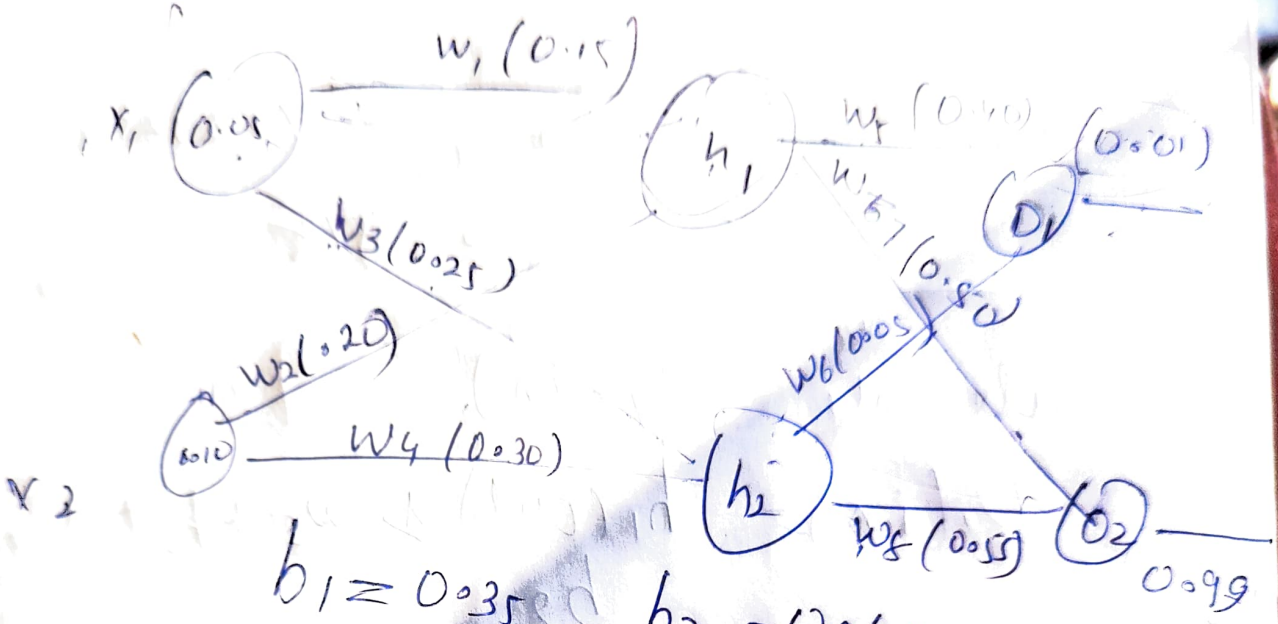
BPNN

Back Propagation Neural Network



$b_1 = 0.35$ $b_2 = 0.60$

Step 1 Calculate forward prop^n Error

z_1

$h_1(in) = w_1 x_1 + w_2 x x_2 + b_1$

$= .15 * .05 + .20 * .10 + .35$

$= 0.377$

z_2

$h_1(out) = \frac{1}{1 + e^{-h_1(in)}} = \frac{1}{1 + e^{-(.377)}}$

$= 0.5932$

$h_2(in) = x_1 w_3 + x_2 w_4 + b_1$

$.05 * .25 + .10 * .30 + .35 = 0.3925$

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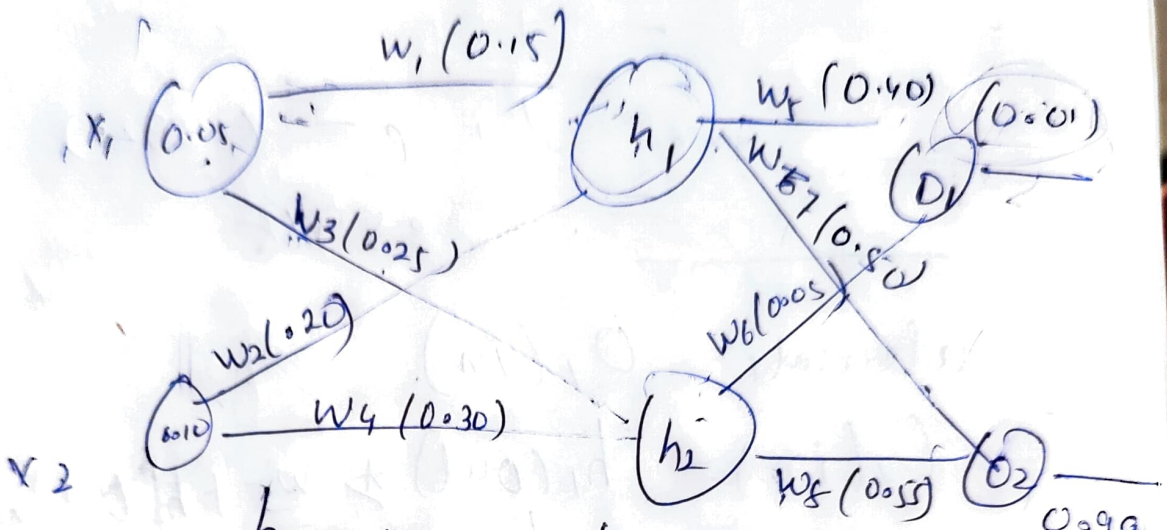

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Step 1 Calculate forward prop^n Error.

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$h_1(in) = w_1 x_1 + w_2 x x_2 + b_1$

$= 0.15 * 0.05 + 0.20 * 0.10 + 0.35$

$= 0.377$

z_2

$h_1(out) = \frac{1}{1 + e^{-h_1(in)}} = \frac{1}{1 + e^{-(0.377)}}$

$= 0.5932$

$h_2(in) = x_1 w_3 + x_2 w_4 + b_1$

$0.05 * 0.25 + 0.10 * 0.30 + 0.35 = 0.3925$

$$h_2(out) = \frac{1}{1+e^{-h_2(in)}}$$

$$= \frac{1}{1+e^{-(0.3325)}}$$

$$= 0.5968$$

Calculate $O_1(in)$.

$$O_1(in) = h_1(out) * w_5 + h_2(out) w_6 + b_2.$$

$$= 0.593 * 0.4 + 0.596 * 0.057 * 6$$

$$= 1.105$$

$$O_1(out) = \frac{1}{1+e^{-O_1(in)}}$$

$$= \frac{1}{1+e^{-(1.105)}} = 0.7513$$

$$O_2(in) = h_2(out)\,\Delta w_s + h_1(out) + w_1 + h_2$$

$$= 1.02264$$

$$O_2(out) = \frac{1}{1 + e^{-(1.024)}}$$

$$= 0.7729$$

Calculate E_{Total}

$$E_{total} = \sum \frac{1}{2}(target - o/p)^2$$

$$= E_{01} + E_{02}$$

$$\frac{1}{2}(.01 - .7513)^2 + \frac{1}{2}\left(.99 - .7729\right)^2$$

$$= 0.29837 \text{ Ephoon}$$

Part 2 — Calculate Backprop of Error

Output → hidden layer

I → h → o

w_5, w_6, w_7 w_8

$$w_5(N) = w_5 - \eta \cdot \frac{\delta E_{total}}{\delta w_5}$$

learning rate

$\eta, \alpha = 0.6$

$$\frac{\delta E_{total}}{\delta w_5} = \frac{\delta E_{total}}{\delta out_{o1}} \times \frac{\delta out_{o1}}{\delta net_{o1}} \times \frac{\delta net_{o1}}{\delta w_5}$$

for (1) $= \frac{\delta E_{total}}{\delta out_{o1}} = out_{o1} - target_{o1}$

$= 0.751361 - 0.01$

$O_1 (out) = 0.74136$

$$\frac{\delta out_{o1}}{\delta net_{o1}} = out_{o1}(1 - out_{o1})$$

$$= 0.7513(1 - 0.7513)$$

$$= 0.1868$$

$$\frac{\delta net_{o1}}{\delta w_5} = out_{h1} = 0.5932$$

$$0.741356 * 0.1868 * 0.5932$$

$$= \boxed{0.082}$$

$$w_5^+(N) = w_5 - \eta * 0.082$$

$$= 0.40 - 0.6 * 0.082$$

$$= 0.399$$

$x_1\ x_2$ $v_1\ v_2$ $w_1\ w_2\ w_3\ w_4\ w_5\ w_6$ $\Delta w_1\ \Delta w_2$