پاسخ سری یک تمرین شورع محاسبات - شبکه عصبی

ج 1/ =

چون خطی است

$y_{in} = y_{out} = 3\times1 + 2\times1 + 3\times1 + 2 = 10$

ج 2/ =

$b(k) = 0$, $w(k) = [1, -1]$ $\quad k \in Z$, $x = \begin{bmatrix} 2\sin(\frac{k\pi}{3}) \\ \cos(\frac{k\pi}{3}) \end{bmatrix}$

$y_{in} = 2\sin(\frac{k\pi}{3}) - \cos(\frac{k\pi}{3})$

	y_{out}	y_{out}
$k=1 \rightarrow 2\times\frac{\sqrt{3}}{2} - \frac{1}{2} = \sqrt{3} - \frac{1}{2}$	1	$\sqrt{3} - \frac{1}{2}$
$k=2 \rightarrow 2\times\frac{\sqrt{3}}{2} - (-\frac{1}{2}) = \sqrt{3} + \frac{1}{2}$	1	$\sqrt{3} + \frac{1}{2}$
$k=3 \rightarrow 2\times0 - (-1) = 1$	1	1
$k=4 \rightarrow 2\times(-\frac{\sqrt{3}}{2}) - (-\frac{1}{2}) = -\sqrt{3} + \frac{1}{2}$	-1	0
$k=5 \rightarrow 2\times(-\frac{\sqrt{3}}{2}) + \frac{1}{2} = -\sqrt{3} - \frac{1}{2}$	-1	0
$k=6 \rightarrow 2\times0 + 1 = -1$	-1	0
	تابع sign	تابع ReLU

موضوع ——— تاریخ / /

$\alpha = 0.5$ $\quad w = [1, 2]$ $\quad$ ج/3 الف

$x_1 = [-1, 3]^t$ $\quad x_2 = [2, 1]^t$

دور اول

$x_1 \Rightarrow \quad y = sign(w, x_1) = sign(-1 + 6) = 1$

$\Delta w = \alpha \cdot y \cdot x_1 = 0.5 \times 1 \times [-1, 3] = [-0.5, 1.5]$

$w' = w + \Delta w = [0.5 \;\; 3.5]$

$x_2 \Rightarrow \quad y = sign(w' \cdot x_2) = sign(0.52 + 3.51) = 1$

$\Delta w = \alpha \cdot y \cdot x_2 = 0.5 \times 1 \times [2, 1] = [1, 0.5]$

$w'' = w' + \Delta w = [1.5, 4]$

دور دوم

$x_1 \Rightarrow \quad y = sign(w'', x_1) = sign(1.5 \times (-1) + 4 \times 3) = 1$

$\Delta w = \alpha \cdot y \cdot x_1 = 0.5 \times 1 \times [-1, 3] = [-0.5, 1.5]$

$w''' = w'' + \Delta w = [1, 5.5]$

$x_2 \Rightarrow \quad y = sign(w''', x_2) = sign(2 + 5.51) = 1$

$\Delta w = \alpha \cdot y \cdot x_2 = 0.5 \times 1 \times [2, 1] = [1, 0.5]$

$w'''' = w''' + \Delta w = [2, 6]$

ج/5

$s_1 = (1, -1, -1, -1)$ $\quad t_1 = (-1, 1)$

$s_2 = (1, 1, -1, -1)$ $\quad t_2 = (-1, 1)$

$s_3 = (-1, -1, -1, 1)$ $\quad t_3 = (1, -1)$

$s_4 = (-1, -1, 1, 1)$ $\quad t_4 = (1, 1)$

موضوع ——— تاريخ / /

$S_1 \rightarrow \begin{bmatrix} 1 \\ -1 \\ -1 \\ -1 \end{bmatrix} [-1, 1] = \begin{bmatrix} -1 & 1 \\ 1 & -1 \\ 1 & -1 \\ 1 & -1 \end{bmatrix}$

$S_2 \Rightarrow \begin{bmatrix} 1 \\ 1 \\ -1 \\ -1 \end{bmatrix} [-1, 1] = \begin{bmatrix} -1 & 1 \\ -1 & 1 \\ 1 & -1 \\ 1 & -1 \end{bmatrix}$

$S_3 \Rightarrow \begin{bmatrix} -1 \\ -1 \\ -1 \\ 1 \end{bmatrix} [1, -1] = \begin{bmatrix} -1 & 1 \\ -1 & 1 \\ -1 & 1 \\ 1 & -1 \end{bmatrix}$

$S_4 \Rightarrow \begin{bmatrix} -1 \\ -1 \\ 1 \\ 1 \end{bmatrix} [1, 1] = \begin{bmatrix} -1 & -1 \\ -1 & -1 \\ 1 & 1 \\ 1 & 1 \end{bmatrix}$

$$W = \begin{bmatrix} -1 & 1 \\ 1 & -1 \\ 1 & -1 \\ 1 & -1 \end{bmatrix} + \begin{bmatrix} -1 & 1 \\ -1 & 1 \\ 1 & -1 \\ 1 & -1 \end{bmatrix} + \begin{bmatrix} -1 & 1 \\ -1 & 1 \\ -1 & 1 \\ 1 & -1 \end{bmatrix} + \begin{bmatrix} -1 & -1 \\ -1 & -1 \\ 1 & 1 \\ 1 & 1 \end{bmatrix} = \begin{bmatrix} -4 & 4 \\ -2 & 2 \\ 2 & -2 \\ 4 & -4 \end{bmatrix}$$

$\alpha = 1 \qquad w = 0$

ج-9-ب/6

$(1, 1, 1, 1)$, $(-1, 1, -1, -1) \rightarrow 1$

$(1, 1, 1, -1)$, $(1, -1, -1, 1) \rightarrow -1$

الف)

input	y_{in}	y	t	Δw_1	Δw_2	Δw_3	Δb	w_1	w_2	w_3	b
								(1	1	1	1)
1 1 1 1	0	1	1	(1	1	1	1)	(1	1	1	1)
-1 1 -1 -1	0	1	-1	(1	-1	1	1)	(0	2	0	0)
1 1 1 -1	0	1	-1	(-1	-1	-1	1)	(-1	1	-1	1)
1 -1 -1 1	0	1	-1	(-1	1	1	-1)	(-2	2	0	0)

ب)

$y_{in} = \sum x_i w_i + b$

$b_{new} = b_{old} + \alpha (t - y_{in})$

$w_{new} = w_{old} + \alpha (t - y_{in}) x_i$

/ / تاريخ ——— موضوع

$(1, 1, 1, 1) \longrightarrow 1$

$w_1 = 0 + 0.5(1-0)1 = 0.5$

$w_2 = 0 + 0.5(1-0)1 = 0.5$

$w_3 = 0 + 0.5(1-0)1 = 0.5$

$w_4 = 0 + 0.5(1-0)1 = 0.5$

$(-1, 1, -1, -1) \longrightarrow 1$

$w_1 = 0 + 0.5(1-0)(-1) = -0.5$

$w_2 = 0 + 0.5(1-0)(1) = 0.5$

$w_3 = 0 + 0.5(1-0)(-1) = -0.5$

$w_4 = 0 + 0.5(1-0)(-1) = -0.5$

$(1, 1, 1, -1) \longrightarrow -1$

$w_1 = w_2 = w_3 = 0 + 0.5(-1-0)(1) = -0.5$

$w_4 = 0 + 0.5(-1-0)(-1) = 0.5$

$(1, -1, -1, 1) \longrightarrow -1$

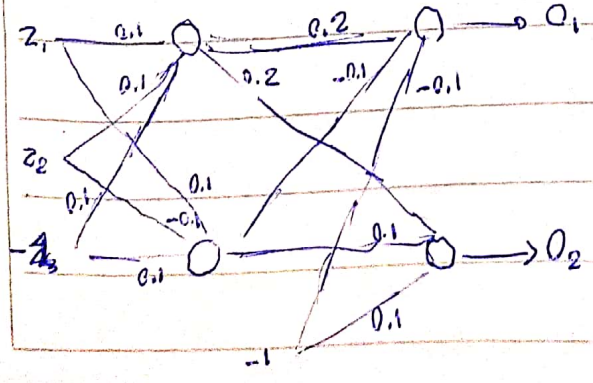
$w_1 = w_4 = 0 + 0.5(-1-0)(1) = -0.5$

$w_2 = w_3 = 0 + 0.5(-1-0)(-1) = 0.5$

$$f(net) = \frac{2}{1+e^{-net}} - 1 \qquad \alpha = 0.5$$

$d_1 = \begin{bmatrix} -1 \\ 1 \end{bmatrix}$ $\quad z_1 = [1 \ 1]^t$

$d_2 = \begin{bmatrix} 1 \\ -1 \end{bmatrix}$ $\quad z_2 = [-1 \ -1]^t$



موضوع _____ تاریخ / /

$$z_{in_j} = v_{0j} + \sum_{i=1}^{n} x_i v_{ij} \longrightarrow z_j = f(z_{in_j})$$ لایه مخفی

$$y_{in_k} = w_{0k} + \sum_{j=1}^{p} z_j w_{jk} \longrightarrow y_k = f(y_{in_k})$$ لایه خروجی

$$z_{in_1} = 0.1 [1 \quad 1] + 0.1 [1 \quad 1] - 0.1$$