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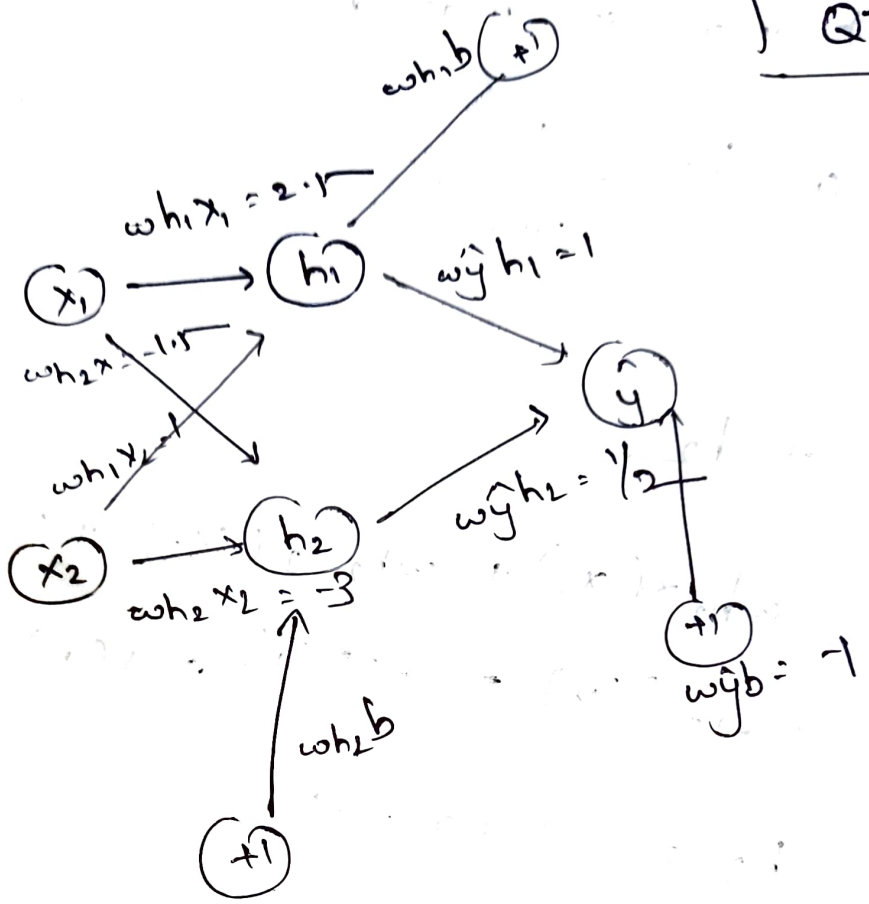
Part 2



$$g(z) = 1/1+e^{-z}$$

a) Given $x_1 = 0$; $x_2 = 1$

output at h_1

$$h_{01} = w_{h_1 x_1}(x_1) + w_{h_1 x_2}(x_2) + w_{h_1 b}(1)$$

$$h_{01} = (2.5)(0) + 1(1) + 1.5$$

$$h_{01} = 1 + 1.5 = 2.5$$

out put value at node h_1

$$out\text{-}h_1 = \frac{1}{1+e^{-2.5}} = 0.92414$$

Out put at h_2

$$h_2 = wh_2 * (x_1) + wh_2 x_2 (x_2) + 1(wh_2 b)$$

$$h_2 = (-1.5)(0) + (-3)(1) + 1(2)$$

$$h_2 = -3 + 2 = -1$$

out put value at node h_2

$$out\text{-}h_2 = \frac{1}{1+e^{-(-1)}} = 0.2689$$

out put at node $\hat{y}$:-

$$\hat{y} = (w\hat{y}h_1)\,|h_1$$

$$= (w\hat{y}h_1)\, out\text{-}h_1 + (w\hat{y}h_2)\, out\text{-}h_2 + w\hat{y}b$$

$$\hat{y} = (0.9241)(1) + 0.5(0.2689) + (-1)(1)$$

$$= 0.9241 + 0.1345 - 1$$

$$= 0.0586$$

output value at node $\hat{y}$

$$\text{out}-\hat{y} = \frac{1}{1+e^{-(0.0586)}} = 0.5146$$

b)

$$E = \frac{1}{2}(y - \text{out}-\hat{y})^2$$

$$= \frac{1}{2}(1 - 0.5146)^2 = 0.11778$$

$$\frac{\partial E}{\partial \hat{y}} = 1 - 0.5146 = 0.4853$$

$$\frac{\partial \hat{y}}{\partial z_{out}} = h_1 = 0.9241 \; \hat{y}(1-\hat{y})$$

$$= 0.5146(1-0.5146)$$

$$= 0.24979$$

$$\frac{\partial z_{out}}{\partial w_1 h_1} = h_1 = 0.9241$$

$$\frac{\partial E}{\partial w_{yh_1}} = \frac{\partial E}{\partial \hat{y}} \frac{\partial \hat{y}}{\partial Z_{out}} \frac{\partial Z_{out}}{\partial w_{yh_1}}$$

$$= (0.11778)(0.48135)(0.24979)$$

$$= 0.014279$$

$$w_{yh_1} = \Delta w_{yh_1} + w_{yh_1} = \frac{\partial \partial E}{\partial w_{yh_1}} + w_{yh_1}$$

$$= 0.1(0.14279) + 1$$

$$w_{yh_1} = 1.0014279$$

$$w_{yh_2} = \alpha h_2 \hat{y}(1-\hat{y})(y-0) + w_{yh_2}$$

$$= 0.1(0.26894)(0.24979)(0.11778) + 0.5$$

$$w_{yh_2} = 0.50079123$$

$$w_{\hat{y}b} = \alpha(1)\hat{y}(1-\hat{y})(y-o) + w_{\hat{y}b}$$

$$= 0.1(1)(0.24979)(0.11728) - 1$$

$$w_{\hat{y}b} = -0.9970578$$

Input hidden weights

$$\Delta w_{h_1 x_1} = h_1 g(z_1) \sum_k w_{h\hat{y}} \alpha_k$$

$$= \alpha x_1 h_1 (1-h) w_{\hat{y}h_1} (y - \hat{y})$$

$$= 0.1(0)(0.92414)(0.07586)(1)(0.48535)$$

$$= 0$$

$$w_{h_1 x_1} = 2.5$$

$$w_{h_2 x_2} = -1.5$$

$$w_{x_1 x_2} = (0.1)(1)(0.92414)(0.07586)(1)(0.48535)$$

$$w_{bx_1 x_2} = 1.0034026$$

$$w_{h_2 x_2} = (0.1)(1)(0.26894)(0.73106)(0.5)(0.48)$$

$$w_{h_2 x_2} = -2.995229$$

$w_{h_1b} = (0.7)(1)(0.92414)(0.07586)(1)(0.98535)+1.4$

$w_{h_1b} = 1.5034026$

$w_{h_2b} = (0.1)(1)(0.26894)(0.73106)(0.5)(0.44853)+2$

$w_{h_2b} = 2.0047713$