Exam Knowledge Systems
August 14th 2003

Questions	points
question 1: Knowledge Systems	10+10
question 2: Time & Space	10+10
question 3: Uncertainty	10+10
question 4: Classification	5+5+5+5
question 5: Diagnosis	5+5+5+5
TOTAL:	100
mark = points / 10	

Good luck!

Question 1: Knowledge System

a. What is meant by ”fidelity of a knowledge representation” ? Illustrate with an example how ”fidelity” is related to the goal?

b. What is meant by a canonical representation form? Illustrate this with an example.

Question 2: Time & Space

a. We have incomplete knowledge about the time an action (e.g. studying the material for KS) has taken place. How can you express this incompleteness in a point-based time representation and in an interval based time representation?

b. What is the problem with ”nearest-first search” algorithm when objects are non-uniformly distributed in the space? Which representation method can solve this problem?

Question 3: Uncertainty

This question is about the ”certainty factor model”.

a. Given:

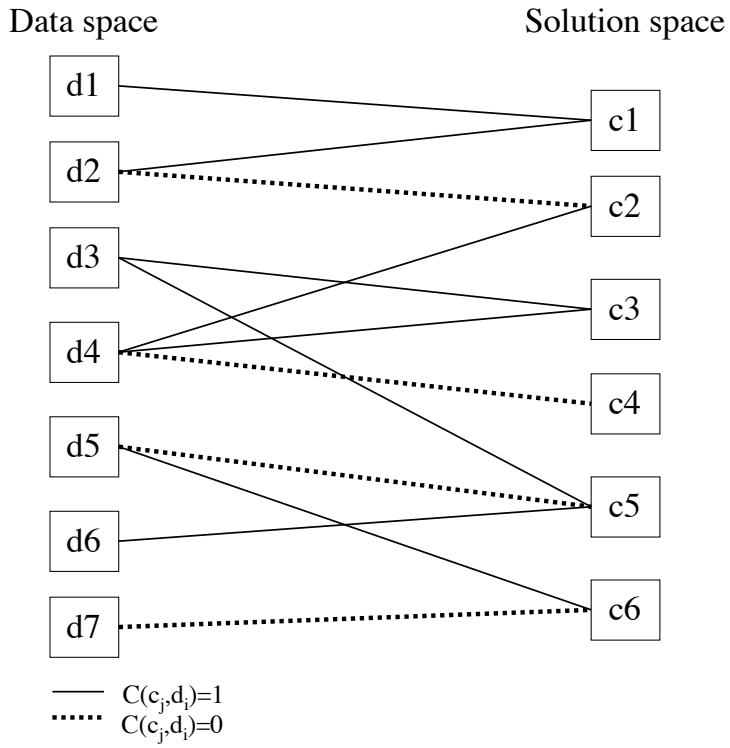
observation A, with certainty factor 0.7
observation B, with certainty factor 0.9
observation C, with certainty factor - 0.8
observation D, with certainty factor 0.2
rule: if A then E, certainty factor: 0.8
rule: if B then E, certainty factor: 0.9
rule: if C then F, certainty factor: 0.8
rule: if D then F, certainty factor: 0.6
rule: if (E or F) then G, certainty factor:0.7

What is the certainty factor of G? Make clear how you got the value of the certainty factor of G.

b. Give two disadvantages and two advantages of the ”certainty factor model”.

Question 4: Classification

Given the following classification knowledge:



Answer the following questions with the **given observations**:
$\{d1 = 0, d2 = 1, d3 = 1, d4 = ?, d5 = 0, d6 = 1, d7 = 0\}$.

a. Which classes are inconsistent with the given observations, and which classes are consistent with the given observations.

b. Which data elements are irrelevant for the class c1?

c. Which classes are a "positive coverage" given the observations?

d. Can a hierarchical classification method be useful for the given classification knowledge? If yes, give then the hierarchical solutionspace. If no, show why.

Question 5: Diagnosis

a. What is meant by model based diagnosis?

b Give a concrete model based system, and motivate why this system is a model based system.

c Give an advantage of a model based system.

d. Why is the single fault assumption not very realistic? Motivate your answer.

End exam