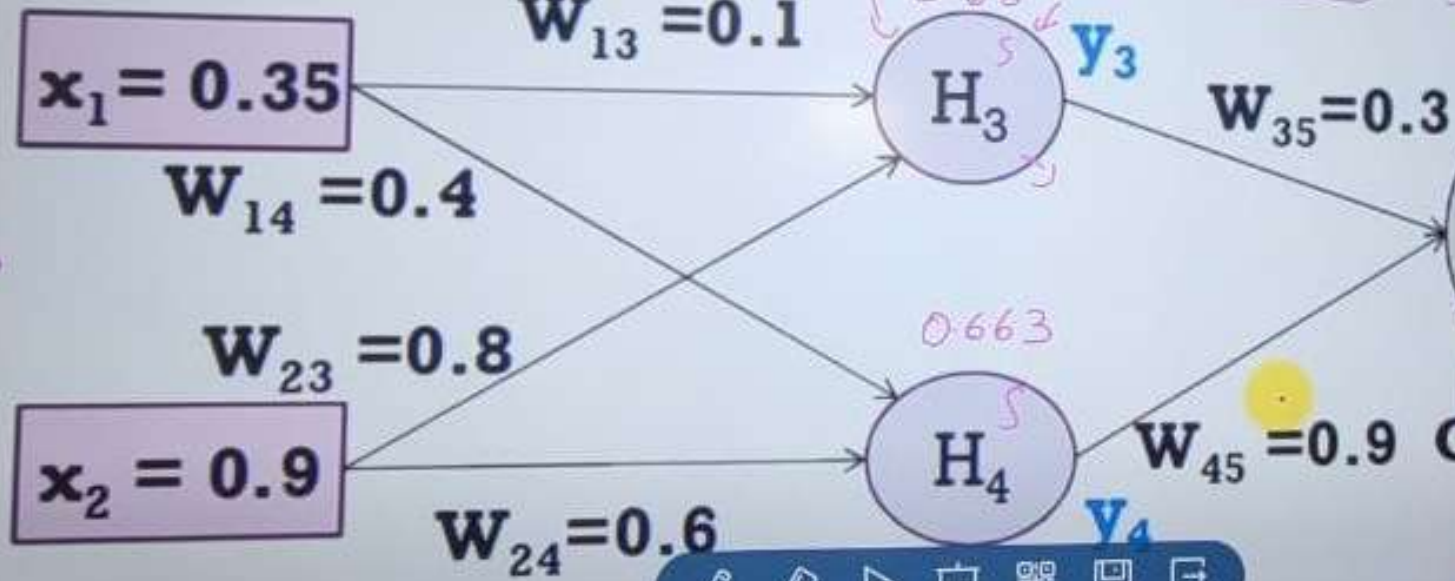
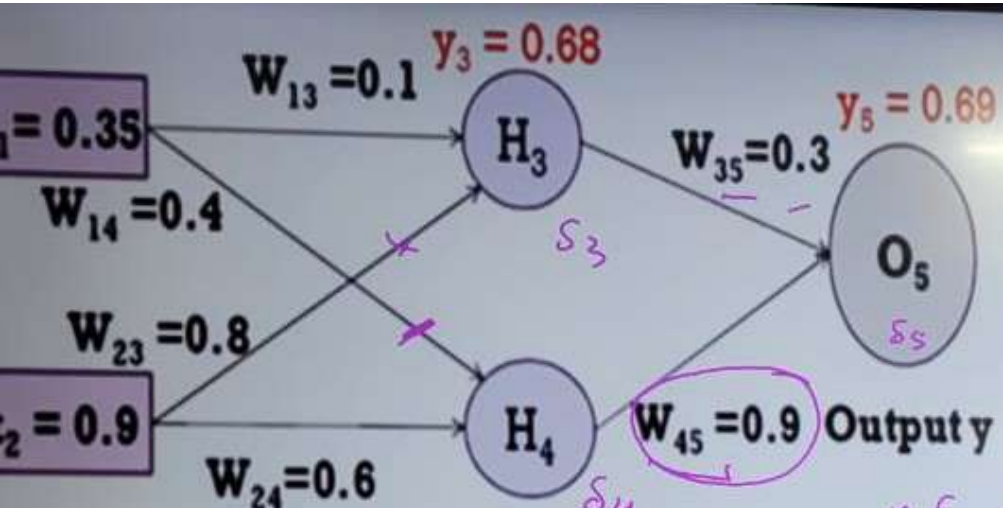
Backpropagation

Assume that the neurons have a sigmoid activa... perform a forward pass and a backward pass on the network. Assume that the actual output of y is 0.5 and learning rate is 1. Perform another forward pass.





Backward Pass: Compute δ3, δ4 and δ5.

For output unit:

$\delta_5 = y(1-y)\,(y_{target} - y)$

$= 0.69*(1-0.69)*(0.5-0.69) = -0.0406$

$\delta_5 \rightarrow$ O/P

For hidden unit:

$\delta_3 = y_3(1-y_3)\,w_{35} * \delta_5$

$= 0.68*(1 - 0.68)*(0.3 * -0.0406) = -0.00265$

$\eta\delta_3 x_2$

$\Delta w_{23} =$

$= 1 \times 0.0026 \times 0.9$

$= -0.0265\ 0.002385$

new $w_{23} =$ 0.7976

Compute new weights

$\Delta w_{ji} = \eta \delta_j o_i$

$w_{45} = \eta\,\delta_5\,y_4 = 1 * -0.0406 * 0.6637 = -0.0269$

w_{45} (new) $= \Delta w_{45} + w_{45}$(old) $= -0.0269 + (0.9) = 0.8731$

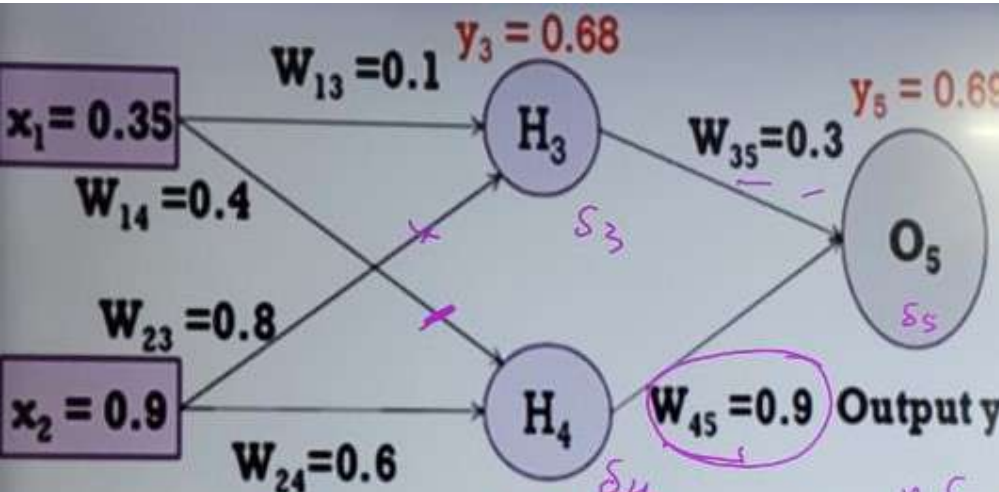
$\delta_4 = y_4(1-y_4)\,w_{45} * \delta_5$

$= 0.6637*(1 - 0.6637)*(0.9 * -0.0406) = -0.0082$

$w_{14} = \eta\,\delta_4\,x_1 = 1 * -0.0082 * 0.35 = -0.00287$

w_{14} (new) $= \Delta w_{14} + w_{14}$(old) $= -0.00287 +$

$\Delta w_{35} = \eta\delta_5 y_3 = (1 * -0.0406) *$



Backward Pass: Compute δ3, δ4 and δ5.

For output unit:

$\delta_5 = y(1-y)\,(y_{target} - y)$

$= 0.69*(1-0.69)*(0.5-0.69) = -0.0406$

$\delta_5 \rightarrow$ O/P

For hidden unit:

$\delta_3 = y_3(1-y_3)\,w_{35} * \delta_5$

$= 0.68*(1 - 0.68)*(0.3 * -0.0406) = -0.00265$

$\Delta W_{23} = \eta \delta_3 x_2$

$= 1 \times -0.0026 \times 0.9$

$= -0.00238$

new $W_{23} = 0.7976$

Compute new weights

$\Delta w_{ji} = \eta \delta_j o_i$

$\Delta W_{45} = \eta\, \delta_5\, y_4 = 1 * -0.0406 * 0.6637 = -0.0269$

W_{45} (new) $= \Delta W_{45} + W_{45}$(old) $= -0.0269 + (0.9) = 0.8731$

$\delta_4 = y_4(1-y_4)\,w_{45} * \delta_5$

$= 0.6637*(1 - 0.6637)*(0.9 * -0.0406) = -0.0082$

$\Delta w_{35} = \eta \delta_5 y_3 = (1 * -0.0406) *$

$\Delta w_{35} = -0.0276$ 0.68 =

$W_{14} = \eta\, \delta_4\, x_1 = 1 * -0.0082 * 0.35 = -0.00287$