AI- Assignment 1

During pandemic times, you need to keep yourself and others safe. Your goal is to reach home, but you forgot the mask at the library. You might be able to buy the mask on your way to the home.

Your environment is a 9*9 square lattice.

	Home					Covid		
	Covid			Doctor				
							Mask	
Actor								

Actor

You start from bottom left. Your goal is to reach home in as minimum number of steps as possible. **Your ability to perceive covid is defined in the "*variants section*" below.** Your algorithms will work on both variants. The actor can move one step per turn and can move horizontally, vertically and diagonally.

Covid

Covid's perception is only in consecutive cells (Moore neighborhood), shown in figure below. There are 2 covid agents generated randomly on the map. You do not want to face covid as it ends the game. You are safe from covid only if you enter its perception zone after visiting the doctor or you already got the mask.

	Covid	

Doctor

The doctor is generated randomly on the map but cannot be in the covid zone. You do not know the location of the doctor's cell. You can perceive the doctor only when you are inside the doctor's cell. Once you go inside the doctor's cell, you are vaccinated and covid cannot harm you even if you go inside covid infected cells.

Home

Home is randomly generated on the map except inside the covid infected cells. You know the location of the home.

Mask

Mask is generated randomly and is not in the covid zone. You do not know the location of the mask. You can perceive mask only when you are inside the mask cell. If you get the mask, covid cannot harm you even if you go inside covid infected cells.

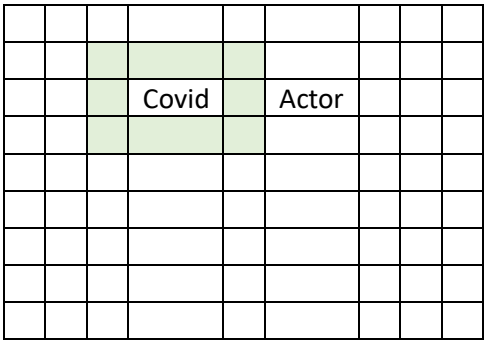
Algorithms

A backtracking search
Another search method of your choosing (e.g. A-star, Simulated Annealing, etc.)

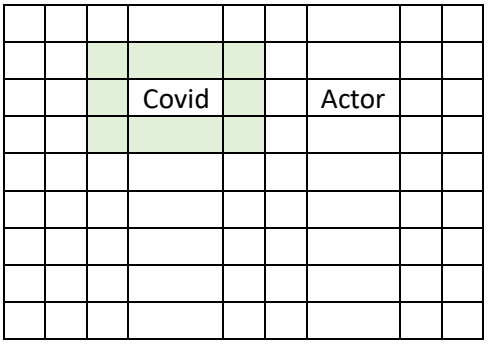
Variants

The algorithms consider two scenarios:

1) In one scenario, you can perceive covid if you are standing next to the covid infected cells, shown in fig. below.



2) In the other scenario, you can perceive covid from a larger distance, which is, when you are 1 square away from the covid infected cells, shown in fig. below.



Input

The algorithms input is a 9*9 square lattice. The map has a single actor, 2 covid agents, a doctor, mask, and home. The input file would be as such,

[0,0] [0,1] [0,2]….till

[8,0] [8,1] [8,2]…

Output

The output comprises of

1) outcome- Win or lose

2) The number of steps algorithm took to reach home

3) The path on the map. Path can be displayed as, for example,

[0,0] [1,1] [1,2]…

It would be better if the path is highlighted on the map.

4) Time taken by the algorithm to reach home

Test Function

The code should include a simple test function where we can generate a map and run both algorithms to see the output

Statistical Analysis

Comparison of algorithms through statistical arguments based upon test maps generated. Statistical analysis is required for both variants (described above). As an example , for each test map, comparison would be:

Backtracking (variant 1) compared to 2nd algorithm (variant 1)

Backtracking (variant 2) compared to 2nd algorithm (variant 2)

Backtracking (variant 1) compared to Backtracking (variant 2)

2nd algorithm (variant 1) compared to 2nd algorithm (variant 2)

Implementation

Prolog

Submission

1) Source code with comments [10 points]

2) Report describing, each algorithm flow in plain English (not more than 2, 3 paragraphs), statistical comparison among algorithms and PEAS description with respect to the Actor agent [8 points]

3) Graphical representation of maps that were impossible to solve. You can generate the maps directly through the code or hand draw them for the report after testing them on both algorithms [2 points]

4) Any interesting outcome/map is encouraged to highlight

Note

Plagiarism in your work will lead to a fail grade in the assignment. We reserve the right to use software for comparisons against your classmates.