

CSC14003 – Artificial Intelligence

LAB 01: SEARCH STRATEGIES

Problem description

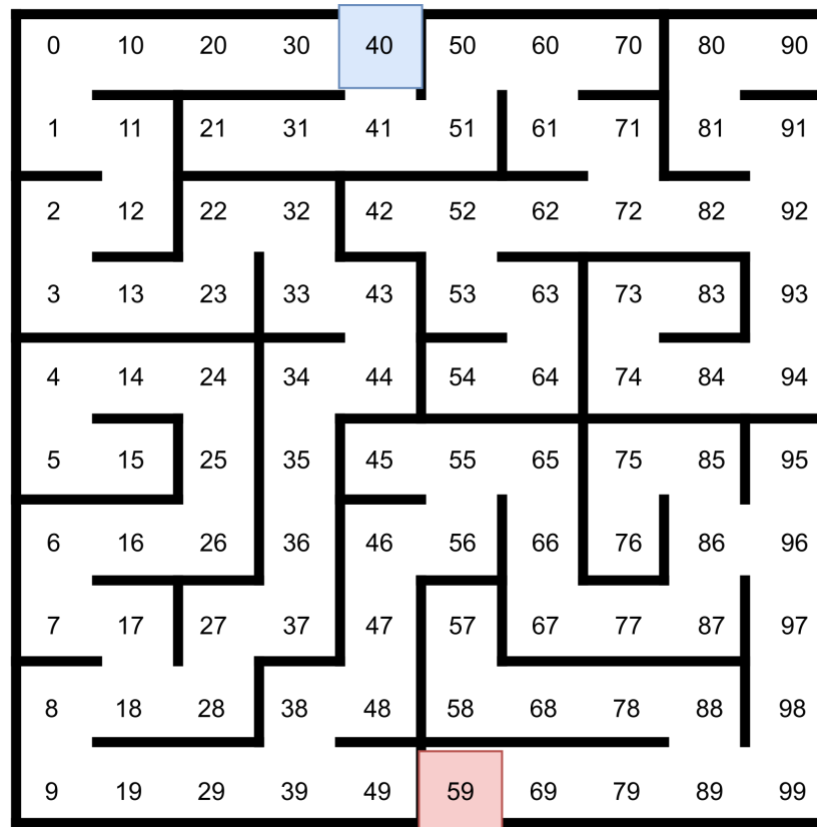


Figure 1. Maze

Imagine you are participating in a game where a character is attempting to navigate through a maze and requires your assistance in order to escape. As illustration, in the maze mentioned above, the entrance is located in cell 40 and the exit is located in cell 59. In order to make this task less challenging, we will presume that this maze contains only a single entrance and exit. Additionally, it is essential to always confirm that there is a viable escape route from the maze. You can only move horizontally and vertically.

Problem representation

Input: The maze is represented as a text file as follows.

- The first line must contain a positive integer N , representing the size of the maze.
- The second line contains 2 integers representing the entrance and exit.
- $N \times N$ next line contains an adjacency list or adjacency matrix.

Output: The program must print the following information to the console:

- The time to escape the maze.
- The list of nodes explored in the correct order.
- The list of nodes on the path found in the correct order.

Search strategies implementation

You are required to implement and provide results for the following search strategies:

- Breadth-first search (BFS) & Depth-first search (DFS)
- Uniform-cost search (UCS)
- Greedy Best First Search using the Manhattan distance as heuristic
- Graph-search A* using the same heuristic as above

You must prepare a function for each strategy and name it with a reminiscent name.

Although sources of AI search strategies are widely available, copying them at any level is strictly prohibited. Plagiarism may result in severe penalties.

Submission preparation

This assignment is to be completed **individually**. To prepare for it, you will need to create a folder that contains various subfolders, including:

- Source: This folder should contain all of your Python files.
- Input: This folder contain some example mazes, in addition to the one given to you.
- Output: This folder contain the corresponding search results for the mazes.
- Document: Create a PDF-formatted file that includes a checklist of what you have/have not done and a brief description of the main functions.

When naming the main folder, use your Student ID and compress it in a common format.

Contact this email if you have any questions about this lab (quochuuy2000@gmail.com).