2015 Artificial Intelligence Technologies and Commercial Applications

midterm examination

1. Assume in the search tree below, the open list is [ A ] initially. Please describe the traversal of the search tree

(a) by depth first search. (15)

(b) by breadth first search. (15)

Note you need to describe the states of the open list as the search progresses.

1. Please explain briefly the meaning of each term.
2. *Perceptron*  (10)
3. *Entropy*  (10)
4. *Dendrogram*  (10)
5. *Inverse document frequency (IDF)*  (10)
6. Assume the training data { (xi, yi) }, i = 1~n are given for regression analyses. All xi’s and yi’s are scalars. Describe how to find the regression coefficients for the following regression functions.

(a) Y = a + bX (10)

(b) Y = c + d·X + e·X2 + f·X3 (10)

(c) Y = ·eX (10)

1. Given two vectors X1=[0 1 1 0 1 0 0 1 0 1] and X2=[1 0 1 1 0 0 1 1 0 0], please compute the simple matching coefficient, the Jaccard coefficient and the Rao’s coefficient. (20)
2. Please answer the questions about search on game tree.
3. Please illustrate how min-max algorithm is performed for the following game tree. (10)
4. Please describe the detailed process (e.g. alpha-pruning, beta-pruning) when alpha-beta pruning is applied to the min-max. (10)
5. Please encircle those nodes that are visited in (b). (10)

3 2 9 6 0 8 2 4 1 5 7

MAX

MIN

MAX

MIN

1. Please answer the following questions about search.
2. Use the problem of 3x3 puzzle to illustrate the basic factors for defining a state space search. (15)
3. Explain briefly the constraints of algorithm A and algorithm A\*. (10)
4. If there are two heuristics h1(n) and h2(n) for A\* search and h1(n) ≦ h2(n) for any state n. What is the difference of the two heuristics for search? (5)

1. Please describe how inductive learning algorithm (ID3) for decision trees is conducted. (20).