HAMMING N/W

DATE: / /

input :-

orange $P_1 = \begin{bmatrix} 1 \\ -1 \\ -1 \end{bmatrix}$, $P_2 = \begin{bmatrix} 1 \\ 1 \\ -1 \end{bmatrix}$ Apple $P = \begin{bmatrix} P_1 \\ P_2 \end{bmatrix}$

* Feed forward Layer → performs correlation / or inner product, b/w each prototype patterns & the input patterns.

$$W^1 = \begin{bmatrix} P_1^T \\ P_2^T \end{bmatrix} = \begin{bmatrix} 1 & -1 & -1 \\ 1 & 1 & -1 \end{bmatrix}$$

& feedforward layers uses a linear transfer function, & each element of the bais vector is equal to R, (R is the no. of elements in input vector

$$b^1 = \begin{bmatrix} R \\ R \end{bmatrix} = \begin{bmatrix} 3 \\ 3 \end{bmatrix}$$

output of the feed forward layer is

$$a^1 = W^1 p + b^1 = \begin{bmatrix} P_1^T \\ P_2^T \end{bmatrix} p + \begin{bmatrix} R \\ R \end{bmatrix} = \begin{bmatrix} P_1^T p + 3 \\ P_2^T p + 3 \end{bmatrix}$$

* Recurrent Layer → ("competitive" layer.
Neuron in this layer are initialised with the outputs of the feedforward layer, The neurons compete with each other to determine a winner.

$a^{(2)}(0) = a^{(1)}$ initial condition.

Be Positive......

Linear for positive value & zero for negative

& $a^2(t+1) = \text{poslin}\,(W^2 a^2(t))$ DATE: __/__/__
(superscript here indicate the layer no. not a power of 2)

&

$$W^2 = \begin{bmatrix} 1 & -\varepsilon \\ -\varepsilon & 1 \end{bmatrix}$$

$\varepsilon \rightarrow$ some no. less than $1/(S-1)$
$S \rightarrow$ no. of neurons in recurrent layer.

Ex $\rightarrow$ $p = \begin{bmatrix} -1 \\ -1 \\ -1 \end{bmatrix}$, $a^1 = \begin{bmatrix} +1 & -1 & -1 \\ 1 & 1 & -1 \end{bmatrix} \begin{bmatrix} -1 \\ -1 \\ -1 \end{bmatrix} + \begin{bmatrix} 3 \\ 3 \end{bmatrix} = \begin{bmatrix} 4 \\ 2 \end{bmatrix}$

which is initial condition for the recurrent layer

$W^{(2)} = \begin{bmatrix} 1 & -.5 \\ -0.5 & 0 \end{bmatrix}$, $\varepsilon = 1/2$

$a^2(1) = \text{poslin}\,(W^2 a^2(0)) = \text{poslin}\left(\begin{bmatrix} 3 \\ 0 \end{bmatrix}\right) = \begin{bmatrix} 3 \\ 0 \end{bmatrix}$

second iteration.

$a^2(2) = \begin{bmatrix} 3 \\ 0 \end{bmatrix}$

Since the o/p of successive iterations produce the same result, the network has converged.