Soft-Computing in Engineering (ME-674)

Tutorial #2; Marks: 10; Time 50 min.

A feed forward neural network consisting of three layers, namely input, hidden and output layers. The neurons lying on the hidden and output layers have log-sigmoid ($f(x) = \frac{1}{1+e^{-x}}$) and tan-sigmoid ($f(x) = \frac{e^{x} - e^{-x}}{e^{x} + e^{-x}}$) transfer functions, respectively.

There are two inputs, namely I_1 and I_2 and two outputs, which are O_1 and O_2. Assumed number of neurons in the hidden layer is three and bias value of each neuron is zero. The initial connection weights between the input and hidden layers ([V]) and those between the hidden and output layers ([W]) are assumed to be as follows:

$$\begin{bmatrix} v_{11} & v_{12} & v_{13} \\ v_{21} & v_{22} & v_{23} \end{bmatrix} = \begin{bmatrix} 0.2 & 0.4 & 0.3 \\ 0.1 & 0.6 & 0.5 \end{bmatrix}; \quad \begin{bmatrix} w_{11} & w_{12} \\ w_{21} & w_{22} \\ w_{31} & w_{32} \end{bmatrix} = \begin{bmatrix} 0.1 & 0.2 \\ 0.2 & 0.3 \\ -0.1 & 0.4 \end{bmatrix}$$

Using a batch mode of training for the patterns shown in Table 1, calculate the changes in V (that is ΔV) and W (that is ΔW) values. Assumed learning rate and momentum coefficient values are 0.3 and 0.2, respectively.

Table 1: Training patterns.

Pattern	I_1	I_2	O_1	O_2
1	0.6	0.4	0.2	0.4
2	0.3	0.7	0.5	0.1