UNIVERSITI SAINS MALAYSIA

Second Semester Examination
Academic Session 1998199

February 1999

CSC501 - Analysis and Design of Knowledge-based System

Duration : [3 hours]

INSTRUCTION TO CANDIDATE:

- Please ensure that this examination paper contains **FOUR** questions in **THREE** printed pages before you start the examination.

- Answer **all** questions.

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1. (a) Why production rules are considered to be the most popular knowledge representation method used in most commercially available knowledge-base system shells?

   (25 marks)

   (b) What are the advantages of frame-based representation over rule-based representation?

   (25 marks)

   (c) If the department of computer science is developing a knowledge-based system to determine whether a candidate is accepatable for post-graduate studies, what knowledge representation method will you choose? Explain your choice.

   (25 marks)

   (d) For the same system as in (c), discuss the suitability of using case-based reasoning.

   (25 marks)

2. (a) What are the sources of uncertainty in a knowledge based system?

   (25 marks)

   (b) In the development of MYCIN, Bayes's model was found to be inadequate. Explain the reason for this conclusion.

   (25 marks)

   (c) Certainty factor (CF) was used in the development of MYCIN. Explain why CF was chosen?

   (25 marks)

   (d) Describe with the aid of an example, a situation where Demster-Shafer theory might be appropriate to represent uncertain information.

   (25 marks)

3. (a) Discuss the importance of developing an initial prototype in the knowledge-based system development lifecycle.

   (25 marks)

   (b) Determine whether a knowledge-base approach is suited if the department of computer science would like to develop a system to determine whether a candidate is qualified to do post graduate studies.

   (25 marks)

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(c) Does the selection of a particular knowledge representation paradigm influences the selection of reasoning method? Discuss.

(25 marks)

(d) Discuss the suitability of model-based reasoning in a knowledge-based system for the diagnosis of an automobile.

(25 marks)

4. (a) Define the following rules and provide an example for each of them.

   (i)   redundant rules

   (ii) conflicting rules

   (iii) subsumed rules

(25 marks)

(b) How does Auto-Intelligence [Parsaye, 1988] facilitate the knowledge acquisition process?

(25 marks)

(c) Using the following set of examples shown below for the diagnosis of an automobile that will not start, describe how the ID3 technique can aid the knowledge acquisition process?

Lights	sound	turnover	fuel-gauge	smell	problem
Dim	howl	yes	not-empty	normal	battery
Normal	screech	no	not-empty	normal	starter
Normal	click	no	not-empty	normal	solenoid
Normal	normal	yes	empty	normal	out-of-gas
Normal	normal	yes	not-empty	gas	flooding

(25 marks)

(d) Describe the advantages and disadvantages of team interviewing in knowledge extraction interviews.

(25 marks)

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