Assignment 1

Introduction to Artificial Intelligence and Logic Programming

Winter 2024

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**Instructions**

* This is an individual assignment.
* Copying another person’s work is a breach of the academic integrity policy.
* Check eclass for due date and time.
* After completing this assignment, submit only the answer file.

**Do no alter the format of this answer file and do not omit any of the text in this file.**

**Part 1 – Uniformed Search**

**Question 1**

**Answer Format:** For the question below, type your answer in this format: **Start-A-B-C-D-E-F-Goal**. Do not explain your answer.

(Q.1.a) Depth-first graph search.

States Expanded (5 Marks): **Start,A,C,D,Goal**

Path Returned (5 Marks): **Start-A-C-D-Goal**

(Q.1.b) Breadth-first graph search.

States Expanded (5 Marks): **Start,A,B,C,D,Goal**

Path Returned (5 Marks): **Start-D-Goal**

(Q.1.c) Uniform cost graph search.

States Expanded (5 Marks): **Start,A,B,D,C,Goal**

Path Returned (5 Marks): **Start-A-C-Goal**

**Question 2**

**Answer Format:** For the question below, type **True, False, Yes, or No** based on what the question is asking. Do not explain your answer.

**(Q2.a.1)** (5 Marks): **True**

**(Q2.a.2)** (5 Marks): **True**

**(Q2.a.3)** (5 Marks): **True**

**(Q2.a.4)** (5 Marks): **Yes**

**(Q2.b.1)** (15 Marks)

**Answer Format:** List only the numbers, e.g., 1, 2, 3, 4, 5 then explain your answer for each item whether needed or not.

Answer: **1,4**

**1.Yes, the current location of Scorpblorg is necessary to determine which node is being visited and which node will be visitied next.**

**2.No, the total number of edges travelled so far is unnecessary as it plays no role in determine if a node has been visited for the 3rd time.**

**3.No, an array of booleans indicating whether each snail has been visited so far provides us with redudant information that is not needed in the simplest state representation.**

**4. Yes, an array of numbers indicating how many times each snail has been visited so far is needed as we check when a node has been visited 3 times and then output that as the mate for Scorpblorg.**

**5. No, the number of distinct snails visited so far provides us with nothing useful as we don't need that information to figure out whether a node has been visited thrice.**

**Part 2 – Informed Search**

**Question 3**

**Answer Format:** For the question below, type your answer in this format: **Start-A-B-C-D-E-F-Goal**. Do not explain your answer.

Returned Path (10 Marks): **Start-A-C-Goal**

**Question 4**

**(Q4.1)** (10 Marks): **There are m\*n possible tiles for the agent. There are 4 possible directions i.e North, South, East and West. The speed can take Vmax +1 possible velocities which ranges from 0 to Vmax. Hence, the size of the state space is**

**4\*m\*n\*[Vmax +1].**

**(Q4.2)** (15 Marks): **Answer Format:** Answer yes or no, then give a specific example to support your answer. Answering yes or not alone without a supporting example will receive zero marks.

**No, the Manhattan distance from the agent's location to the exit's location is not admissable. This is due to the velocity and turning constraints of this model. For example, let's assume the agent is the at exit but requires turning 180 degrees to escape. He would need to turn left twice and then provide a velocity of 1 to escape which is overestimating the distance of 1 by requiring 3 steps instead of 1.**