

科目：人工智慧(A)

日期：99年7月28日 第1頁共1頁

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* 請將答案依題號順序寫入答案卷

答題時字跡需工整，否則不予計分。Write your answers legibly; otherwise you will get zero score.

1. (10 pts) You are working for a data mining company as a ML (machine Learning) algorithm developer. One of your clients, who is a big chain-drugstore owner, ask you to design a data mining tool based on ML to profile the customer purchase history, so that he can better predict the behavior of the prospective customers. Note that the owner is only interested accurate prediction of the probability for a prospective customer's future purchase, but his life-time companion, his wife, is more interested in the reasons for a customer's purchase. Suppose you have only Decision Tree and ANN available. Explain which approach you'd propose to the owner, and which to his wife. (Hint: Try to focus on the advantages and disadvantages of Decision Tree and ANN. No more than two paragraphs.)
2. (10 pts) Suppose you are a medical doctor who has AI background. According to the records, 99% of the Lab test for those real cancer patients came out positive, and 97% of the Lab test for normal people came out negative. This indicates the Lab test is quite accurate. Now one of your patients just had a Lab test that came out 'positive', and he is extremely worried. As a doctor, you are also aware of the fact that for any person, the chance to actually have the cancer is 0.000001. How will you comfort this patient based on your AI knowledge?
3. (10 pts) Explain the need for inductive bias, and list and describe two types of bias.
4. You are given a learning task which involves 100 attributes. You are informed by the domain expert that there are numerous interactions among these attributes. Now assume you are applying decision tree learning algorithms.
 - A. (10 pts) Suppose you have validation dataset besides training dataset, and your boss insists on pruning. What pruning method will you apply and why? (Write your answer in no more than five sentences but be PRECISE and SPECIFIC)
 - B. (10 pts) Suppose you are provided with more data than enough to reflect the characteristics of target concept, and your boss is VERY serious about the generalization accuracy of your classifier. Which pruning method will you use and why, or do you think pruning is not necessary and why? (Write your answer in no more than five sentences but be PRECISE and SPECIFIC)

科目：人工智慧(B)

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1. (9 points) Consider depth-first search, hill climbing, and beam search, which of them may never find a solution even when one exists and explain your reasons briefly.
2. (20 points) Consider a 2x2x2 Rubik's Mini Cube. Your goal is to create the cube with a single color on each face. You may formulate solving the Mini Cube problem as search. Please keep the number of states to the minimum.
 - (a) Suppose one state represents one physical configuration (positions of small color tiles) of the cube. So what is the size of the set of possible physical configurations of the Rubik's Mini Cube?
 - (b) Consider turning the front face of the cube clockwise for 90 degrees. Describe this action in terms of state transition.
 - (c) What is the branching factor of searching in this space? (Hint: Consider the number of non-redundant turning actions.)
 - (d) Suppose that the cube has only three colors instead of six, and a finished cube has the same color on the opposite faces of the cube. What is the branching factor for solving this simplified cube?
 - (e) Please argue for or against the statement that “There exist task environments (PEAS) in which a simple reflex agent is perfectly rational”. What about the task environment like solving a rubik cube?
3. a. (6 points) Represent the following sentences in FOL:
Cats and dogs are animals. Everyone loves either a cat or a dog. Anyone who loves an animal has a friend.
b. (6 points) Prove that “Everyone has a friend” using resolution and proof-by-refutation in FOL.
4. (9 points) Represent the following statements in propositional logic and use inference mechanism to prove/disprove that the unicorn is mythical and magical. “If the unicorn is mythical, then it is immortal. But if it is not mythical, then it is a mortal mammal. If the unicorn is either immortal or a mammal, then it is horned. The unicorn is magical if it is horned.”