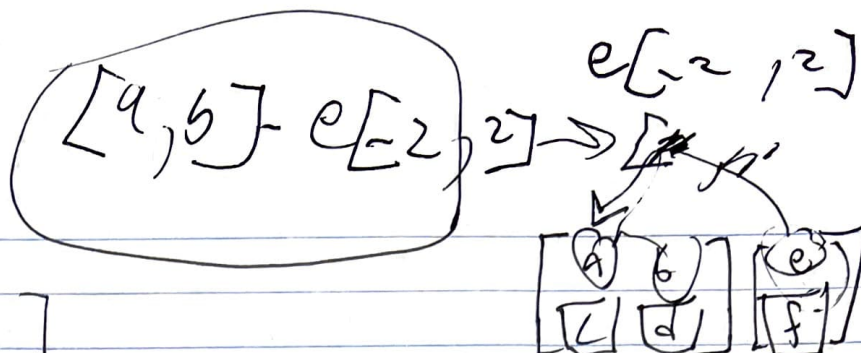


CISC 489



$$\text{Input}_2 = [1, 1]$$

$$w_1 = \begin{bmatrix} 1 & -1 \\ -1 & 1 \end{bmatrix} \begin{bmatrix} 1 \\ 1 \end{bmatrix} = \begin{bmatrix} 0 \\ 0 \end{bmatrix}$$

$$\text{b}_1 = [0 \ 0] + [1 \ -1] = \begin{bmatrix} 1 & -1 \\ 1 & 0 \end{bmatrix} \rightarrow f(x)$$

$$w_2 = \begin{bmatrix} -1 & -1 \\ 1 & 1 \end{bmatrix} \begin{bmatrix} 1 \\ 0 \end{bmatrix} = \begin{bmatrix} -1 \\ 1 \end{bmatrix}$$

$$b_2 = [1 \ 1] + [-1 \ 1] = \begin{bmatrix} -2 & 2 \\ 0 & 1 \end{bmatrix} \rightarrow f(x)$$

$$\text{exp output}_2 = [1 \ 0]$$

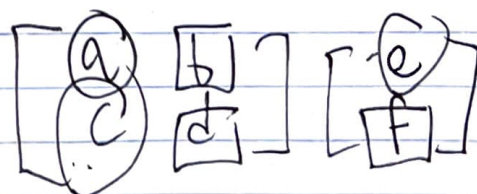
$$\Delta = \begin{bmatrix} 2(0-1) \cdot 1 & 2(1-0) \cdot 1 \\ -2 & 2 \end{bmatrix}$$

$$\Delta w_1 = \begin{bmatrix} -1 & -1 \\ 1 & -3 \end{bmatrix}$$

$$w_2 = \begin{bmatrix} 1 & -3 \\ 1 & 1 \end{bmatrix}$$

$$[1 \ 1] - (0 \cdot [-2 \ 2])$$

$\Delta_n = w_n \odot \delta_n$
deltas for
every layer



CISC 489

$$\text{input}_1 = [1, 0]$$

$$\text{exp_output} = [0, 1]$$

$$\text{Weights} = \begin{bmatrix} 1 & -1 \\ -1 & 1 \end{bmatrix}$$

$$f(x) = \begin{cases} 0 & \text{if } x < 0 \\ 1 & \text{if } x \geq 0 \end{cases}$$

$$\text{biases} = [1, -1]$$

$$w_1 \begin{bmatrix} 1 & -1 \\ -1 & 1 \end{bmatrix} \begin{bmatrix} 1 \\ 0 \end{bmatrix} = \begin{bmatrix} 1 \\ -1 \end{bmatrix}$$

$$\begin{aligned} & -1 \cdot 1 + 1 \cdot 0 \\ & 1 \cdot 0 + -1 \cdot 0 \end{aligned}$$

$$\begin{bmatrix} 1 & -1 \end{bmatrix} + \begin{bmatrix} 1 & -1 \end{bmatrix} \xrightarrow{b} \begin{bmatrix} 2 & -2 \end{bmatrix}$$

~~$$\text{exp_output} = [0, 1]$$~~

$g(\text{lin}_i) = 1$
in this case

~~$$\Delta = [2(1-0), 2(0-1)]$$

$$= [2, -2]$$~~

$$w_2 \begin{bmatrix} -1 & -1 \\ 1 & 1 \end{bmatrix} \begin{bmatrix} 1 \\ 0 \end{bmatrix} = \begin{bmatrix} -1 \\ 1 \end{bmatrix}$$

$$\begin{bmatrix} -1 & 1 \end{bmatrix} + \begin{bmatrix} -1 & 1 \end{bmatrix} \xrightarrow{\text{bias}_2} \begin{bmatrix} -2 & 2 \end{bmatrix} \xrightarrow{f(x)} \begin{bmatrix} 0 & 1 \end{bmatrix}$$