Final Exam 2011

ARTIFICIAL INTELLIGENCE

Questions: 5 – Total marks: 10 – Time: 120 minutes – Open book

Question 1 (4 marks): Consider the following statements:

- In a house, the alarm sounds when the house is burglarized or an earthquake happens nearby.
- The house owner will make an emergency call when the alarm sounds.
- The alarm in John's house does not sound.
- Mary's house is burglarized.

(a) Represent these statements using predicate logic. (1 m)
(b) Convert the obtained formulas into the conjunctive normal form. (1 m)
(c) Use the refutation-resolution method to:
- Prove that John's house is not burglarized. (1 m)
- Find whose house in which the alarm sounds. (1 m)

Question 2 (1 mark): Use existential graphs and their inference rules to prove the soundness of modus ponens in propositional logic.

Question 3 (3 marks): For the AI course at HCMUT, the final course result of a student depends on how well he/she performs in the tutorials and the assignments. Also, good performance in the tutorials helps students to do the assignments. Statistics shows that 90% of those students who perform well in both the tutorials and the assignments obtain good final results, while the percentage is only 10% for those who perform well in only the tutorials or the assignments, and it drops to 5% for those who badly perform in both of the activities. Besides, for the percentage of students accomplishing well the assignments, it is 80% among those students who perform well in the tutorials but it is only 30% among those students who have bad performance in the tutorials. In fact 95% of students attending the course perform well in the tutorials.

(a) Construct a Bayesian network from these statistical data. (1 m)
(b) How likely does a student obtain a good final result if he/she performs well in the tutorials? (1 m)
(c) What is the probability that a student performs well in the assignments, given a good final result of the student? (1 m)

Question 4 (1 mark): Propose a voting model of 10 voters for the concept "hot weather temperature" in Vietnam and derive the corresponding fuzzy set. Assume a discrete temperature range from 0^{o}C to 40^{o}C for the domain of the fuzzy set.

Question 5 (1 mark): For a person to buy a new car, it depends on financial situation, age of current car, gender, and distance to work, as shown in the table below. Use the candidate-elimination algorithm to learn the concept "Buy a New Car".

No.	ATTRIBUTES				CLASSIFICATION
	Financial Situation	Age of Current Car	Gender	Distance to Work	Buy a New Car
1	good	old	male	far	yes
2	bad	new	male	near	no
3	bad	old	female	far	no
4	good	new	female	near	no
5	good	middle	male	far	yes
6	bad	middle	male	near	no

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