At top of diagram:

$i1$ — $0.15w1$ — $h1$ — $.40w5$ — $O1$ — $.01$

0.05 — $.820w2$

$.45w6$

$.25w3$ — $h2$ — $.50w7$

$i2$ — $.30w4$ — $O2$ — 0.99

0.10

$.55w8$

$b1$ — 1 — 0.35

$b2$ — 1 — 0.60

We calculate the outputs from $h1$ and $h2$ using logistic activation function.

$$P(x) = \frac{1}{1 + e^{-x}}$$

$$out_{h_1} = f\left(w_1 x'_{1} + w_2 x'_{i_2} + b_1 \times 1\right)$$

$$= \cancel{f\left(0.15 \times 0.05 + 0.20 + 0.10 + 0.35 \times 1\right)}$$

$$= \cancel{f(0.3775)}$$

$$= f\left(\left(0.15 \times 0.05\right) + \left(0.20 \times 0.10\right) + \left(0.35 \times 1\right)\right)$$

$$= 0.3775$$

Sigmod function $= \dfrac{1}{1 + e^{-0.3775}}$

$$= 0.593327$$

$out\,h_2 = f\left((0.25 \times 0.05) + 0.30 \times 0.10) + (0.35 \times 1)\right)$

$= f(0.3925)$

$= \dfrac{1}{1 + e^{-0.3925}}$

$= 0.59689$

Similarly, calculate the outputs from $o1$ & $o2$ using logistic activation function.

$$f(x) = \dfrac{1}{1 + e^{-x}}$$

$Out_{o1} = f\left(w_5 \times outh_1 + w_6 \times outh_2 \times b_3 \times 1\right)$

$= f\left(0.40 \times 0.59327 + 0.45 \times 0.59689 + 0.60 \times 1\right)$

$= 1.10591$

$= \dfrac{1}{1 + e^{-1.10591}}$

$= 0.75137$

$Out_{O_2} = f\left(w_7 \times outh_1 \times w_8 \times outh_2 \times b_4 \times 1\right)$

$= f\left(0.50 \times 0.59327 \times 0.55 \times 0.59689 \times 0.60 \times 1\right)$

$= 1.22492$

$= \dfrac{1}{1 + e^{-1.22492}}$

$= 0.77293$

Sum of Squares of the output Errors is given by

$$E = \frac{1}{2}\left(T_1 - out_{o_1}\right)^2 + \frac{1}{2}\left(T_2 - out_{o_2}\right)^2 \quad \begin{bmatrix} Total \\ Error \end{bmatrix}$$

$$= \frac{1}{2}\left(0.01 - 0.75137\right)^2 + \frac{1}{2}\left(0.99 - 0.77293\right)^2$$

$$= 0.298371$$

we begin backward phase. we Adjust the weights leading to

o1 and o2
$$\begin{bmatrix} Individual \\ calculating \\ Error \end{bmatrix}$$

$$\delta_{o1} = \left(T_1 - out_{o1}\right) \times out_{o1} \times \left(1 - out_{o1}\right)$$

$$= \left(0.01 - 0.75137\right) \times 0.75137 \times \left(1 - out_{o1}\right)$$

$$= -0.13850$$

based upon output o1 we are updating weights & biases

$$w_5^t = w_5 + \eta \times \delta_{o1} \times out_{h_1}$$

$$= 0.40 + 0.5 \times (-0.13850) \times \cancel{0.52565879} \; 0.59327$$

$$= 0.35892$$

$$w_6^t = w_6 + \eta \times \delta_{o1} \times out_{h2}$$

$$= 0.45 + 0.5 \times (-0.13850) \times 0.59689$$

$$= 0.40867$$

$$b_3^t = b_3 + \eta \times \delta_{o1} \times 1$$

$$= 0.60 + 0.5 \times (-0.13850) \times 1$$

$$= 0.53075$$

we begin backward phase. we adjust the weights leading to $O1$ & $O2$

$$\delta_{O_2} = (T_2 - Out_{O_2}) \times Out_{O_2} \times (1 - Out_{O_2})$$

$$= (0.99 - 0.77293) \times 0.77293 \times (1 - 0.77293)$$

$$= 0.03810$$

update the weights & bias

$$w_7^{+} = w_7 + \eta \times \delta_{O_2} \times out_{h_1}$$

$$= 0.50 + 0.5 \times 0.03810 \times 0.59327$$

$$= 0.51130$$

$$b_4^{+} = b_4 + \eta + \delta_{O_2} \times 1$$

$$w_8^{+} = w_8 \times \eta \times \delta_{O_2} \times out_{h_2}$$

$$= 0.60 + 0.5 \times 0.03810 \times 1$$

$$= 0.55 \times 0.5 \times 0.03810 \times 0.59689$$

$$= 0.61905$$

$$= 0.56137$$

we begin backward phase. we adjust the weights leading to h_1 and h_2

$$\delta_{h_1} = (\delta_{O_1} \times w_5 + \delta_{O_2} \times w_7) \times Out_{h_1} \times (1 - Out_{h_1})$$

$$= (-0.13850 \times 0.40 + 0.03810 \times 0.50) \times 0.59327 \, (1 - 0.59327)$$

$$= -0.00877$$

Updating the weights & bias

$$w_i^{+} = w_i + \eta * \delta_{h_1} \, xi_1$$

$$= 0.15 + 0.5 * (-0.00877) \times 0.05 = 0.14978$$

$w_2^+ = w_2 + \eta \times \delta_{h_1} \times i_2$

$= 0.20 + 0.5 \times (-0.00877) \times 0.10$

$= 0.19956$

$b_1^+ = b_1 \times \eta \times \delta_{h_1} \times 1$

$= 0.35 \times 0.5 \times (-0.00877) \times 1$

$b_1^+ = 0.34562$

we begin backward phase - we adjust the weights leading to

h_1 and $h2$

$\delta_{h_2} = \left(\delta_{o_1} \times w_6 + \delta_{o_2} \times \partial w_8 \right) \times outh_2 \ (1 - out_{h_2})$

$= \left((-0.13850) \times 0.45 + 0.03810 \times 0.55687 \right) 0.59659 (1 - 0.59659)$

$= -0.00995$

updating the weights & bias

$w_3^+ = w_3 + \eta \times \delta_{h_2} \times i_1$

$= 0.25 + 0.5 \times (-0.00945) \times 0.05$

$= 0.24975$

$$w_4^+ = w_4 + n \times \delta_{h_2} \times i_2$$

$$= 0.30 + 0.5 \times (-0.00995) \times 0.10$$

$$w_4^+ = 0.29950$$

$$b_2^+ = b_2 \times n \times \delta_{h_2} \times 1$$

$$= 0.35 \times 0.5 \times (-0.00995) \times 1$$

$$= 0.34503$$

Now Set or replace old weights to New weights.

$$w_1 = w_1^+ \qquad w_2 = w_2^+ \qquad w_3 = w_3^+ \qquad w_4 = w_4^+$$

$$w_5 = w_5^+ \qquad w_6 = w_6^+ \qquad w_7 = w_7^+ \qquad w_8 = w_8^+$$

$$b_1 = b_1^+ \quad, \quad b_2 = b_2^+ \quad, \quad b_3 = b_3^+ \quad, \quad b_4 = b_4^+$$

The repeated until the root mean square of output

Errors in minimized

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