



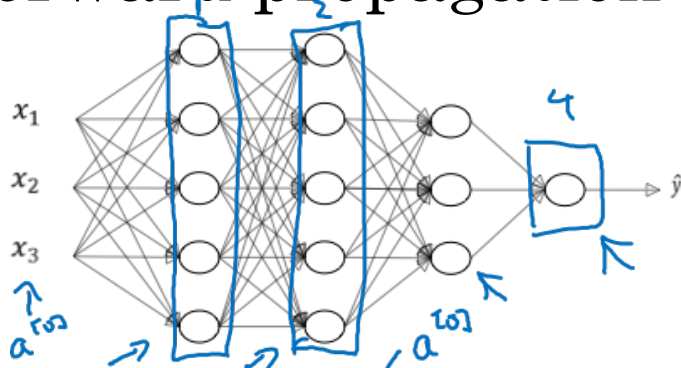
deeplearning.ai

# Deep Neural Networks

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## Forward Propagation in a Deep Network

# Forward propagation in a deep network



$$X : z^{[1]} = W^{[1]} a^{[0]} + b^{[1]}$$

$$a^{[1]} = g^{[1]}(z^{[1]})$$

$$z^{[2]} = W^{[2]} a^{[1]} + b^{[2]}$$

$$a^{[2]} = g^{[2]}(z^{[2]})$$

$$z^{[4]} = W^{[4]} a^{[3]} + b^{[4]}, a^{[4]} = g^{[4]}(z^{[4]}) = \hat{y}$$

$$\begin{aligned} z^{[l]} &= W^{[l]} A^{[l-1]} + b^{[l]} \\ A^{[l]} &= g^{[l]}(z^{[l]}) \end{aligned}$$

$A^{[0]} = X$

Vertical:

$$\begin{aligned} z^{[1]} &= W^{[1]} A^{[0]} + b^{[1]} \\ A^{[1]} &= g^{[1]}(z^{[1]}) \\ z^{[2]} &= W^{[2]} A^{[1]} + b^{[2]} \\ A^{[2]} &= g^{[2]}(z^{[2]}) \\ &\vdots \\ \hat{y} &= g^{[4]}(z^{[4]}) = A^{[4]} \end{aligned}$$

$X = A^{[0]}$

for  $l=1 \dots 4$

Z & A