

國立交通大學試題紙

科目：人工智慧(A)

日期：97年7月24日 第1頁共1頁

請“✓”明 ✓不可看書 可看書

* 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. (16 pts) Given a diagnosis problem, you plan to apply machine-learning techniques to assist medical doctors. Briefly describe your design scenario and issues for your diagnosis system.
2. (10 pts) Two commonly used quality measures for decision tree learners are “Information Gain” and “Gain Ratio”. Briefly describe their natural biases in terms of attribute selection in learning.
3. (12 pts) Explain the need for inductive bias, and list and describe two types of bias.
4. (12 pts) The department Chair is calling for designs for a Robot Navigation System that will drive a patrol robot in our Computer Science Department building. Due to government budget cut, you have been informed that our department building will not be remodeled in ten years. As a computer scientist with AI background, you are aware of two alternative approaches to the design of Robot Navigation System, Learning and Planning. Briefly discuss your design decision based on the available background knowledge.

國立交通大學試題紙

科目：‘人工智慧(B)’

日期：97年7月24日 第1頁共2頁

請“✓”明 ✓不可看書 可看書

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* 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 points) How many nodes are expanded (in the worst case) by each of the following search methods when searching a tree with branching factor b to find a goal at depth of d ? (You can use ellipses in your answer to indicate a sequence. Do NOT use big Oh notation).

a. breadth-first search:

b. iterative deepening depth-first search:

2. (6 points) Assume h_1 , h_2 , and h_3 are all admissible heuristic functions. Give the reasons why or why not the following heuristics are admissible. (No points will be given if correct explanation is not described)

(i) $h_4 = h_1 + h_2 + h_3$

(ii) $h_5 = (h_1 + h_2 + h_3) / 3$

3. (12 points) Consider the sliding block puzzle with the following initial configuration:

| | | | | | | |
|---|---|---|---|---|---|---|
| B | B | B | W | W | W | E |
|---|---|---|---|---|---|---|

There are three black tiles (B), three white tiles (W), and one empty cell (E). The puzzle has the following legal moves:

. •A tile may move into an adjacent empty cell with unit cost.

. •A tile may hop over at most two other tiles into an empty cell with a cost equal to the number of tiles hopped over.

The goal of this puzzle is to have all of the white tiles to the left of the black tiles (without regard of the position of the blank cell).

(a) (6 points) This puzzle can be solved as a search problem. What is the size of the state space? What is the branching factor of the search tree?

(b) (6 points) Describe in details how branch-and-bound search may expand different nodes than A* search in solving this puzzle.

國立交通大學試題紙

科目：「人工智慧(B)」

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4. (10 points) Provide a formal interpretation that shows the following translation from English to First Order Predicate Calculus (FOPC) is incorrect. Be sure to explain your answer formally using the interpretation you provide.

“A dog of Mary’s is missing.”

$\forall x (\text{dog}(x) \wedge \text{owner}(x, \text{Mary})) \rightarrow \text{missing}(x)$

5. (12 points) Consider the following problem:

↳ Tony, Mike, and John belong to the Alpine Club. Every member of the Alpine Club is either a skier or a mountain climber or both. No mountain climber likes rain, and all skiers like snow. Mike dislikes whatever Tony likes and likes whatever Tony dislikes. Tony likes rain and snow. Is there a member of the Alpine club who is a mountain climber but not a skier? Who?

1: write down correct sentences in (FOPC) w.r.t. the problem description.

2: Use resolution procedure to extract the answer for the problem