Compre CB Soln
NNFL Dec 17

A2 S1 → 10100 : 10

$x_1 = x_3 = 1 \quad y_1 = 1$

$w_{11} = w_{11}(old) + x_1 y_1 = 0+1 = 1$

$w_{31} = w_{31}(old) + x_3 y_1 = 0+1 = 1$

S2 → 01100 : 10 ; $x_2 = x_3 = 1$, $y_1 = 1$

$w_{21} = 0+1 = 1 \Rightarrow w_{31} = 1+1 = 2$

S3 → 00011 : 01 ; $x_4 = x_5 = 1$, $y_2 = 1$

$w_{42} = 0+1 = 1$, $w_{52} = 0+1 = 1$

S4 → 00010 : 01 $\quad x_4 = 1 \quad y_2 = 1$

$w_{42} = 1+1 = 2$, $W = \begin{bmatrix} 1 & 0 \\ 1 & 0 \\ 2 & 0 \\ 0 & 2 \\ 0 & 1 \end{bmatrix}$ (5)

(b) $\begin{bmatrix} 1 \\ 0 \\ 1 \\ 0 \\ 0 \end{bmatrix}[1\ 0] + \begin{bmatrix} 0 \\ 1 \\ 1 \\ 0 \\ 0 \end{bmatrix}[1\ 0] + \begin{bmatrix} 0 \\ 0 \\ 0 \\ 1 \\ 1 \end{bmatrix}[0\ 1] + \begin{bmatrix} 0 \\ 0 \\ 0 \\ 1 \\ 0 \end{bmatrix}[0\ 1] =$

$= \begin{bmatrix} 1 & 0 \\ 1 & 0 \\ 2 & 0 \\ 0 & 2 \\ 0 & 1 \end{bmatrix}$ (4½)

(c) $[1\ 1\ 1\ 1\ 1]\begin{bmatrix} 1 & 0 \\ 1 & 0 \\ 2 & 0 \\ 0 & 2 \\ 0 & 1 \end{bmatrix} = [4,3] \rightarrow [1,1]$ (1½)

o/p doesnot belong to any stored target as input has more mistakes (1)

A3 P1[1 0 0] $\quad W = \begin{bmatrix} 0.5 & 0.3 \\ 0.8 & 0.5 \\ 0.4 & 0.3 \end{bmatrix}$

$D_1 = (1-.5)^2 + (0-.8)^2 + (0-.4)^2 = 1.05$

$D_2 = (1-.3)^2 + (0-.5)^2 + (0-.3)^2 = 0.83$ (2) $\quad D_2 < D_1 \Rightarrow P1 \in C_2$

$w_{12} = 0.3 + 0.5(1-.3) = 0.65$

$w_{22} = 0.5 + 0.5(0-.5) = 0.25$ (1.5)

$w_{32} = 0.3 + 0.5(0-.3) = 0.15$

$W = \begin{bmatrix} 0.5 & 0.65 \\ 0.8 & 0.25 \\ 0.4 & 0.15 \end{bmatrix}$ (½)

P2[0 0 1] $\quad D_1 = (0-.5)^2 + (0-.8)^2 + (1-.4)^2 = 1.25$

$D_2 = (0-.65)^2 + (0-.25)^2 + (1-.15)^2 = 1.20$ (2)

$D_2 < D_1 \Rightarrow P_2 \in C_2$ $\quad w_{12} = .65 + .5(0-.65) = 0.325$

$w_{22} = .25 + .5(0-.25) = 0.125$

$w_{32} = .15 + .5(1-.15) = 0.575$ (1.5)

$W = \begin{bmatrix} .5 & .325 \\ .8 & .125 \\ .4 & .575 \end{bmatrix}$

A4 $W = \begin{bmatrix} 1 \\ -1 \\ 0 \end{bmatrix}$, $\eta = 0.1$ $\quad \Delta w^i = \eta(t_i - y_i)x_i$ (1M)

Input x_1: $[1\ -1\ 0]\begin{bmatrix} 1 \\ 0 \\ 1 \end{bmatrix} = 1 = y_1$, $t_1 = -1$

[1 0 1]

$w^1 = w^0 + \eta(t_1 - y_1)x_1$

$= \begin{bmatrix} 1 \\ -1 \\ 0 \end{bmatrix} + 0.1(-2)\begin{bmatrix} 1 \\ 0 \\ 1 \end{bmatrix} = \begin{bmatrix} 0.8 \\ -1 \\ -0.2 \end{bmatrix}$ (1.5)

Input x_2[0 −1 −1]: $[.8\ -1\ -.2]\begin{bmatrix} 0 \\ -1 \\ -1 \end{bmatrix} = 1.2 \Rightarrow 1 = y_2$ (1M)

$t_2 = 1$

$\because$ NC $w^2 = w^1$

Input x_3[−1 −.5 −1]:

$[.8\ -1\ -.2]\begin{bmatrix} -1 \\ -.5 \\ -1 \end{bmatrix} = -.1 \Rightarrow -1 = y_3$ (1M)

$t_3 = 1$

$w^3 = w^2 + \eta(t_3 - y_3)x_3 = \begin{bmatrix} .8 \\ -1 \\ -.2 \end{bmatrix} + 0.2\begin{bmatrix} -1 \\ -.5 \\ -1 \end{bmatrix} = \begin{bmatrix} .6 \\ -1.1 \\ -.4 \end{bmatrix}$ (1.5)

A5 $TP = 440$, $FP = 50$, $FN = 90$

$PPV = \frac{TP}{TP + FP} = \frac{440}{490} = 0.897$ (2)

$Sensitivity = \frac{TP}{TP + FN} = \frac{440}{530} = 0.83$ (2)

A6. $(R \circ S)(h,i) = \max\{\min(hR_v, vS_i), \min(hR_c, cS_i)\}$

$= \max\{\min(0.7, 0.8), \min(0.2, 0.1)\}$

$= \max\{0.7, 0.1\} = 0.7$ (2.5)

$(R \circ S)(b,o) = \max\{\min(bR_v, vS_o), \min(bR_c, cS_o)\}$

$= \max\{\min(0.5, 0.6), \min(0.6, 0.2)\}$

$= \max\{0.5, 0.2\} = 0.5$ (2.5)