	6	7	8	9
0										
1		i								
2		i								
3		i								
4		i								
5		i	i	i						
6		@		i						
7		@								
8										
9										

迷宫问题(续)

- 下方路不通，向右方前进一步

栈

(6, 5)
(6, 4)
(6, 3)
(5, 3)
(5, 2)
(5, 1)
(4, 1)
(3, 1)
(2, 1)
(1, 1)


	0	1	2	3	4	5	6	7	8	9
0										
1		i								
2		i								
3		i								
4		i								
5		i	i	i						
6		@		i	i					
7		@								
8										
9										

迷宫问题(续)

- 向下方前进一步

栈

(7, 5)
(6, 5)
(6, 4)
(6, 3)
(5, 3)
(5, 2)
(5, 1)
(4, 1)
(3, 1)
(2, 1)
(1, 1)


	0	1	2	3	4	5	6	7	8	9
0										
1		i								
2		i								
3		i								
4		i								
5		i	i	i						
6		@		i	i	i				
7		@								
8										
9										

迷宫问题(续)

- 向下方前进一步

栈

(8, 5)
(7, 5)
(6, 5)
(6, 4)
(6, 3)
(5, 3)
(5, 2)
(5, 1)
(4, 1)
(3, 1)
(2, 1)
(1, 1)


	0	1	2	3	4	5	6	7	8	9
0										
1		i								
2		i								
3		i								
4		i								
5		i	i	i						
6		@		i	i	i				
7		@				i				
8										
9										

迷宫问题(续)

- 下方路不通，向右方前进一步

栈

(8, 6)
(8, 5)
(7, 5)
(6, 5)
(6, 4)
(6, 3)
(5, 3)
(5, 2)
(5, 1)
(4, 1)
(3, 1)
(2, 1)
(1, 1)


	0	1	2	3	4	5	6	7	8	9
0										
1		i								
2		i								
3		i								
4		i								
5		i	i	i						
6		@		i	i	i				
7		@				i				
8						i				
9										

迷宫问题(续)

- 下方路不通，向右方前进一步

栈

(8, 7)
(8, 6)
(8, 5)
(7, 5)
(6, 5)
(6, 4)
(6, 3)
(5, 3)
(5, 2)
(5, 1)
(4, 1)
(3, 1)
(2, 1)
(1, 1)


	0	1	2	3	4	5	6	7	8	9
0										
1		i								
2		i								
3		i								
4		i								
5		i	i	i						
6		@		i	i	i				
7		@				i				
8						i	i			
9										

迷宫问题(续)

- 下方路不通，向右方前进一步，到达出口

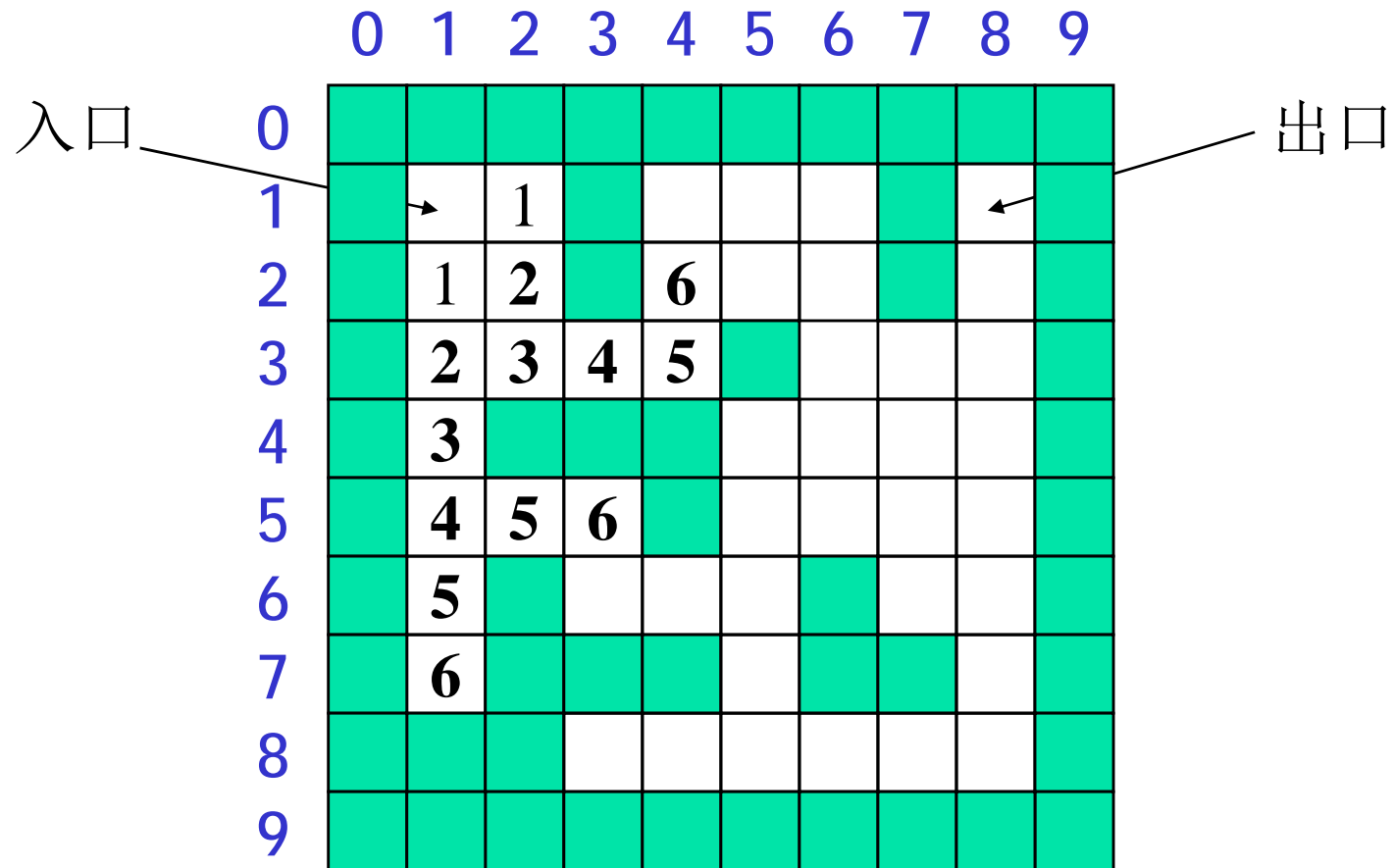
栈

(8, 8)
(8, 7)
(8, 6)
(8, 5)
(7, 5)
(6, 5)
(6, 4)
(6, 3)
(5, 3)
(5, 2)
(5, 1)
(4, 1)
(3, 1)
(2, 1)
(1, 1)

	0	1	2	3	4	5	6	7	8	9
0										
1		i								
2		i								
3		i								
4		i								
5		i	i	i						
6		@		i	i	i				
7		@				i				
8						i	i	i		
9										

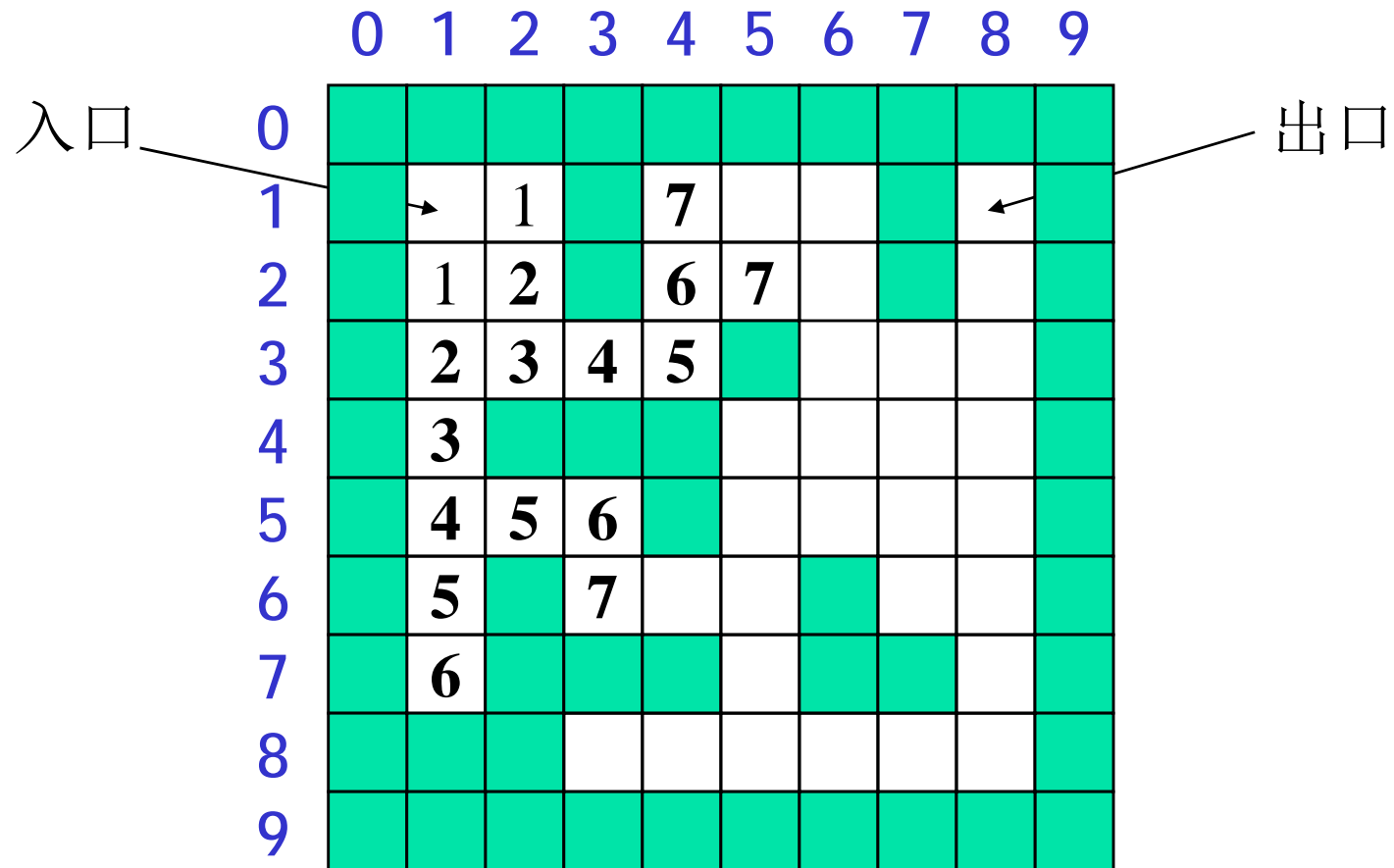
迷宫问题(最短路径)

- 借助于队列可求得入口到出口的最短路径(若存在)



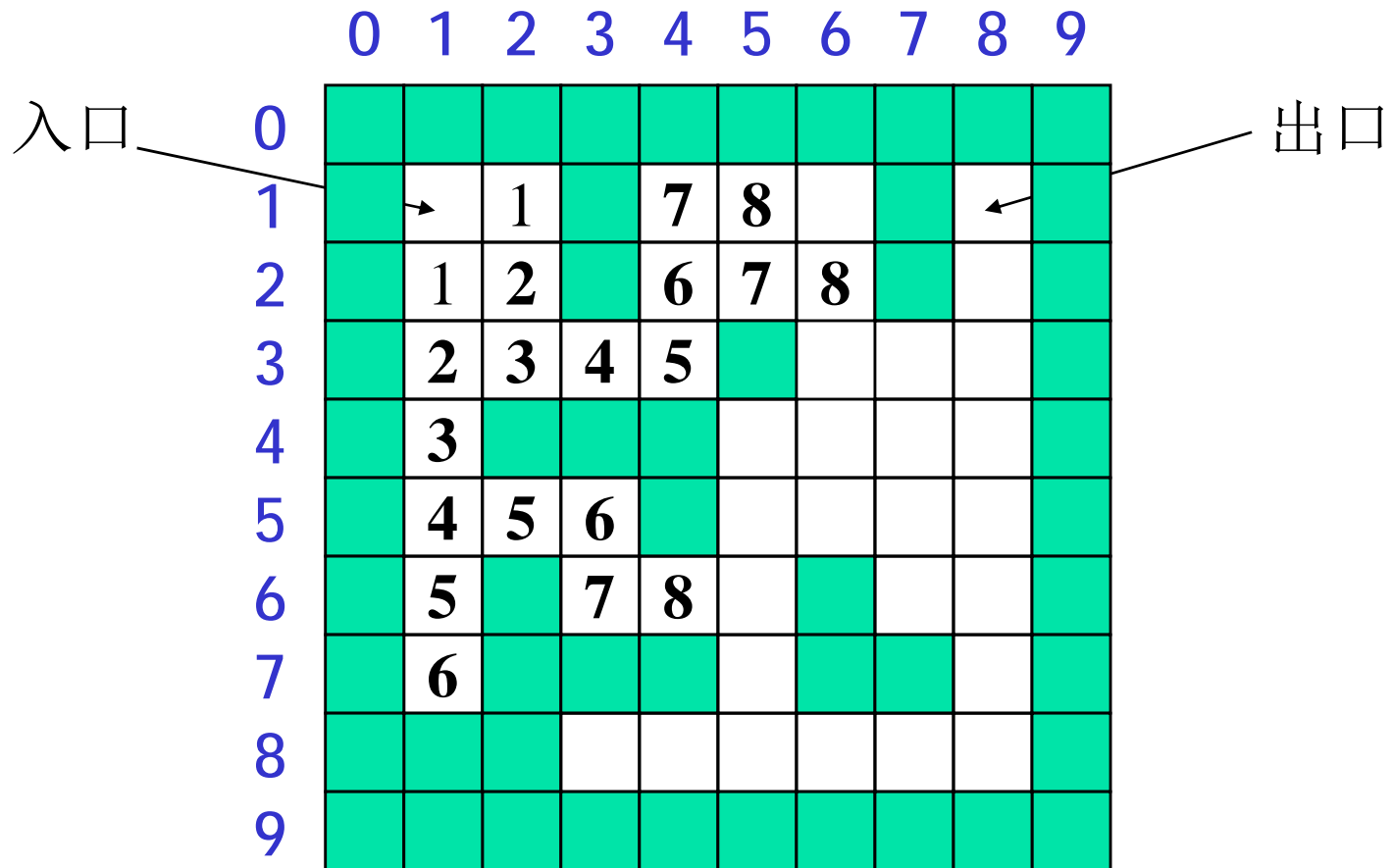
迷宫问题(最短路径)

- 借助于队列可求得入口到出口的最短路径(若存在)



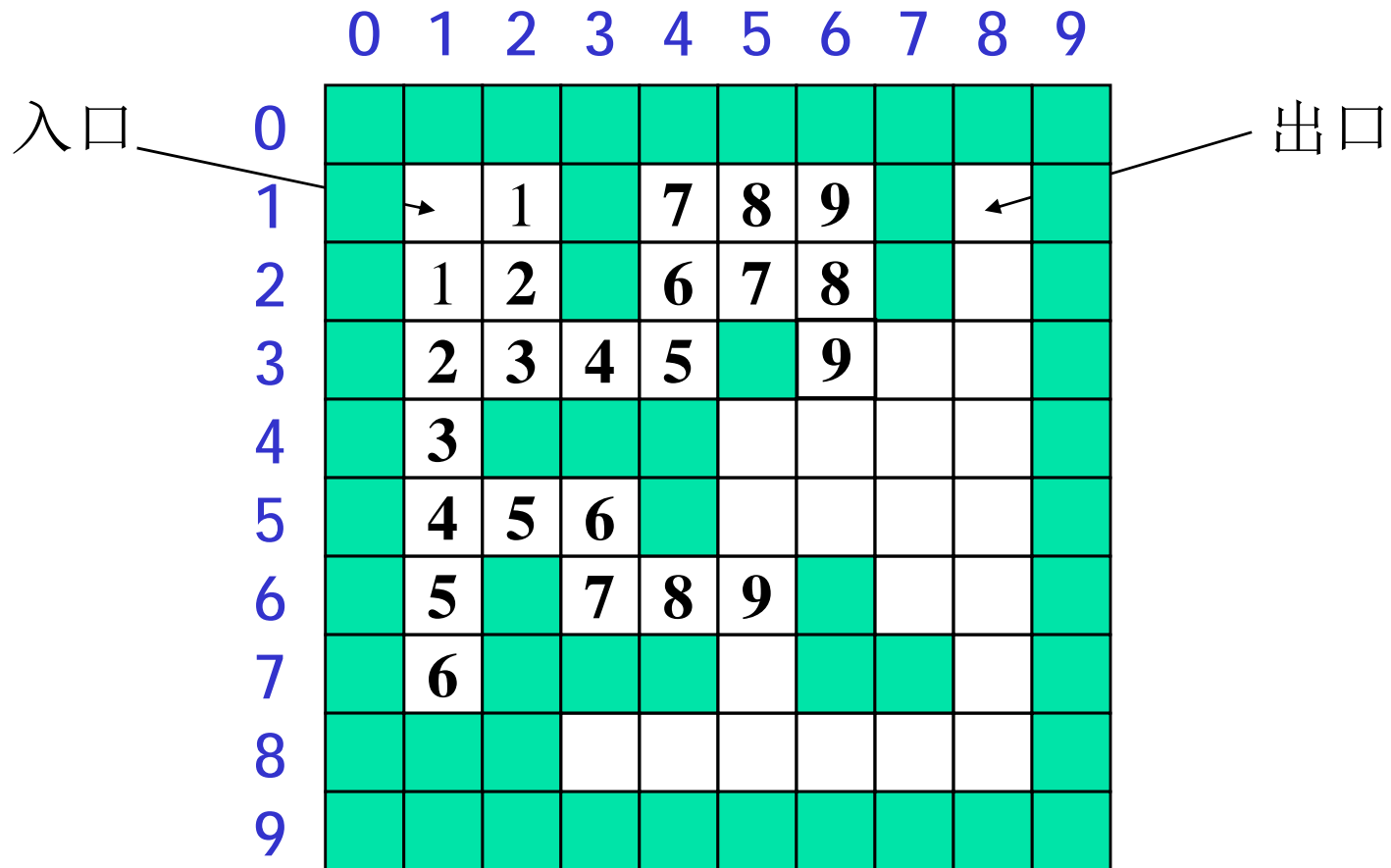
迷宫问题(最短路径)

- 借助于队列可求得入口到出口的最短路径(若存在)



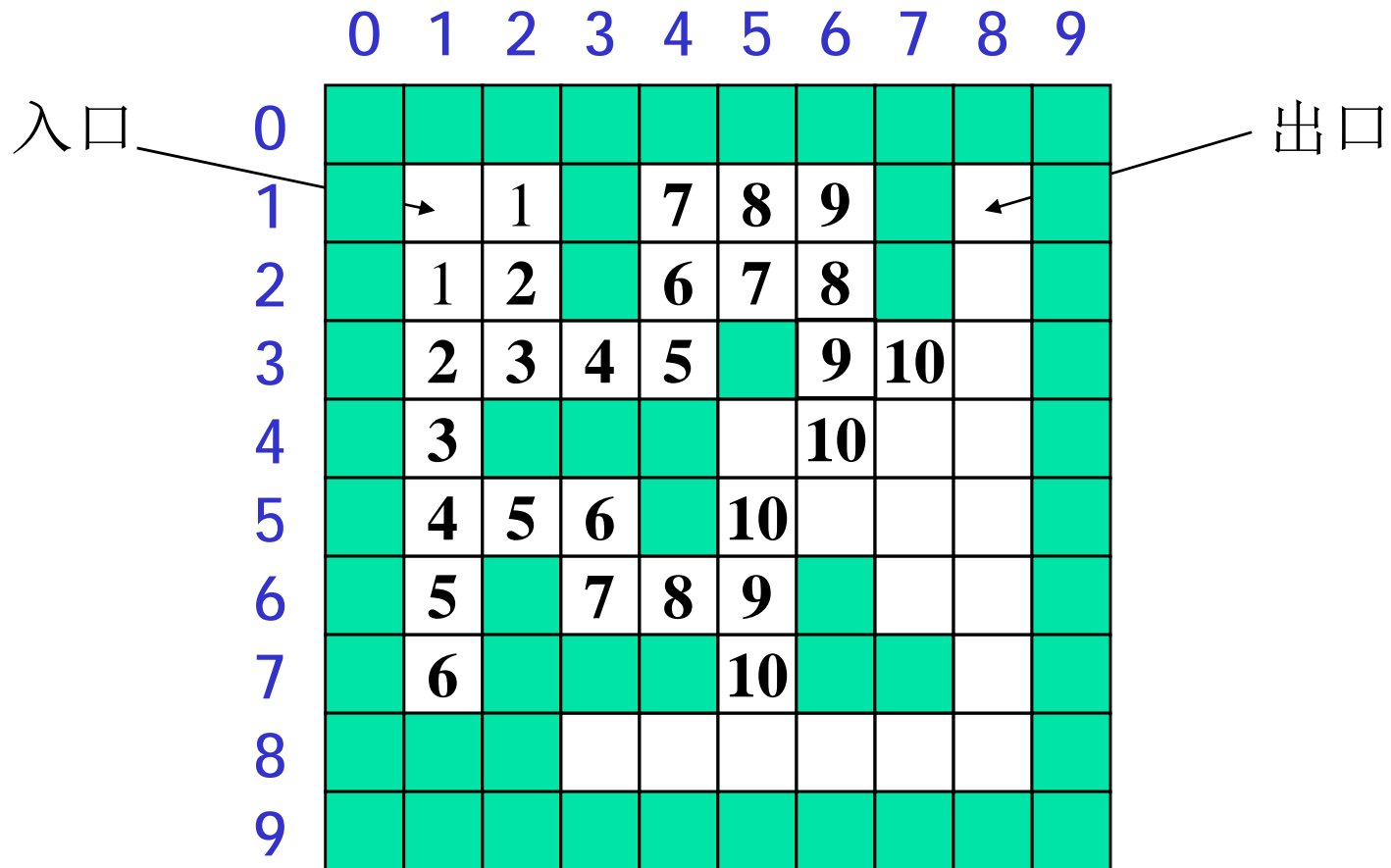
迷宫问题(最短路径)

- 借助于队列可求得入口到出口的最短路径(若存在)



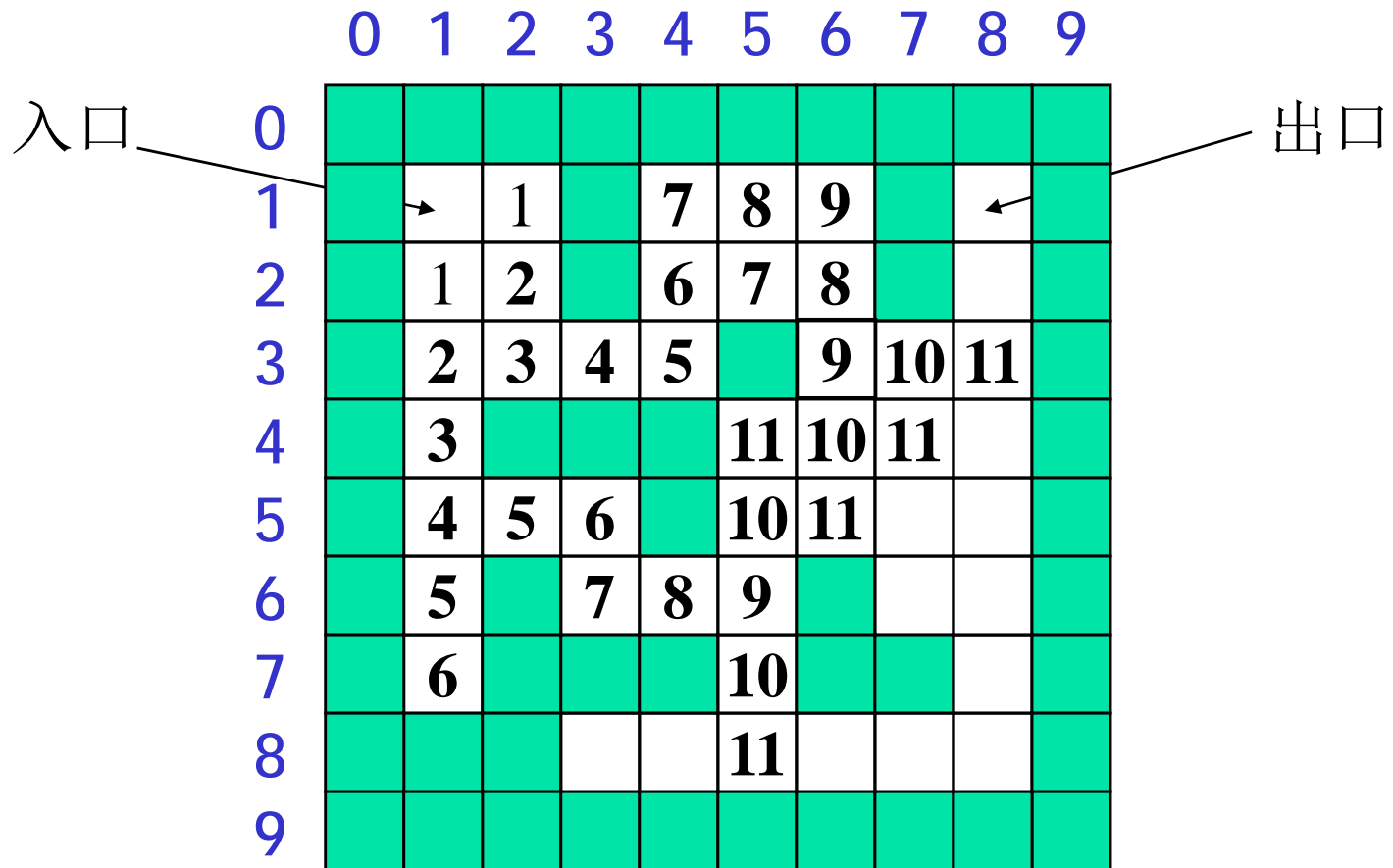
迷宫问题(最短路径)

- 借助于队列可求得入口到出口的最短路径(若存在)



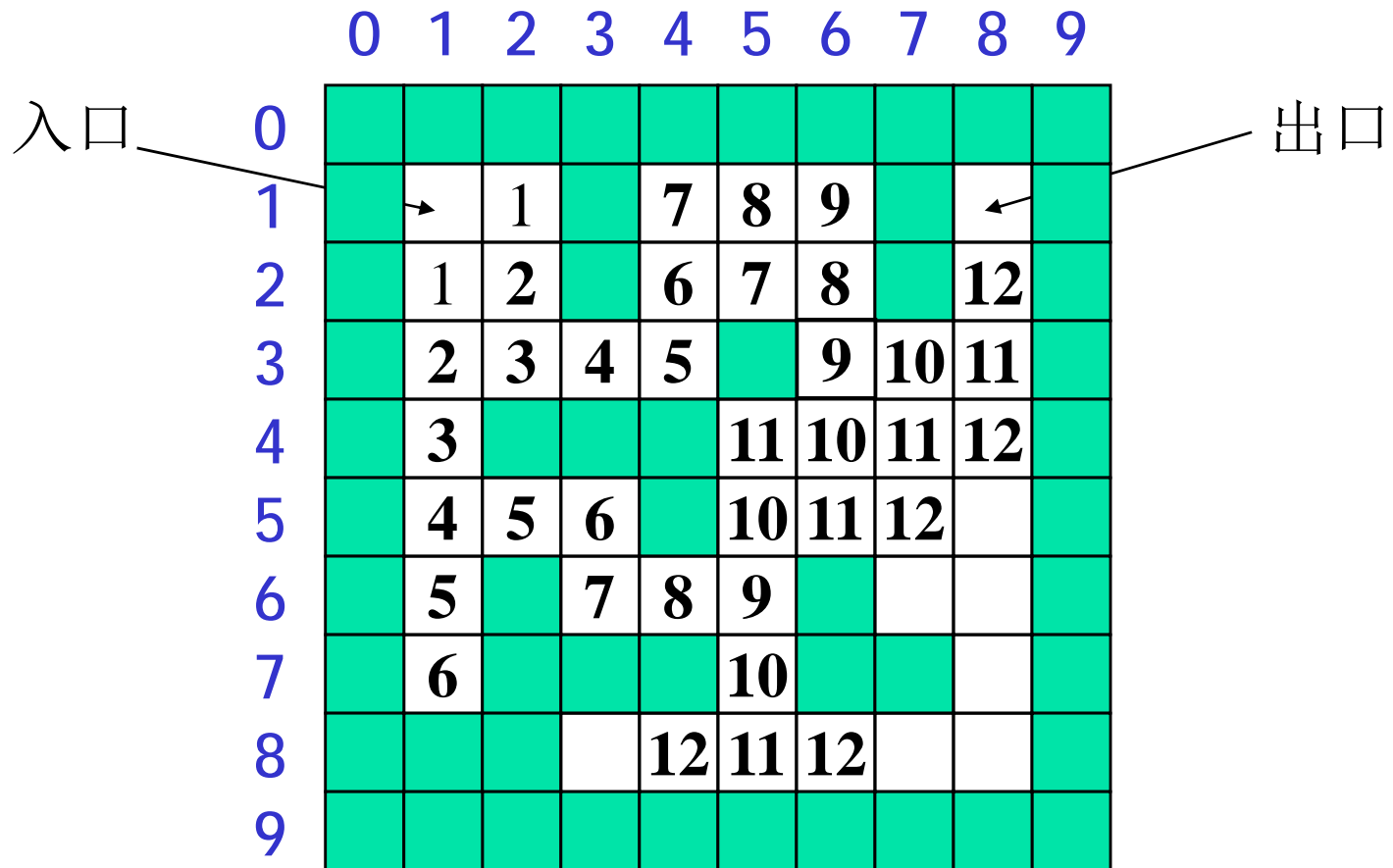
迷宫问题(最短路径)

- 借助于队列可求得入口到出口的最短路径(若存在)



迷宫问题(最短路径)

- 借助于队列可求得入口到出口的最短路径(若存在)



Rescue 【z oj1649】

- 题目
- <http://acm.zju.edu.cn/onlinejudge/showProblem.do?problemCode=1649>

分析——输入

#	.	#	#	#	#	#	.
#	.	A	#	.	.	R	.
#	.	.	#	X	.	.	.
.	.	#	.	.	#	.	#
#	.	.	.	#	#	.	.
.	#
.

分析——数据结构

- 地图的数据结构
 - 二维数组（最大 $202*202$ ）
 - 数组中每个元素是一个结构体，记录地图符号和最小步数
- 辅助结构——队列
 - 因为是求最短路径，所以需要队列

分析——思路调整

- 若有 n 个营救者，则需要搜索 n 次。
 - 效率太低
- 逆向思维
 - 计算从A（被营救者出发）到达所有位置的步数，求多个R位置的最小值。
 - 只需要搜索一次

