ReLU

Softmax

$x = \begin{bmatrix} 1 \\ 2 \end{bmatrix}$ $W^1 = \begin{bmatrix} 1 & 1 \\ -1 & 1 \\ 1 & -1 \end{bmatrix}$ $b^1 = \begin{bmatrix} 0 \\ 0 \\ 0 \end{bmatrix}$

$W^2 = \begin{bmatrix} 0 & 1 & 0 \\ 1 & -1 & 0 \\ 0 & 0 & 1 \end{bmatrix}$ $b^2 = \begin{bmatrix} 0 \\ 0 \\ 0 \end{bmatrix}$

x

1 $\quad z^1 = W^1 x + b^1 = \begin{bmatrix} 1 & 1 \\ -1 & 1 \\ 1 & -1 \end{bmatrix} \begin{bmatrix} 1 \\ 2 \end{bmatrix} + \begin{bmatrix} 0 \\ 0 \\ 0 \end{bmatrix} = \begin{bmatrix} 3 \\ 1 \\ -1 \end{bmatrix}$

2 $\quad a^1 = \text{ReLU}\left(\begin{bmatrix} 3 \\ 1 \\ -1 \end{bmatrix} \right) = \begin{bmatrix} 3 \\ 1 \\ 0 \end{bmatrix}$

3 $\quad z^2 = W^2 a^1 + b^2 = \begin{bmatrix} 0 & 1 & 0 \\ 1 & -1 & 0 \\ 0 & 0 & 1 \end{bmatrix} \begin{bmatrix} 3 \\ 1 \\ 0 \end{bmatrix} = \begin{bmatrix} 1 \\ 2 \\ 0 \end{bmatrix}$

4 $\quad y = \text{Softmax}\left(\begin{bmatrix} 1 \\ 2 \\ 0 \end{bmatrix} \right) = \begin{bmatrix} \dfrac{e^1}{e^1 + e^2 + e^0} \\[2mm] \dfrac{e^2}{e^1 + e^2 + e^0} \\[2mm] \dfrac{e^0}{e^1 + e^2 + e^0} \end{bmatrix} = \begin{bmatrix} 0.24 \\ 0.66 \\ 0.10 \end{bmatrix}$

$c = -\log y_t = -\log(0.66) = 0.18$