Implementing an artificial neuron from scratch

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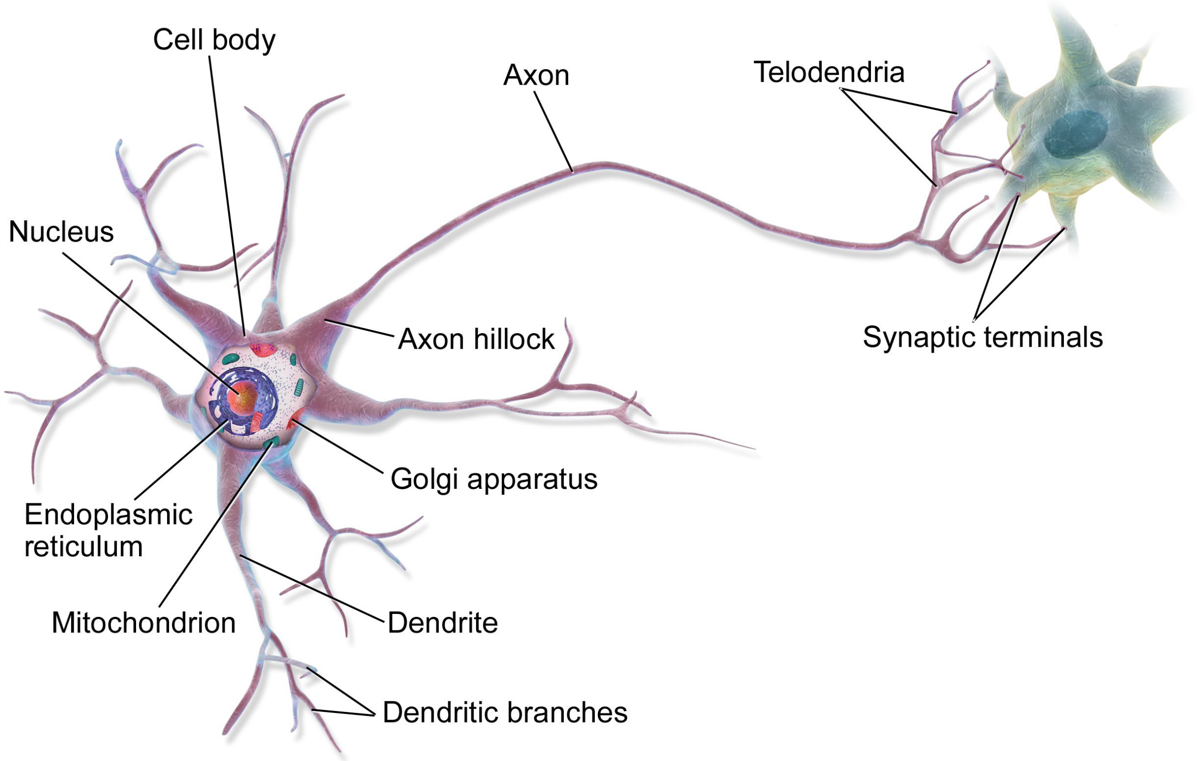
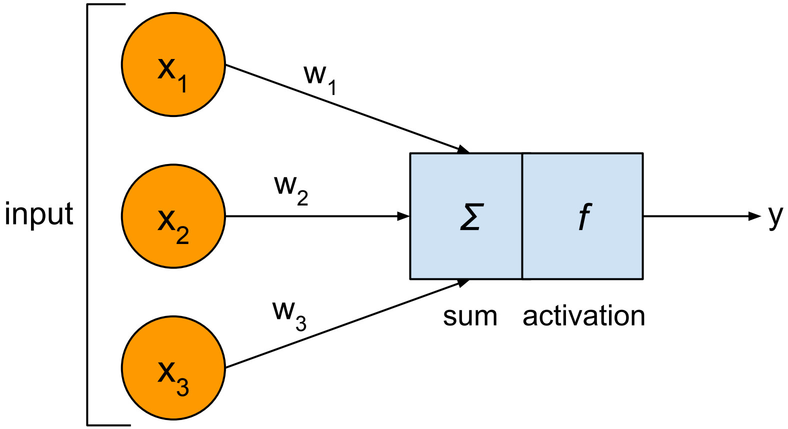
What you’ll learn

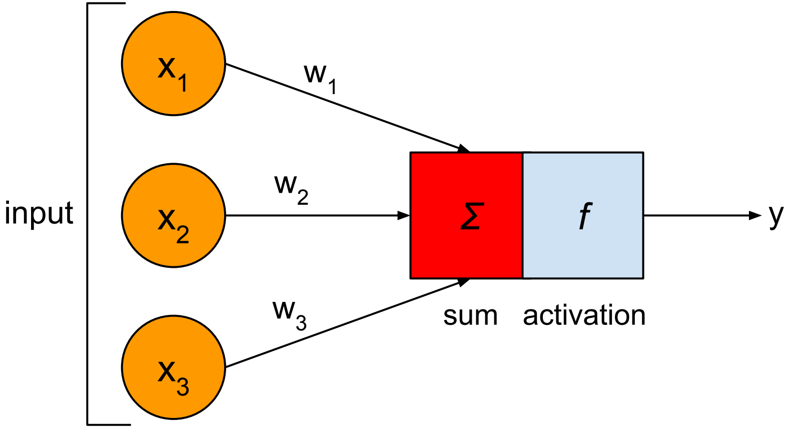
- Biological neurons
- Math behind the artificial neuron
- Implementing an artificial neuron with Python


Cell body
Axon
Telodendria
Nucleus
Axon hillock
Synaptic terminals
Golgi apparatus
Endoplasmic reticulum
Mitochondrion
Dendrite
Dendritic branches

The artificial neuron

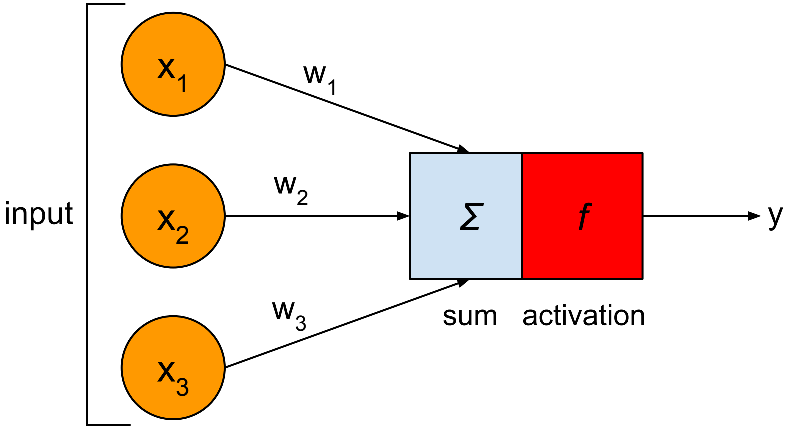


The artificial neuron



$$h = \sum_i x_i w_i = x_1 w_1 + x_2 w_2 + x_3 w_3$$

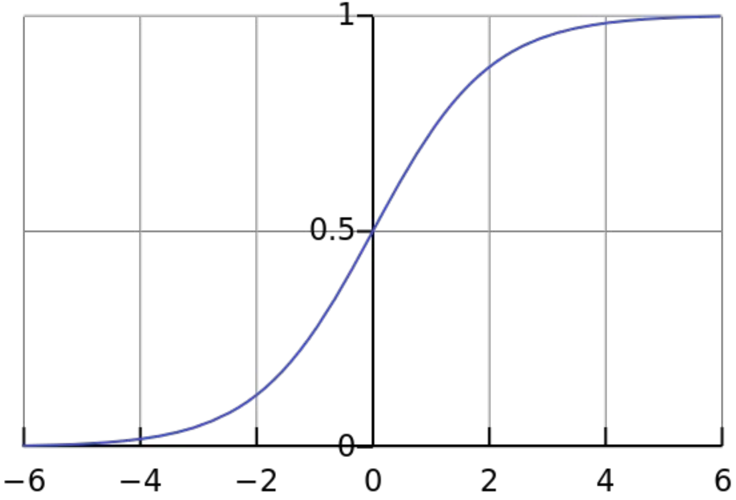
The artificial neuron



$$h = \sum_i x_i w_i = x_1 w_1 + x_2 w_2 + x_3 w_3$$

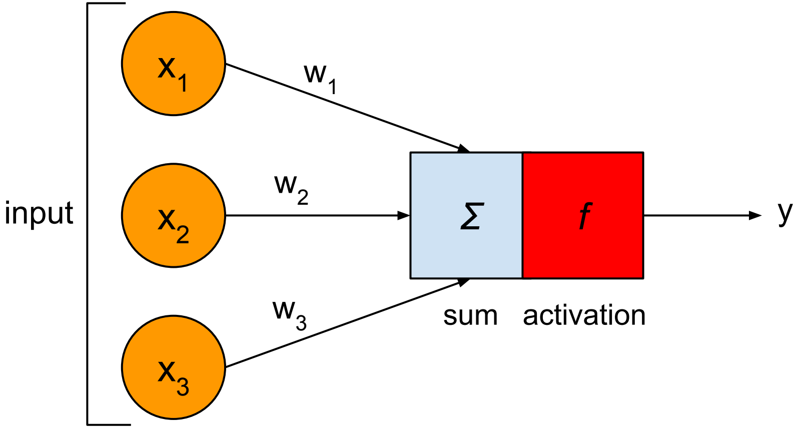
$$\boxed{y = f(h) = f(x_1 w_1 + x_2 w_2 + x_3 w_3)}$$

The activation function: Sigmoid



$$y = \frac{1}{1 + e^{-x}}$$

The artificial neuron with sigmoid activation function

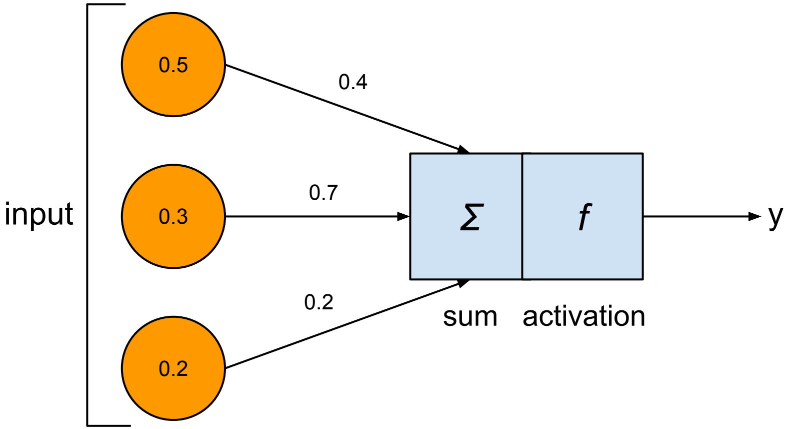


$$h = \sum_i x_i w_i = x_1 w_1 + x_2 w_2 + x_3 w_3$$

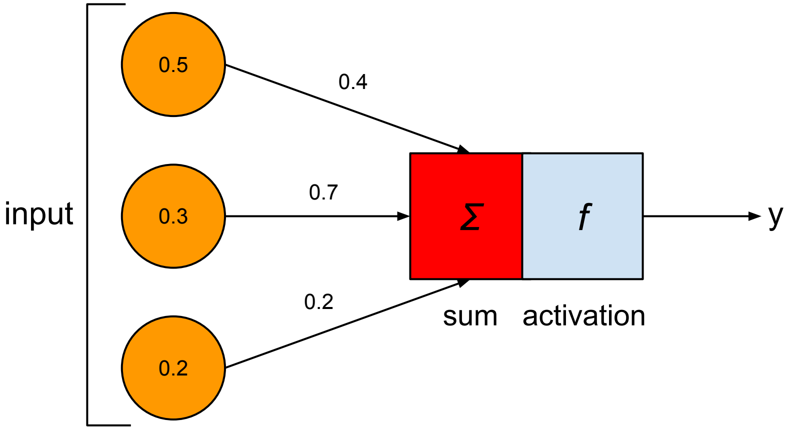
$$y = f(h) = f(x_1 w_1 + x_2 w_2 + x_3 w_3)$$

$$\boxed{y = \frac{1}{1 + e^{-(x_1 w_1 + x_2 w_2 + x_3 w_3)}}}$$

The artificial neuron with sigmoid activation function

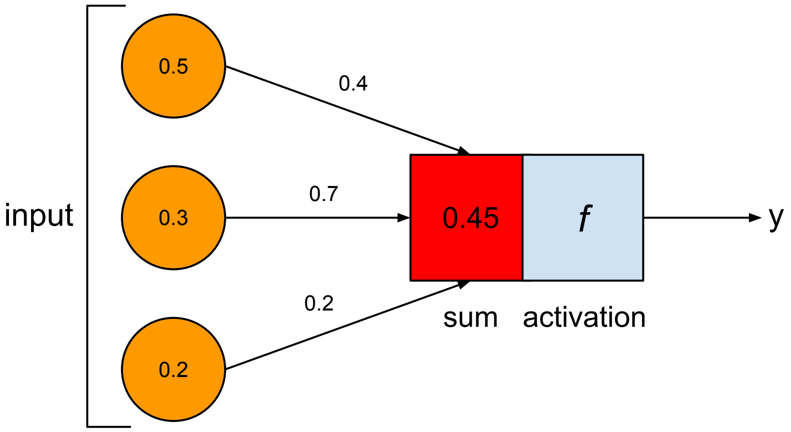


The artificial neuron with sigmoid activation function



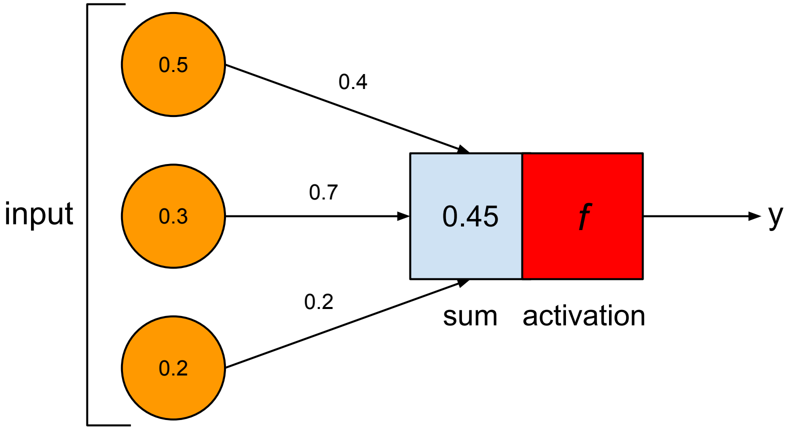
$$\boxed{h = x_1 w_1 + x_2 w_2 + x_3 w_3}$$

The artificial neuron with sigmoid activation function



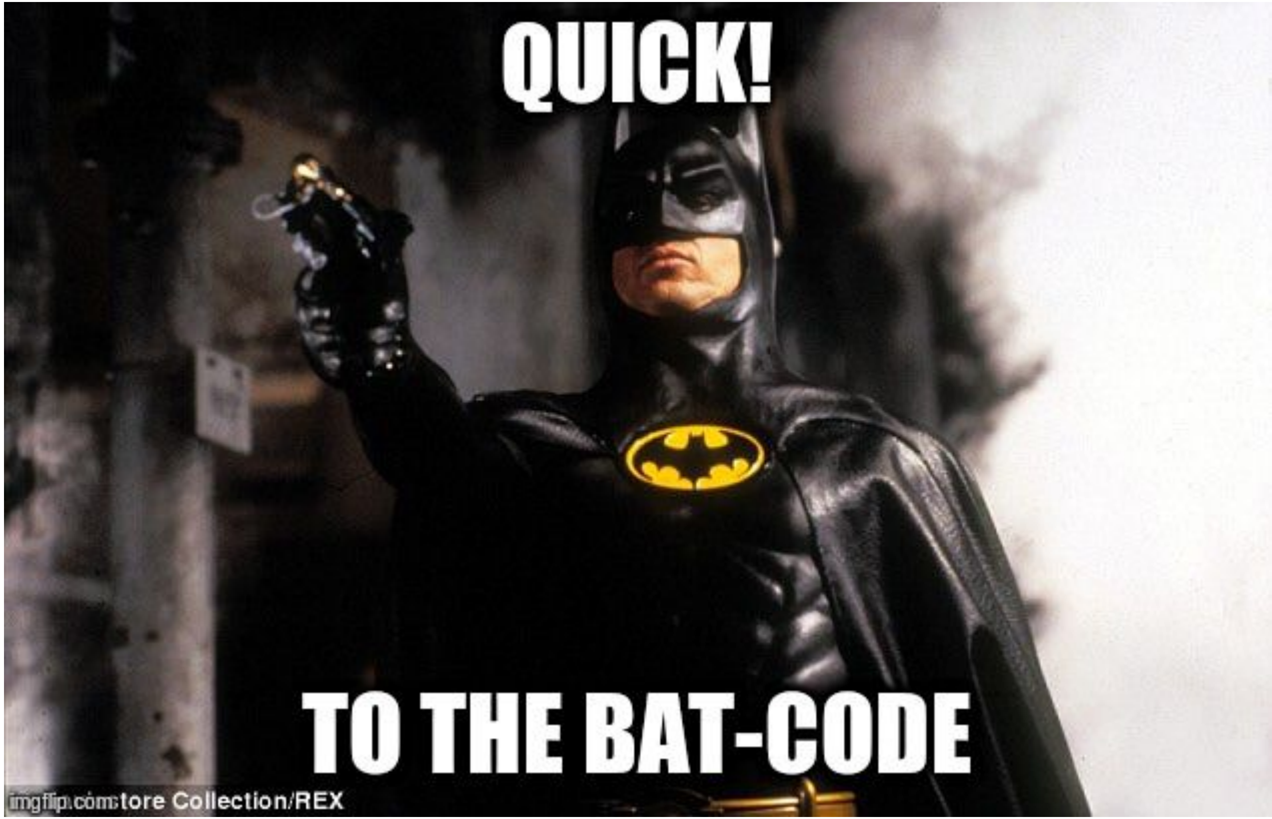
$$h = x_1 w_1 + x_2 w_2 + x_3 w_3 \boxed{= 0.5 \cdot 0.4 + 0.3 \cdot 0.7 + 0.2 \cdot 0.2 = 0.45}$$

The artificial neuron with sigmoid activation function



$$h = x_1 w_1 + x_2 w_2 + x_3 w_3 = 0.5 \cdot 0.4 + 0.3 \cdot 0.7 + 0.2 \cdot 0.2 = 0.45$$

$$\boxed{y = \frac{1}{1 + e^{-0.45}} = 0.61}$$



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Takeaway points

- Artificial neurons are loosely inspired to biological neurons
- Artificial neurons are computational units
- They transform inputs into outputs using an activation function

What’s up next?