,

CS 6673 spring 2009

Assignment 2, Due March 3, 2009
Please submit a hardcopy at the beginning of class

Consider the feedforward neural network with the following training set (this is case A from the last HW):

$$\mathbf{s}^{(1)} = \begin{bmatrix} 1 & 1 & 1 \end{bmatrix}, \quad \text{with} \quad \mathbf{t}^{(1)} = 1$$

$$\mathbf{s}^{(2)} = \begin{bmatrix} 1 & 1 & -1 \end{bmatrix}, \quad \text{with} \quad \mathbf{t}^{(2)} = 1$$

$$\mathbf{s}^{(3)} = \begin{bmatrix} -1 & 1 & 1 \end{bmatrix}, \quad \text{with} \quad \mathbf{t}^{(1)} = 1$$

$$\mathbf{s}^{(4)} = \begin{bmatrix} -1 & -1 & 1 \end{bmatrix}, \quad \text{with} \quad \mathbf{t}^{(2)} = 1$$

$$\mathbf{s}^{(5)} = \begin{bmatrix} 1 & -1 & -1 \end{bmatrix}, \quad \text{with} \quad \mathbf{t}^{(3)} = -1$$

$$\mathbf{s}^{(6)} = \begin{bmatrix} 1 & -1 & 1 \end{bmatrix}, \quad \text{with} \quad \mathbf{t}^{(4)} = -1$$

We re-visit this problem but this time using the perceptron learning rule instead of Hebb's rule. Since we know that the problem is linearly separable and so, according to the Perceptron Convergence Theorem, we should be able to find a correct set of weights and bias to correctly classify the training set.

Here we assume zero initial weights and bias, a learn rate $\alpha = 1$, and a small but positive value of θ.

1. How many steps does it take for convergence?

2. What is the final set of weights and bias?
3. Make sure you show a table displaying every step in the Perceptron algorithm.

You can do this assignment either by hand or by writing a computer program.