UNIVERSITI SAINS MALAYSIA

Peperiksaan Semester Kedua
Sidang Akademik 1993/94

April 1994

CSI 503 - Knowledge Based Systems

Masa: [3 jam]

ARAHAN KEPADA CALON:

* Sila pastikan bahawa kertas peperiksaan ini mengandungi **EMPAT** muka surat yang bercetak sebelum anda memulakan peperiksaan ini.

* Jawab **SEMUA** soalan.

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1. (a) Discuss as to how the map coloring problem can be described as a state space search problem.

(4/20)

(b) Solve the following map coloring problem using a good search technique:

The following map is to be colored using 4 different colors such that no two adjacent countries have the same color(Assume that A,B,...are country names):
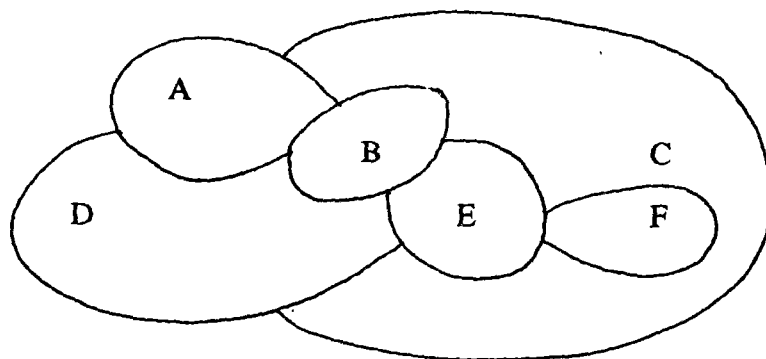
(8/20)

(c) Explain with an illustrative example the use of predicate calculus in state space problem solving.

(8/20)

2. (a) Under what conditions does the A* algorithm behave like the breadth first algorithm?

(2/20)

(b) Explain the effect of (i) underestimating and (ii) overestimating 'h' in the A* algorithm?

(6/20)

(c) Why does the search in game playing programs always proceed forward from the current position than backward from a goal state?

(2/20)

(d) In the mini-max procedure with alpha-beta cutoff, does the ordering of the list of successor positions created by the move generator matter? Explain your answer with a suitable example?

(6/20)

(e) A game playing program is capable of evaluating 200,000 nodes/second. How many ply could the program look ahead in the allotted time of three minutes. Assume that (i) the effective branching ratio is 20, (ii) the time for comparison of the values is negligible and (iii) the program uses Mini-Max algorithm without alpha-beta cutoffs.

(4/20)

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3. (a) What are the advantages in keeping the knowledge base separate from the control module in knowledge-based systems?

(2/20)

(b) Name and explain with an example four different types of selection criteria that might be used to select the most relevant rules for firing in a production system.

(8/20)

(c) Explain the difference between forward and backward chaining and under what conditions each would be the best to use for a given set of problems?

(4/20)

(d) Explain with typical examples how uncertainty is propagated through a chain of rules during a consultation with an expert system which is based on the MYCIN architecture.

(6/20)

4. (a) Discuss the salient features of an expert system shell that you are familiar.

(6/20)

(b) Design a simple expert system, using the above shell, to advise the masters students on the choice of electives.(Assume that a few elective subjects are offered by the School and the students have a choice.)

(8/20)

(c) Represent the following knowledge of elephant world in a semantic network and demonstrate the power and problems of semantic networks. You may assume any additional knowledge necessary.

"Circus elephants are elephants. Elephants have heads and trunks. Heads have mouths. Elephants are animals. Animals have hearts. Circus elephants are performers. Performers have costumes. Costumes are cloths."

(6/20)

5. (a) Show the CD representation of the sentence,

"John begged Mary for a pencil".

How does this representation make it possible to answer the question

Did John talk to Mary?

(4/20)

(b) What are scripts? Compare them with other forms of knowledge representation.

(4/20)

(c) Construct a script for shopping in a super market.

(4/20)

(d) Develop and explain by simulating with a typical example, the property inheritance algorithm for frame systems to work with multivalued attributes.

(8/20)

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