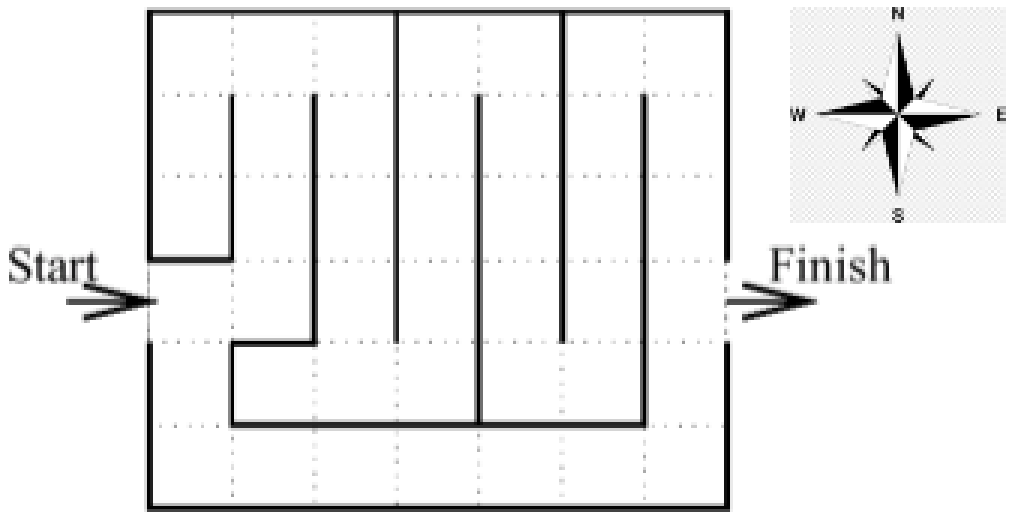
Artificial & Computational Intelligence

Assignment 1 - Question 1

Problem statement

Given the below maze configuration, the task of the robot is to navigate in the maze and find the optimal path to reach the finish position. It can move to the north, south, west and east direction. While navigating through the environment it has obstacles like walls. For each transition, a path cost of +3 is added in search. Assume that the robot's vision sensors are sensitive to the exposure to the sunlight and whenever it tries to move towards the east direction resulting in incurring an additional penalty of +5 cost. Use Manhattan distance as a heuristic wherever necessary.



Use the following algorithms to find the optimal path.

a. Iterative Deepening A* Algorithm
b. Hill Climbing Algorithm

Evaluations will be based on the following:

1. Explain the PEAS (Performance measure, Environment, Actuator, Sensor.) for your agent. (20% marks)
2. Use both the above mentioned algorithms and implement in PYTHON. (20% + 20% = 40% marks)
3. Print the optimal path sequence with costs. (20% marks)

4. Include code in your implementation to calculate the space complexity and time complexity for the informed search and print the same. For local search interpret the significance of the hyperparameters if any applicable . (20% marks)

Note 2:

- You are provided with the python notebook template which stipulates the structure of code and documentation. Use well intended python code.
- Use a separate MS word document for explaining the theory part. Do not include the theory part in the Python notebook except Python comments.
- The implementation code must be completely original and executable.
- Please keep your work (code, documentation) confidential. If your code is found to be plagiarized, you will be penalized severely. **Parties involved in the copy will be considered equal partners and will be penalized severely.**