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Uni. Roll No. …………….

Program: B.Tech.

Semester: 6th

Name of Subject: Machine Learning

Subject Code: PCCS-114

Paper ID: 17190

Time Allowed: 02 Hours   **Max. Marks: 60**

NOTE:

1) Each question is of 10 marks.
2) Attempt any six questions out of nine
3) Any missing data may be assumed appropriately

Q1. Compare Find-S and Candidate Elimination algorithms. Justify the limitations of Find-S algorithm by taking an example using both the above said algorithms.

Q2. Solve using k-NN for x(A=3, B=7), K=3

A	B	Label
7	7	False
7	4	False
3	4	True
1	4	True

Q3. Demonstrate the use of Principal Component Analysis for dimensionality reduction using an example.

Q4. i) 'A learning system is designed in number of stages.' Justify this statement by explaining the stages involved.

ii) Compare supervised learning and unsupervised learning.

Q5. Give valid reasons in favour of the statement 'Information Gain' is a good quantitative measure of the worth of an attribute.' Also estimate Gain(S,A) and Gain(S,B) for the given training data

A	B	Label
a1	b1	No

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a1	b2	Yes
a2	b3	Yes
a2	b2	No
a2	b1	Yes

Q6. i) Distinguish between perceptron rule and delta rule.

ii) Explain how back propagation algorithm works for multilayer feed forward network.

Q7. i) Derive the equation for 'Brute force learning algorithm' using Bayes theorem.

ii) Illustrate with an example the significance of a Bayesian belief network.

Q8. Solve the following for genetic algorithms: For the strings of the form x=abcdefgh, consider the strings x1=65413532, x2=87126601, x3=23921285, x4=41852094. Let the fitness function be

f(x)= (a+b)-(c+d)+(e+f)-(g+h)

a) Evaluate the fitness of each individual x1,x2,x3,x4

b) Cross the fittest two individuals using one-point crossover at the middle point, with new hypothesis h1 and h2

c) Cross x1 and x3 using two-point crossover (over points b and f), with new hypothesis h3 and h4

d) Cross x2 and x3 using a uniform crossover, with new hypothesis h5 and h6

e) Evaluate the fitness of new population, i.e. h1,h2,h3,h4,h5 and h6.

Q9. i) Explain the term 'Design of Experiments' with respect to Machine Learning.

ii) Recommend and explain the statistical techniques for estimating quantities about a population by averaging estimates from multiple small data samples.

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