2022_01_10_P2

f. activación = sigmoid $\longrightarrow g(x) = \frac{1}{1+e^{-x}}$ $g'(x) = x(1-x)$

$\eta = 1.0$

$x = (1,1)^t$ $t = (1,0)^t$

$\Theta_1^1 = [1,1,1]$ $\Theta_2^1 = [-1,-1,-1]$ $\Theta_3^1 = [1,1,1]$

$\Theta_1^2 = [1,1,1,1]$ $\Theta_2^2 = [-1,-1,-1,-1]$

Notación extendida 1.0 $x = (1,1,1)$

Calculo hacia delante

capa oculta

$\phi_1^1 = \Theta_1^{1t} x = 1\cdot1 + 1\cdot1 + 1\cdot1 = 3 \longrightarrow S_1^1 = \frac{1}{1+e^{-3}} = 0,9525$

$\phi_2^1 = \Theta_2^{1t} x = -1\cdot1 + -1\cdot1 + -1\cdot1 = -3 \longrightarrow S_2^1 = 1/1+e^{3} = 0,0474$

$\phi_3^1 = \Theta_3^{1t} x = 1\cdot1 + 1\cdot1 + 1\cdot1 = 3 \longrightarrow S_3^1 = 0,9525$

Notación extendida $S_{capa\ oculta} = 1.0$

capa salida

$\phi_1^2 = 1\cdot1 + 1\cdot0,9525 + 1\cdot0,0474 + 1\cdot0,9525 = 2,9524$

$\phi_2^2 = \Theta_2^2 \cdot S_1 = -1\cdot1 + -1\cdot0,9525 + -1\cdot0,0474 + -1\cdot0,9525 = -2,9524$

$S_1^2 = 1/1+e^{-2,9524} = 0,95$

$S_2^2 = 1/1+e^{2,9524} = 0,049 \approx 0,05$

Actualización parámetros

$\Theta_{23}^2 = \Theta_{23}^2 + \eta \delta_2^2 (S_3^1 = -1 + 1\cdot -0,002375 \cdot 0,9525$

$= -1,0022$

$\Theta_{32}^1 = \Theta_{32}^1 + \eta \delta_3^1 \cdot x_2 = 1 + 1\cdot 0,00021\cdot 1 = 1,0002$

Calculo del error capa salida

$\delta_1^2 = (t_1 - S_1^2)\cdot S_1^2(1-S_1^2) = (1-0,95)\cdot 0,95(1-0,95) = 0,002375$

$\delta_2^2 = (0-0,05)\cdot 0,05(1-0,05) = \cancel{-0,1283}\ -0,002375$

Calculo error capa oculta

$\delta_1^1 = (\delta_1^2\cdot\Theta_{11}^2 + \delta_2^2\cdot\Theta_{21}^2)\cdot S_1^1(1-S_1^1) = (0,002375\cdot1 + -0,002375\cdot-1)\cdot 0,9525(1-0,9525)$

$= 0,00021$

$\delta_2^1 = (\delta_1^2\cdot\Theta_{12}^2 + \delta_2^2\cdot\Theta_{22}^2)\cdot S_2^1(1-S_2^1) = \delta_1^1$

$\delta_3^1 = (\delta_1^2\cdot\Theta_{13}^2 + \delta_2^2\cdot\Theta_{23}^2) = \delta_1^1$