Computational Intelligence

Short-type Questions

1. A neuron j receives inputs from other neurons whose activity levels are 10, -20, 4 and -2, the respective synaptic weights of the neurons are -0.8, 0.2, -1.0 and 0.9. Calculate the output of neuron j which is linear.
2. What is the output of a logistic activation function, if activation potential is zero and slope parameter is one?
3. Draw the architecture of a 3-5-2 Feedforward network name its components.
4. Write the generalized delta rule and discuss how it is different from delta rule.
5. The inputs to a single neuron are x1=0.163, x2=0.721, weights on them w1=0.386, w2=0.527 and bias=0.104. Find the output of the neuron, if it uses sigmoid activation function with λ=0.01.
6. Given input signals, x1=-0.11, x2 = 0.22, desired response, d= -1, synaptic weights, w1=-0.17, w2=0.53, learning rate = 0.65, make necessary correction to the weights using LMS weight update rule.

Long-type Questions

1. What is RBFN? Discuss in details how it is used to solve classification problems. Classify the XOR problem using RBFN with Gaussian kernel function where $\sigma = 1$.
2. What is activation function? Discuss in detail with a proper diagram of the following activation functions.
   i. Threshold function
   ii. Piece-wise linear function
   iii. Logistic function
   iv. Signum function
   v. Sign function
   vi. Hyperbolic tangent function
3. Write down the ADALINE learning algorithm. Step by step, show how bipolar logical AND function can be implemented using the ADALINE. Set initial weight w1=w2=b=0.1. learning rate = 0.1.
4. What is linearly separable problem? Discuss the rules for adapting synaptic weights of perceptron. Write down the Perceptron learning algorithm and explain each step. Find the new weights after epoch-1 to classify OR function with bipolar input and targets. Assume initial weight w1=w2=b=0. learning rate = 1 and threshold = 0.
5. What is MADALINE MR-I training algorithms? Step by step show how XOR function can be implemented using MADALINE learning. Include the details of the calculation for the first training pair s:t = (1,1): -1 of the first epoch of the training. Assume initial weights [-1.05, -0.15, 1.41, -1.05, 1.35, -0.15] and [0.5 0.5 0.5] and learning rate 0.5.
6. Find the new weights for the following back propagation network after presenting input [0.23, 0.07] and target 0.37. Use logistic activation function, consider learning rate = 0.6.