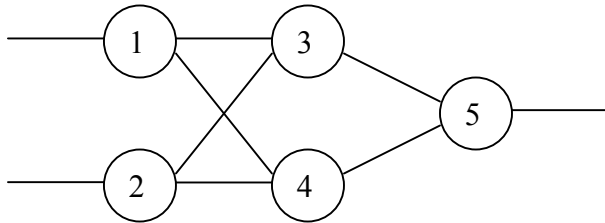


Zadana je neuronska mreža 2x2x1 (ili koje god da oznake nosi, pogledajte sliku, na slici su upisani redni brojevi čvorova za matricu).

Mreža se uvježbava za funkciju XOR (baš kao i na slajdovima)



$k = 0$

$$wh = \begin{bmatrix} 3,1 & 3,2 \\ 4,1 & 4,2 \end{bmatrix} = \begin{bmatrix} 0 & 0 \\ 0 & 0 \end{bmatrix}$$

$$wo = \begin{bmatrix} 5,3 & 5,4 \end{bmatrix} = \begin{bmatrix} 0 & 0 \end{bmatrix}$$

$$th = \begin{bmatrix} 0 \\ 0 \end{bmatrix}$$

$$to = 0$$

prolaz unaprijed:

$$v = wh \cdot xd - th$$

$$xd = \begin{bmatrix} 0 \\ 0 \end{bmatrix}$$

$$yd = 0$$

$$v = \begin{bmatrix} 0 \\ 0 \end{bmatrix} - \begin{bmatrix} 0 \\ 0 \end{bmatrix} = \begin{bmatrix} 0 \\ 0 \end{bmatrix}$$

$$z = \text{sigmoid}(v) = \begin{bmatrix} 1/2 \\ 1/2 \end{bmatrix}$$

$$u = wo \cdot z - th = \begin{bmatrix} 0 \\ 0 \end{bmatrix}$$

$$y = \text{sigmoid}(u) = \begin{bmatrix} 1/2 \end{bmatrix}$$

$$dso = y \cdot (1 - y) = \begin{bmatrix} 1/2 \\ 1/2 \end{bmatrix} \cdot (\text{matlab}) \begin{bmatrix} 1/2 \\ 1/2 \end{bmatrix} = \begin{bmatrix} (1/2) \cdot (1/2) \\ (1/2) \cdot (1/2) \end{bmatrix} = \begin{bmatrix} 1/4 \\ 1/4 \end{bmatrix}$$

$$\delta = (y - y_d) \cdot dso = (1/2 - 0) \cdot \begin{bmatrix} 1/4 \\ 1/4 \end{bmatrix} = 1/8$$

prolaz unatrag:

$$sum(swh) = (wo)^T \cdot \delta = \begin{bmatrix} 0 \\ 0 \end{bmatrix} \cdot \frac{1}{8} = \begin{bmatrix} 0 \\ 0 \end{bmatrix}$$

$$dsh = z \cdot (1 - z) = \begin{bmatrix} 1/2 \\ 1/2 \end{bmatrix} \cdot (matlab) \begin{bmatrix} 1/2 \\ 1/2 \end{bmatrix} = \begin{bmatrix} 1/4 \\ 1/4 \end{bmatrix}$$

$$jpartwh = dsh \cdot sum(swh) = \begin{bmatrix} 1/4 \\ 1/4 \end{bmatrix} \cdot \begin{bmatrix} 0 \\ 0 \end{bmatrix} = \begin{bmatrix} 0 \\ 0 \end{bmatrix}$$

$$gwh = jpartwh \cdot xd^T = \begin{bmatrix} 0 \\ 0 \end{bmatrix} \cdot \begin{bmatrix} 0 & 0 \end{bmatrix} = \begin{bmatrix} 0 & 0 \\ 0 & 0 \end{bmatrix}$$

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

$$gth = -jpartwh = \begin{bmatrix} 0 \\ 0 \end{bmatrix}$$

$$gto = -\delta = -\frac{1}{8}$$

rješenje prvog koraka i ulazak u drugi korak ($k=1$):

$$wh(1) = wh(0) - \mu \cdot gwh(0) = \begin{bmatrix} 0 & 0 \\ 0 & 0 \end{bmatrix}, \mu = 1$$

$$th(1) = th(0) - \mu \cdot gth(0) = \begin{bmatrix} 0 \\ 0 \end{bmatrix}$$

$$wo(1) = \begin{bmatrix} 0 & 0 \end{bmatrix} - 1 \cdot \begin{bmatrix} 1/16 & 1/16 \end{bmatrix} = \begin{bmatrix} -1/16 & -1/16 \end{bmatrix}$$

$$to(1) = \frac{1}{8}$$

to je samo jedan korak kroz koji smo prošli, ako ima grešaka, ovo je samo prepisano iz mojih švrljotina, prepravite po potrebi iako sam se trudila da stvari budu konzistentne

Naznaka prema službenom šalabahteru:

$$t = \theta$$

$$wh = w^h \quad \text{*indeksi i eksponenti nisu pisani u skladu sa oznakama već u istoj razini...}$$

$$th = \theta^h$$

$$to = t^o$$

$$wo = w^o$$