

CS814 AI for Autonomous Systems – Coursework 1

Guidelines

Aim of the assignment

To provide deeper understanding of search algorithms (both informed and uninformed).

Learning outcomes

Program in Python, with the goal being to implement key AI algorithms and build AI systems; Define and understand the problem of Artificial Intelligence as it relates to autonomous systems; Apply search techniques to enable autonomous systems to choose actions that are appropriate to their goals.

Submission

You will be allowed to submit two files only:

1. The first file consists of your answers on all questions. Please make sure that your file is well written and well structured. One should be able to clearly read your solution and identify the final answer to each and every question or sub-question. The submitted file should be in pdf format.
2. The second file consists of your coding, only as a support to the first file. The submitted file should be in py or ipynb extension.

Both files should be submitted using myPlace; no submission will be accepted in any different way. Any extension should be requested in advance of the submission deadline, with a valid reason. Assessments submitted after the Monday midday deadline without an approved extension will receive a mark of zero.

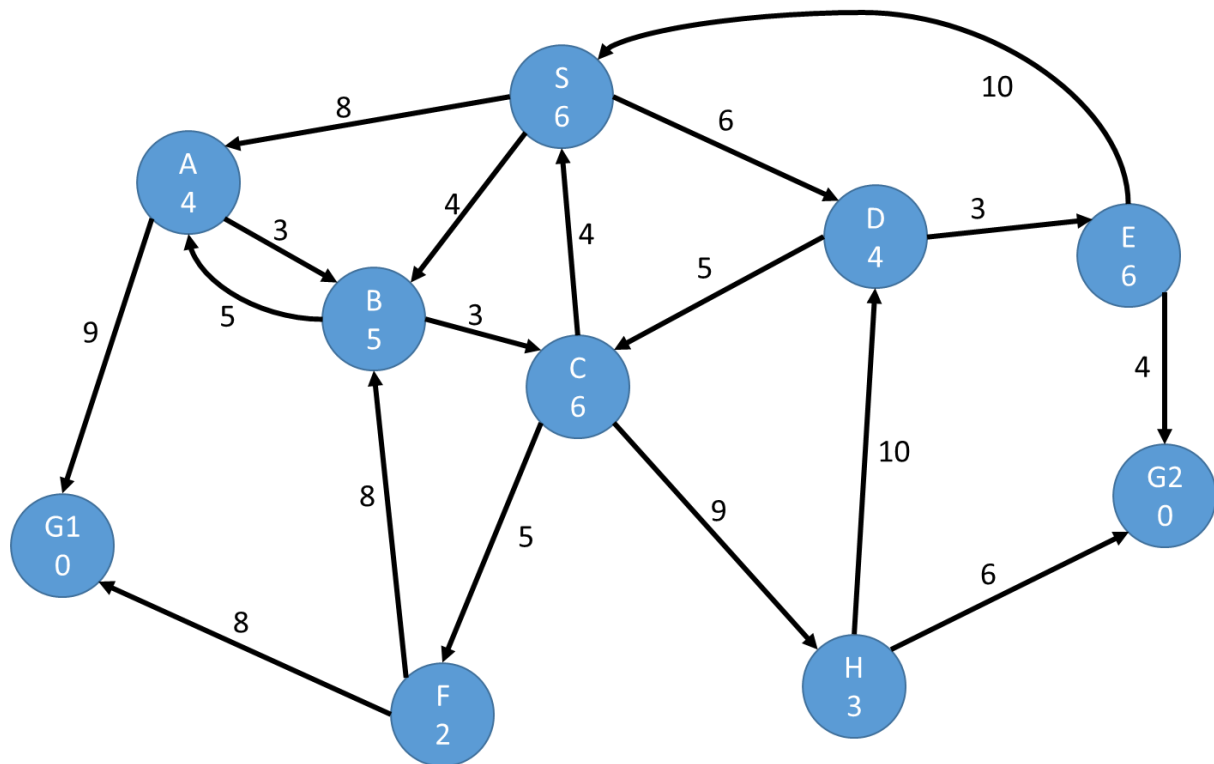
Good Luck!!

DUE: 12:00 noon, Monday November 2nd, 2020

CS814 AI for Autonomous Systems – Coursework 1

Part I (50%)

Let us consider the search space below, where S is the start node, and G1 and G2 satisfy the goal test. Arcs are labelled with the actual cost of traversing them and the estimated cost to a goal state is reported inside the nodes.



Question 1

Apply the following search strategies to this problem:

- Depth-first search (8 points)
- Breadth-first search (8 points)
- Uniform cost search (8 points)
- Best-first search (8 points)
- Algorithm A (8 points)

For each of the strategies, show the agenda and the selected node to be explored at each step in the search. While exploring, when all else is equal, the nodes on the agenda should be visited in alphabetical order. When a solution is reached at the end, show the path and its cost.

Question 2

Check each value shown on the graph and make a table showing the heuristic value versus the true length of the optimal path to the nearest goal. Are the heuristic values shown in the graph above admissible? Please justify. (10 points)

CS814 AI for Autonomous Systems – Coursework 1

Part II (50% of the grade)

Question 3

1. Implement the algorithm A^* for the problem mentioned in Part I, using Python Language. (40 points)
2. Check the result (solution path and its cost) and compare it to the results in Part I. (10 points)