

Exam Artificial Intelligence MN1 07-06-04

You may use a dictionary. You can answer in either English or Swedish.

Write short answers to the open questions: no question requires more than one page of answer.

- 1) a) The minimax algorithm cannot be applied to all games. What properties must a game have for minimax to be applicable?
b) Give one reason why a game playing program could make a choice that differs from the one that minimax makes. (Assuming that minimax is applicable.)
- 2) a) Explain briefly the concept *decision tree*.
b) The ID3 algorithm “learns” a decision tree from examples. These examples would be consistent with several different decision trees. Describe *which* decision tree ID3 learns, and *why* this tree is preferable over others.
- 3) How are the goals different in "academic AI" compared to game AI?
- 4) a) Describe some feature in English that cannot be solved with a context free grammar.
b) Give two examples which show that sometimes knowledge about the world is needed to correctly "understand" a sentence.
- 5) Suppose we have a graph with nodes A, B, C, D, and E, where A is the start and E the goal node. The distances between connected nodes are given in this table:

	<i>A</i>	<i>B</i>	<i>C</i>	<i>D</i>	<i>E</i>
<i>A</i>		10	8	2	
<i>B</i>	10		3		2
<i>C</i>	8	3		2	6
<i>D</i>	2		2		9
<i>E</i>		2	6	9	

Is the heuristic function optimistic and/or monotone if the estimated remaining distances are:

- a) B:3, C:6, and D:14.
- b) B:1, C:4, and D:8.
- c) What does it mean for the search process if the heuristic function is monotone or optimistic?

6) Suppose we have the following rules and their confidence factors:

$A \vee (B \wedge C) \rightarrow D$ (0.75)

$E \rightarrow D$ (1.0)

The system can conclude the following facts (with estimated probabilities):

A (0.6)

B (0.8)

C (0.9)

E (0.5)

Show how you can compute the certainty factor of D,
using the formulæ for certainty factors.

Good Luck!
Roland & Mats