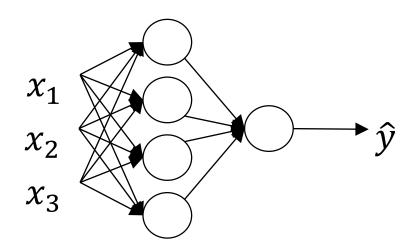


deeplearning.ai

One hidden layer Neural Network

Vectorizing across multiple examples

Vectorizing across multiple examples



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

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

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

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

Vectorizing across multiple examples

```
for i = 1 to m:

z^{[1](i)} = W^{[1]}x^{(i)} + b^{[1]}
a^{[1](i)} = \sigma(z^{[1](i)})
z^{[2](i)} = W^{[2]}a^{[1](i)} + b^{[2]}
a^{[2](i)} = \sigma(z^{[2](i)})
```



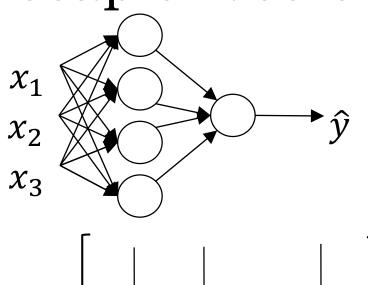
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One hidden layer Neural Network

Explanation for vectorized implementation

Justification for vectorized implementation

Recap of vectorizing across multiple examples



$$X = \begin{bmatrix} & | & & | & & | \\ & \chi^{(1)} & \chi^{(2)} & \dots & \chi^{(m)} \\ & | & & | & & | \end{bmatrix}$$

$$A^{[1]} = \begin{bmatrix} | & | & | & | \\ a^{1} a^{[1](2)} & a^{[1](m)} \\ | & | & | \end{bmatrix}$$

for i = 1 to m
$$z^{[1](i)} = W^{[1]}x^{(i)} + b^{[1]}$$

$$a^{[1](i)} = \sigma(z^{[1](i)})$$

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

$$a^{[2](i)} = \sigma(z^{[2](i)})$$

$$Z^{[1]} = W^{[1]}X + b^{[1]}$$

$$A^{[1]} = \sigma(Z^{[1]})$$

$$Z^{[2]} = W^{[2]}A^{[1]} + b^{[2]}$$

$$A^{[2]} = \sigma(Z^{[2]})$$