USN | | | | | | | | | | **14SCS41**

Fourth Semester M.Tech. Degree Examination, June/July 2016
Machine Learning Techniques

Time: 3 hrs.   Max. Marks:100

Note: *Answer any FIVE full questions.*

1 a. Explain the steps in designing a learning system.   **(10 Marks)**
   b. Describe the find – S algorithm. Explain its working, taking the enjoy sport concept and training instances given below:

Example	Sky	Air temp	Humidity	Wind	Water	Forecast	Enjoy sport
1	Sunny	Warm	Normal	Strong	Warm	Same	Yes
2	Sunny	Warm	High	Strong	Warm	Same	Yes
3	Rainy	Cold	High	Strong	Warm	Change	No
4	Sunny	Warm	High	Strong	Warm	Change	Yes

                                                                        (10 Marks)

2 a. Explain the concepts of entropy and information gain.   **(06 Marks)**
   b. Describe the ID3 algorithm for decision tree learning.   **(10 Marks)**
   c. Give decision trees to represent the following Boolean functions:
       i) $A \&\& -B$
       ii) $A \vee [B \&\& C]$
       iii) A XOR B
       iv) $[A \&\& B] \vee [C \&\& D]$ **(04 Marks)**

3 a. Explain the differentiable sigmoid threshold unit.   **(06 Marks)**
   b. Consider two perceptrons defined by the threshold expression $\omega_0 + \omega_1 x_1 + \omega_2 x_2 > 0$, perception A has weight values

       $\omega_0 = 1$, $\omega_2 = 2$, $\omega_2 = 1$

       and perceptron B has weight values

       $\omega_0 = 0$, $\omega_2 = 2$, $\omega_2 = 1$

       True or False? Perceptron A is more-general-than perceptron B. **(04 Marks)**
   c. Explain the back propagation algorithm. Why is it not likely to be trapped in local minima?
                                                                        (10 Marks)

4 a. Explain the terms genetic algorithms and genetic programming.   **(05 Marks)**
   b. Explain GA, a prototyping genetic algorithm.   **(10 Marks)**
   c. Explain stacking of blocks problem and genetic programming solution. **(05 Marks)**

5 a. Explain naïve Bayes classifier.   **(10 Marks)**
   b. Explain mistake bound model for learning and apply it to FIND-S algorithm. **(10 Marks)**

6 a. Describe K-NEAREST NEIGHBOUR learning algorithm for continuous valued target functions. Discuss one major drawback of this algorithm and how it can be corrected.
                                                                        (12 Marks)
   b. Write the FOIL algorithm for learning rule sets and explain the purpose of outer loop and the function of inner loop.   **(08 Marks)**

7 a. What is reinforcement learning?   **(06 Marks)**
   b. Explain the Q function and Q learning algorithm.   **(10 Marks)**
   c. Compare inductive learning and analytical learning.   **(04 Marks)**

8 Write short note on:
   a. Bayesian belief networks.   **(06 Marks)**
   b. Occam's Razor and minimum description principle.   **(06 Marks)**
   c. Case based learning.   **(08 Marks)**

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