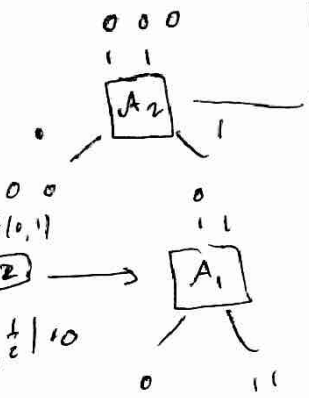
Example	A_1	A_2	A_3	Output Y
X_1	1	0	0	0
X_2	1	0	1	0
X_3	0	1	0	0
X_4	1	1	1	1
X_5	1	1	0	1



gain(A_1) = $H(\frac{2}{3}, \frac{3}{5}) - (\frac{4}{5}) H(\frac{1}{2}, \frac{1}{2}) + \frac{1}{5}(H(0,1))$

= 0.97 - 4/5 = 0.17

gain(A_2) = $H(\frac{2}{3}, \frac{3}{5}) - \frac{2}{5}(H(0,1) + (\frac{3}{5}) H(\frac{1}{3}, \frac{2}{3})$

= 0.97 + $\frac{3}{5}$(0.92) = 1.522

gain(A_3) = $H(\frac{2}{5}, \frac{3}{5}) - \frac{3}{5} H(\frac{2}{3}, \frac{1}{3}) + \frac{2}{5} H(\frac{1}{2}, \frac{1}{2})$

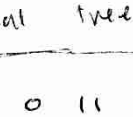
= 0.97 - 0.552 + $\frac{2}{5}$ = 0.818

gain(A_1) = $H(\frac{1}{3}, \frac{2}{3}) - \frac{1}{3} H(0,1) + \frac{2}{3}(H(0,1)$

= 0.92 - 0 + 0 = 0.92

gain(A_3) = $H(\frac{1}{3}, \frac{2}{3}) - \frac{2}{3} H(\frac{1}{2}, \frac{1}{2})$ 10

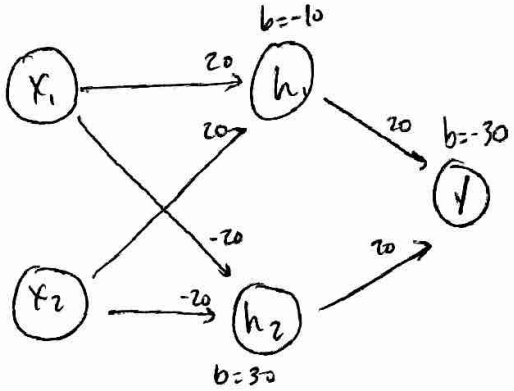
= 0.25

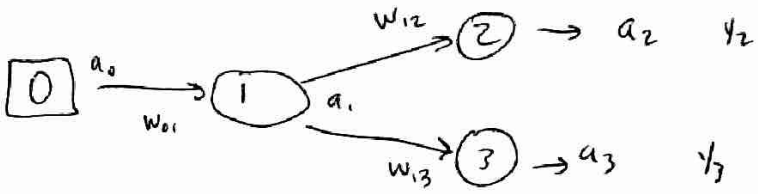


Final tree

XOR

x_1	x_2	Output
0	0	0
0	1	1
1	0	1
1	1	0





$w_{01} = 1 \quad w_{12} = 1$

$w_{13} = 2$

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

input $a_0 = 1$ Desired: $y_2 = 2$
$y_3 = 0$

$a_1 = g(w_{01} a_0) = g(1 \times 1) = \frac{1}{1+e^{-1}} = 0.73$

$a_2 = g(w_{12} a_1) = g(1 \times 1) = \frac{1}{1+e^{-1}} = 0.73$

$a_3 = g(w_{13} a_1) = g(2 \times 1) = \frac{1}{1+e^{-2}} = 0.88$

$\Delta_2 = (y_2 - a_2)\, g'(in_2)$

$= (2 - 0.73)\, g'(1)$

$= 1.27 \left(\frac{1}{1+e^{-1}}\right)\left(\frac{-e^{-1}}{1+e^{-1}}\right)$

$\Delta_2 = -0.24$

Update

$\alpha = 0.1$

$w_{12} = w_{12} + \alpha a_1 \Delta_2$

$= 1 + (0.1)(0.73)(-0.24)$

$w_{12} = 0.982$

$\Delta_3 = (y_3 - a_3)\, g'(in_3)$

$= (0 - 0.88)\, g'(2)$

$\Delta_3 = -0.88(-0.09) = 0.09$

$w_{13} = w_{13} + \alpha a_1 \Delta_3$

$= 2 + 0.1\,(0.73)(0.09)$

$w_{13} = 2.006$

$\Delta_1 = (w_{12}\Delta_2 + w_{13}\Delta_3)\, g'(in_1)$

$= 1(-0.24) + (2)(0.09)\, g'(1)$

$\Delta_1 = 0.11$

$w_{01} = w_{01} + \alpha a_0 \Delta_1$

$= 1 + (0.1)(1)(0.11)$

$w_{01} = 1.011$