

## CSE 4082 – Project 1

( Due 29.12.2021 at 23:59, electronic submission only, to cse.cse482@gmail.com )

Design and implement a maze solver for solving 2D mazes using graph search with the following strategies:

- Depth First Search
- Breadth First Search
- Iterative Deepening
- Uniform Cost Search
- Greedy Best First Search
- A\* Heuristic Search

Your program should input a maze file the format of which will be determined by yourself. The letter “S” denotes the starting square, the letter “G” denotes one or more goal squares and the letter “T” denotes the squares with trap. The cost of each move is one point, however, when the agent moves in a trap square, the cost of the move will be +10. For every search method, the order of node expansion should be East, South, West, North. An example maze is as follows:

	1	2	3	4	5	6	7	8
1								
2				T				
3		S				T	G	
4								
5								
6							G	
7						T		T
8					G			G



For the above maze and for each search method, your program should display

- i. The cost of the solution found.
- ii. The number expanded nodes (the nodes whose children are determined).
- iii. The maximum size of the frontier (i.e. max number of nodes) during the search.
- iv. The maximum size of the explored set (i.e. max number of nodes) during the search.
- v. The solution path itself in the following format:  
 $(2,3) - (1,3) - (1,2) - (1,1) - (2,1) - \dots$

Notes:

- a. For Greedy Best First Search and A\* Heuristic Search, you should use city block distance (Manhattan distance) as an admissible heuristic.
- b. You should also submit a design document describing the classes (fields and methods) used in the project.
- c. The document should also contain the output of your program for the example maze given above and another maze designed by you. If you do not provide any output, then your project will NOT be evaluated!
- d. Details of the project will be discussed in the class.
- e. The project should be done in groups of two or three.