Task 4: Machine Learning - KSOM
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Batch: G3

The diagram draw at end

$W_1 = [1, 0.9, 0.7, 0.5, 0.3]$
$W_2 = [0.3, 0.5, 0.7, 0.9, 1]$
$i/p = [0, 0.5, 1, 0.5, 0]$

$$W_{ij} = \begin{bmatrix} 1 & 0.3 \\ 0.9 & 0.5 \\ 0.7 & 0.7 \\ 0.5 & 0.9 \\ 0.3 & 1 \end{bmatrix} \quad \alpha = 0.5$$

Calculate the euclidean distance

$$D(1) = \sum_{i=5}^{1} (W_i - x_i)^2$$

$= (1-0)^2 + (0.9-0.5)^2 + (0.7-1)^2 (0.5-0.5)^2 + (0-0.3)^2$
$= 1 + 0.16 + 0.09 + 0.09 = 1.34$

$$D(2) = \sum_{i=5}^{1} (W_i - x_i)^2$$

$= (0.3-0)^2 + (0.5-0.5)^2 + (0.7-1)^2 + (0.9-0.5)^2 + (1)^2$
$= 1.34$

If d_1 and d_2 are equal,
We choose the lower index.
So $j=1$ will be the winning unit

$W_{ij}(new) = W_{ij}(old) + \alpha(x_i - W_{ij}(old))$

$W_{11} = 1 + 0.5[0 - 1] = 1 - 0.5 = 0.5$
$W_{21} = 0.9 + 0.5[0.5 - 0.9] = 0.9 - 0.2 = 0.7$
$W_{31} = 0.7 + 0.5[1 - 0.7] = 0.7 + 0.15 = 0.85$
$W_{41} = 0.5 + 0.5[0.5 - 0.5] = 0.5$
$W_{51} = 0.3 + 0.5[0 - 0.3] = 0.15$

Updated weight matrix after presentation of input

$$W_{ij} = \begin{bmatrix} 0.5 & 0.3 \\ 0.7 & 0.5 \\ 0.85 & 0.7 \\ 0.5 & 0.9 \\ 0.15 & 0.1 \end{bmatrix}$$

$$\alpha(t+1) = 0.5\,\alpha(t)$$

$$= 0.5 \times 0.5 = 0.25$$

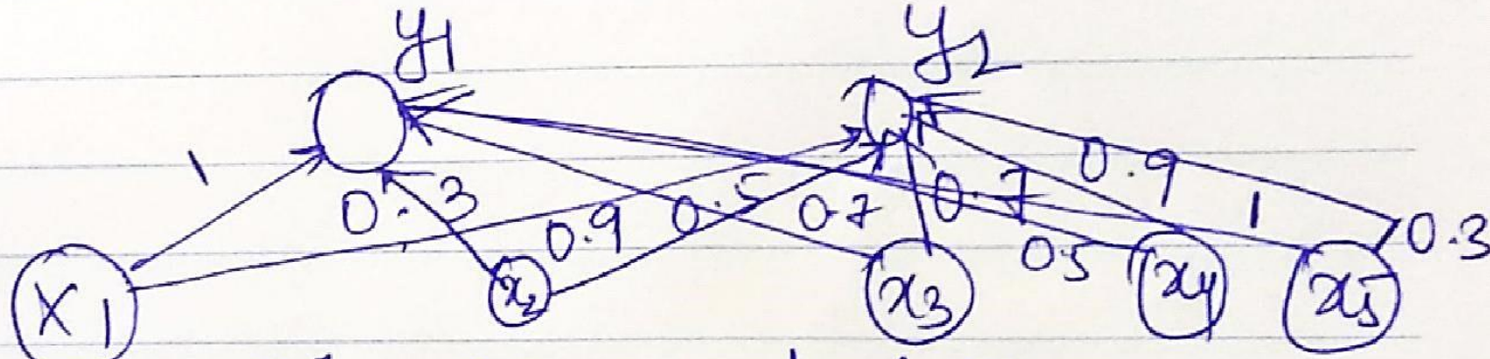

Diagram before updation