

CSCI3230

Fundamentals of Artificial Intelligence

Written Assignment 1 (Optional)

Due date: 23:59:59 (GMT +08:00), 7 October, 2013

1 Questions

1. (40%) Evaluation functions: $f(n) = g(n)$; $f(n) = h(n)$; and $f(n) = g(n) + h(n)$
where $g(n)$ = cost so far to reach n ,
 $h(n)$ = estimated cost to goal from n , and
 $f(n)$ = estimated total cost of path through n to goal

correspond to 3 different search algorithms. Name them and describe briefly their differences in terms of optimality, completeness and time complexity.

2. (60%) The two water tanks problem is as follows:

There are two water tanks with capacities M and N litres respectively, where $M < N$. There is an unlimited source of water and an infinite water sink. You cannot measure the amount of water except with these two tanks. Initially, both tanks are empty, the goal is to have exactly G litres of water in one of the tanks, where $G < N$, without spilling of any water (M, N and G are integers). You can have three operations only: 1) Fill in a tank; 2) Empty a tank; 3) Pour water from one tank to another.

- (a) (10%) Formulate this problem as a search problem by writing down the
 - i. state space
 - ii. state transitions
 - iii. the goal state(s).
- (b) (20%) For the particular instance with $M = 3, N = 5$ and $G = 4$, show the state transitions for the states which are reachable from the initial state in table format:

From	To
(0, 0)	(3,0), (0,5)
...	...
...	...

- (c) (10%) How many goal states are reachable from the initial state in this particular example?
- (d) (20%) Write down the shortest path(s) that can *reach the goal*.

2 Assignment Submission

1. You **MUST** complete this assignment by using any one of the computer text editors (e.g. MS Word, WordPad, iWork Pages etc.) and then save the document to PDF format with A4 printable page size.
2. Scanned version of the hand written work is *NOT* accepted.
3. Please limit the file size of the PDF file to be less than 1MB.
4. You **MUST** submit the PDF file to the submission system on our course homepage (within CSE network), otherwise, we will *NOT* mark your assignment.

3 Important Points

You **MUST** STRICTLY follow these points:

1. You **MUST** strictly follow the submission guidelines.
2. Remember to type your FULL NAME, STUDENT ID on the assignment.
3. Plagiarism will be seriously punished.

4 Late Submission

According to the course homepage, late submission will lead to marks deduction as follows:

No. of Days Late	Marks Deduction
1	10%
2	30%
3	60%
4 or above	100%