NASP. - NEUR. MREŽE

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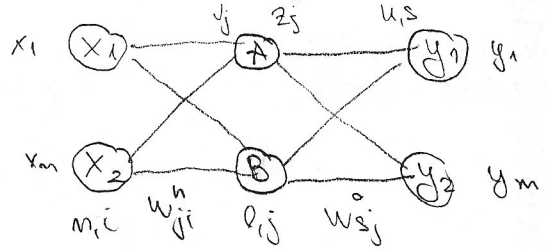

x_1	x_2	y_1	y_2
0	1	1	0
1	0	0	1

① IZRAČUN IZLAZNIH VRIJEDNOSTI

$$\text{izlaz-sigmoid} = \frac{1}{1+e^{-0}} = \frac{1}{2}$$

$k=0$ $\quad x_{d,1} = \begin{bmatrix} 0 \\ 1 \end{bmatrix}$ $\quad y_{d,1} = \begin{bmatrix} 1 \\ 0 \end{bmatrix}$

$$W^{h(0)} = \begin{bmatrix} 0 & 0 \\ 0 & 0 \end{bmatrix} \quad W^{o(0)} = \begin{bmatrix} 0 & 0 \\ 0 & 0 \end{bmatrix}$$

$$\Theta^{h(0)} = \begin{bmatrix} 0 \\ 0 \end{bmatrix} \quad \Theta^{o(0)} = \begin{bmatrix} 0 \\ 0 \end{bmatrix}$$

② FORWARD PASS

$$v^{(0)} = W^{h(0)} \cdot x_{d,1} - \Theta^{h(0)} = \begin{bmatrix} 0 \\ 0 \end{bmatrix}$$

$$z^{(0)} = \frac{1}{1+e^{-v}} = \begin{bmatrix} 1/2 \\ 1/2 \end{bmatrix}$$

$$u^{(0)} = W^{o(0)} \cdot z^{(0)} - \Theta^{o(0)} = \begin{bmatrix} 0 \\ 0 \end{bmatrix}$$

$$y^{(0)} = \frac{1}{1+e^{-z}} = \begin{bmatrix} 1/2 \\ 1/2 \end{bmatrix}$$

$$EA^o = y^{(0)} - y_{d,1}^{(0)} = \begin{bmatrix} 1/2 \\ 1/2 \end{bmatrix} - \begin{bmatrix} 1 \\ 0 \end{bmatrix} = \begin{bmatrix} -1/2 \\ 1/2 \end{bmatrix}$$

$$EI^o = EA^o .* y^{(0)} .* (1 - y^{(0)}) = \begin{bmatrix} -1/2 \\ 1/2 \end{bmatrix} \cdot \begin{bmatrix} 1/2 \\ 1/2 \end{bmatrix} \cdot \begin{bmatrix} 1/2 \\ 1/2 \end{bmatrix} = \begin{bmatrix} -1/8 \\ 1/8 \end{bmatrix}$$

③ REVERSE PASS

$$\delta^o = EI^o$$

$$EW^o = \delta^o \cdot z^T = \begin{bmatrix} -1/8 \\ 1/8 \end{bmatrix} \cdot \begin{bmatrix} 1/2 & 1/2 \end{bmatrix} = \begin{bmatrix} -1/16 & -1/16 \\ 1/16 & 1/16 \end{bmatrix}$$

$$EA^h = (W^o)^T \cdot EI^o = \begin{bmatrix} 0 & 0 \\ 0 & 0 \end{bmatrix} \cdot \begin{bmatrix} -1/8 \\ 1/8 \end{bmatrix} = \begin{bmatrix} 0 \\ 0 \end{bmatrix}$$

$$EI^h = EA^h .* z .* (1-z) = \begin{bmatrix} 0 \\ 0 \end{bmatrix} .* \begin{bmatrix} 1/2 \\ 1/2 \end{bmatrix} .* \begin{bmatrix} 1/2 \\ 1/2 \end{bmatrix} = \begin{bmatrix} 0 \\ 0 \end{bmatrix}$$

$$\delta^h = EI^h = \begin{bmatrix} 0 \\ 0 \end{bmatrix}$$

$$EW^h = \delta^h \cdot x^T = \begin{bmatrix} 0 \\ 0 \end{bmatrix} \begin{bmatrix} 0 & 1 \end{bmatrix} = \begin{bmatrix} 0 & 0 \\ 0 & 0 \end{bmatrix}$$

$$E\Theta^o = -EI^o = \begin{bmatrix} 1/8 \\ -1/8 \end{bmatrix} \quad E\Theta^h = -EI^h = \begin{bmatrix} 0 \\ 0 \end{bmatrix}$$

④ OSVJEŽAVANJE PARAMETARA

$$W^{h(1)} = W^{h(0)} - \alpha \cdot EW^h = \begin{bmatrix} 0 & 0 \\ 0 & 0 \end{bmatrix} - 1 \cdot \begin{bmatrix} 0 & 0 \\ 0 & 0 \end{bmatrix} = \begin{bmatrix} 0 & 0 \\ 0 & 0 \end{bmatrix}$$

$$W^{o(1)} = W^{o(0)} - \alpha \cdot EW^o = \begin{bmatrix} 0 & 0 \\ 0 & 0 \end{bmatrix} - 1 \cdot \begin{bmatrix} -1/16 & -1/16 \\ 1/16 & 1/16 \end{bmatrix} = \begin{bmatrix} 1/16 & 1/16 \\ -1/16 & 1/16 \end{bmatrix}$$

$$\Theta^{h(1)} = \Theta^{h(0)} - \alpha E\Theta^h = \begin{bmatrix} 0 \\ 0 \end{bmatrix} - \begin{bmatrix} 0 \\ 0 \end{bmatrix} = \begin{bmatrix} 0 \\ 0 \end{bmatrix}$$

$$\Theta^{o(1)} = \Theta^{o(0)} - \alpha E\Theta^o = \begin{bmatrix} 0 \\ 0 \end{bmatrix} - \begin{bmatrix} 1/8 \\ -1/8 \end{bmatrix} = \begin{bmatrix} -1/8 \\ 1/8 \end{bmatrix}$$

Sljedeći korak se odvija na isti način kao i prethodni, samo što se za početne vrijednosti parametara uzimaju $W^{h(1)}$ i $W^{o(1)}$, $\Theta^{h(1)}$ i $\Theta^{o(1)}$ te se promatra drugi par ulaznih i izlaznih vrijednosti x i y.

Bolje početne parametre se može dobiti odabirom nasumičnih brojeva iz određenog intervala.