Computer Science II

Project #3: Maze

Taerakul Janat #19B60096

Project Explanation

In this project, I learned about graph and graph transversal. The method that is used in the project is BFS (breath first search) which always give the best answer. This method is also called flood fill because searching pattern is spreading out every direction evenly.

The file maze.py has three functions: **genRandMaze(), printMaze(), and BFSMaze()**.

- **genRandMaze(n, p)**

This function simply generate the maze of n*n cells. p is the probability that there is a wall between each cell. The function returns the generated maze, which is stored as adjacent list.

- **printMaze(n, adjList, visited=None)**

This function receives dimension (n) and the adjacent list of a maze (adjList) and shows the maze on the output as a picture. When this function is called inside BFSMaze(), it also receives the visited nodes array to print out the steps of BSF too.

- **BFSMaze(n, adjList, displayDetails=False)**

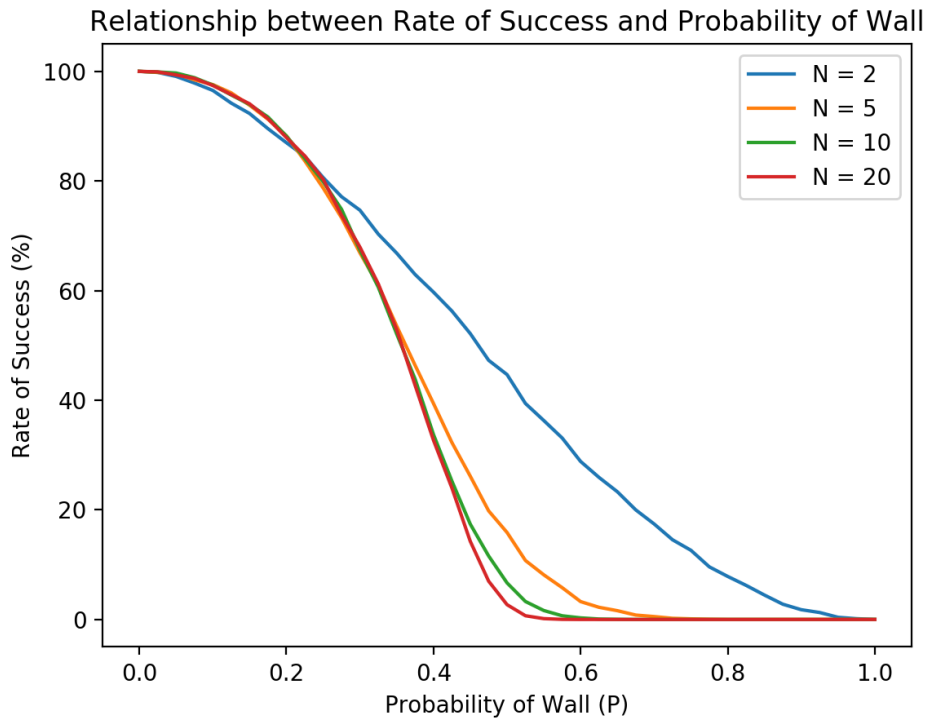
This function also receives dimension (n) and the adjacent list of a maze (adjList) and tries to solve the maze from the top left cell to the bottom right cell. If the is a path between the two cells, the function returns True and False if not. displayDetails can be set to True if user wants to see the steps of BFS.

Experiment

I did experiments by fixing size of the maze (n) and varying probability (p) then run 10,000 simulations for each probability. Then I changed the size of the maze to 2, 5, 10, and 20. The results are as shown in the graph below.

Result

The graph shows the relationship between the rate of success of finding a path from a starting point to the end point of the maze and the probability of wall between cells for each size of maze (2, 5, 10, and 20).



Observation

From the result, for every sizes of the maze, the rate of success decrease as the probability of wall between cells increase, which is reasonable. When comparing the line of each N, the rate of success decreases as the maze grows bigger (The maze is harder to be solved).