

2122

B.E. (Computer Science and Engineering)
 Seventh Semester
 Elective - III
 CS-705B: Neural Networks

Time allowed: 3 Hours

Max. Marks: 50

NOTE: Attempt five questions in all, including Question No. 1 which is compulsory and selecting two questions from each Unit.

x-x-x

I. Attempt the following:-

- Define analogy between biological and artificial neural network.
- Define activation function. Discuss commonly used functions to model the activation of neural in neural networks.
- Why do we need backpropagation in neural network?
- Define SOM in neural network. Can SOM be used for classification?
- Is radial basis function supervised or unsupervised? Justify your answer. (5x2)

UNIT - I

- Assume that we have a 2-layer net (one hidden layer) with weights $W(1)$, $b(1)$, $W(2)$ and $b(2)$. Assume that we use RELU-activations in the hidden layer, and no activation on the output layer. Write down an equation for the output of the j^{th} node in the hidden layer. Make suitable assumptions.
 - What are the main differences among the two models of Artificial Neural networks, namely, McCulloch-Pitts and perceptron. Illustrate with suitable topologies. (2x5)
- Explain the principle of the gradient descent algorithm. Accompany your explanation with a diagram. Explain the use of all the terms and constants that you introduce and comment on the range of values that they can take. What is the role of chain rule in this algorithm?
 - Derive expression for Boltzman learning rule. (7,3)
- A two hidden layer network is to have four inputs and six outputs. The range of the outputs is to be continuous between 0 and 1. What can you tell about the network architecture? Specifically,
 - How many neurons are required in each layer?
 - What are the dimensions of the first-layer and second layer weight matrices? (Hidden layer neurons are 5,6)
 - What kinds of transfer functions can be used in each layer?
 - Discuss various steps involved in solving function approximation with back-propagation networks. (6,4)

P.T.O.

(2)

UNIT - II

- V. a) The following vectors need to be stored in a recurrent auto-associative memory:
S(1)=[1 1 1 1 1]^t
S(2)=[1 -1 -1 1 -1]^t
S(3)=[-1 1 1 1 1]^t
Compute the weight matrix W.
b) Compare between MLP and Radial basis function. (6,4)
- VI. a) Write about the usage of Radial Basis Function networks to perform complex pattern classification task.
b) Define Associative Memory Model. Write condition for perfect recall in Associative memory. (2x5)
- VII. a) Discuss the important features of Kohonen self-organizing maps. Explain its learning mechanism.
b) Write short note on Vector-Quantization using Self Organizing Maps. (2x5)

x-x-x