

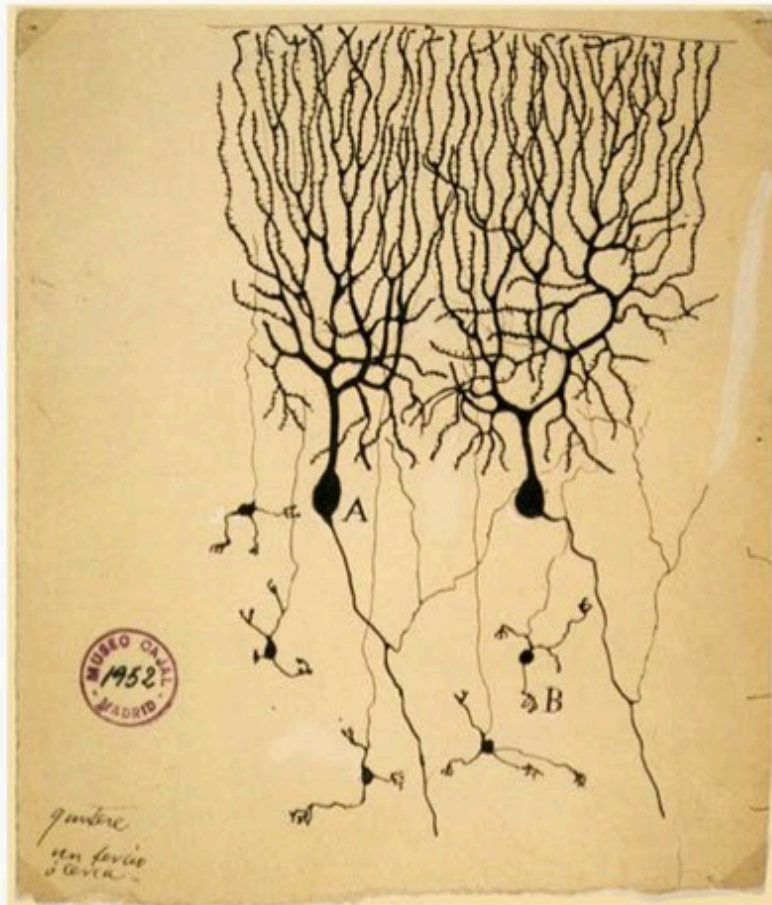
Neural Networks

Forward Pass and Back Propagation

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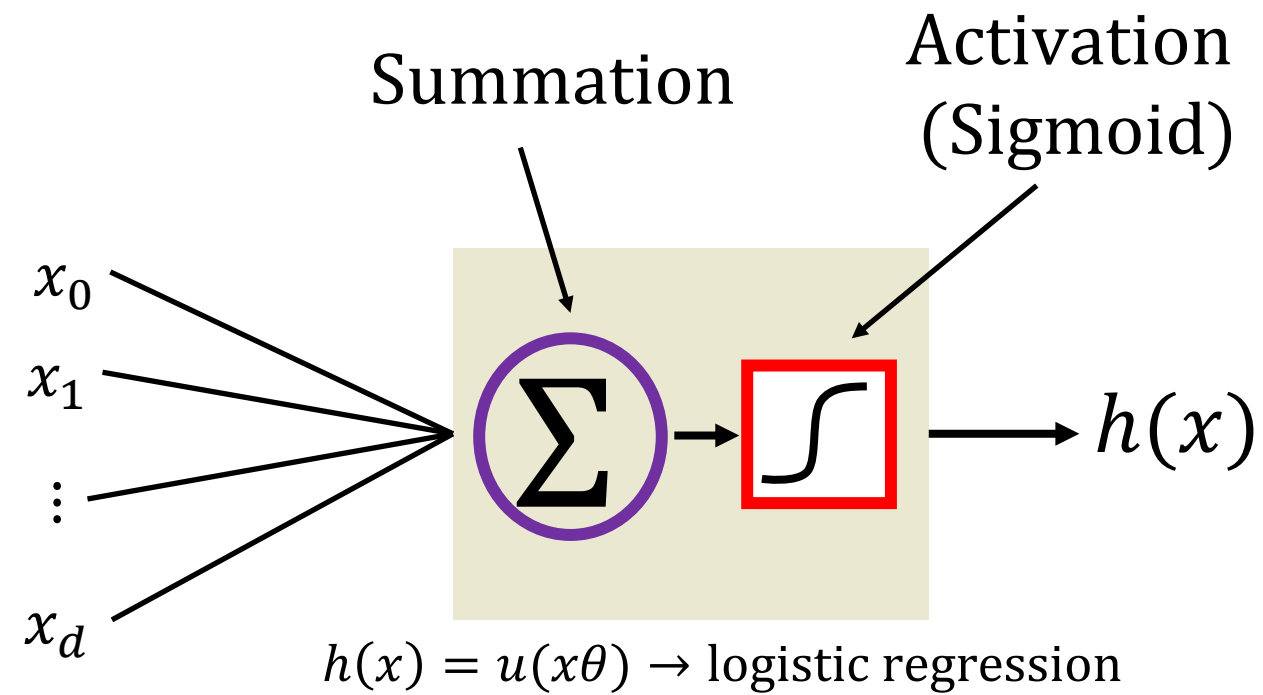
Inspiration from Biological Neurons



The first drawing of a brain cells by Santiago Ramón y Cajal in 1899

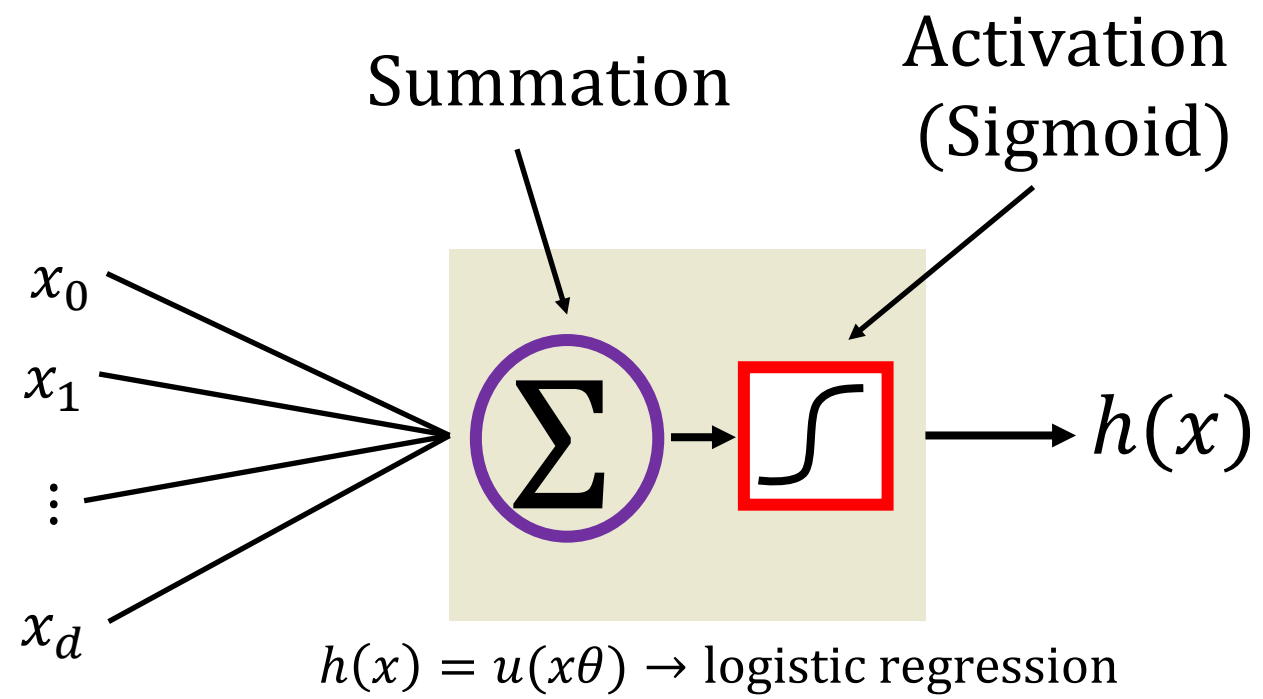
Neurons: core components of brain and the nervous system consisting of

1. Dendrites that collect information from other neurons
2. An axon that generates outgoing spikes

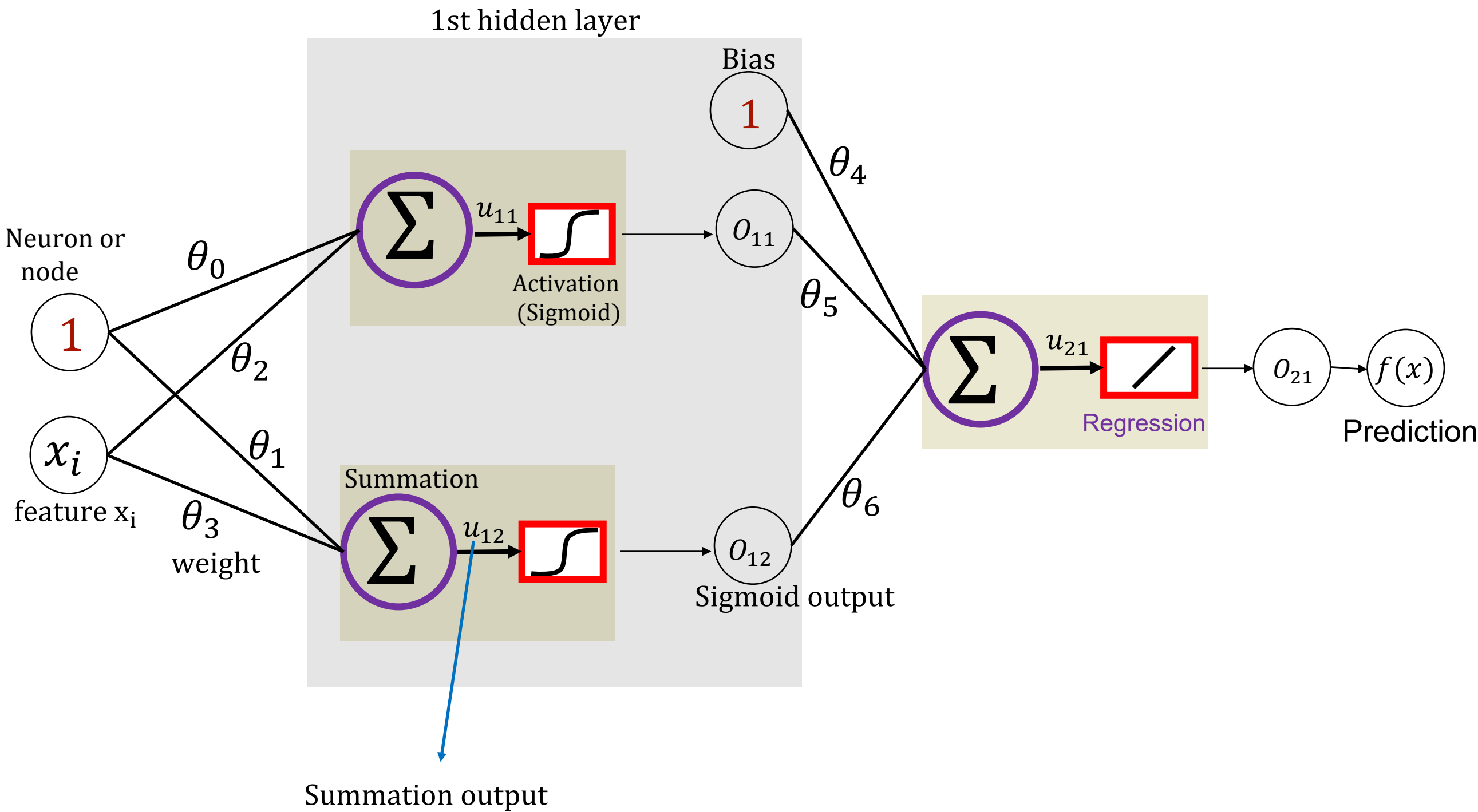
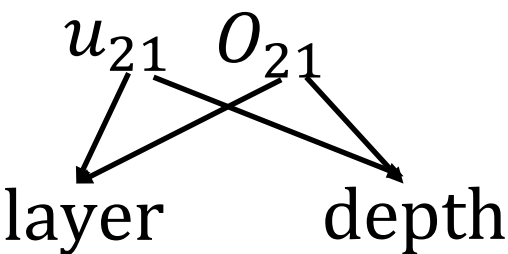


$$\text{output} = \text{activation}(x\theta + b)$$

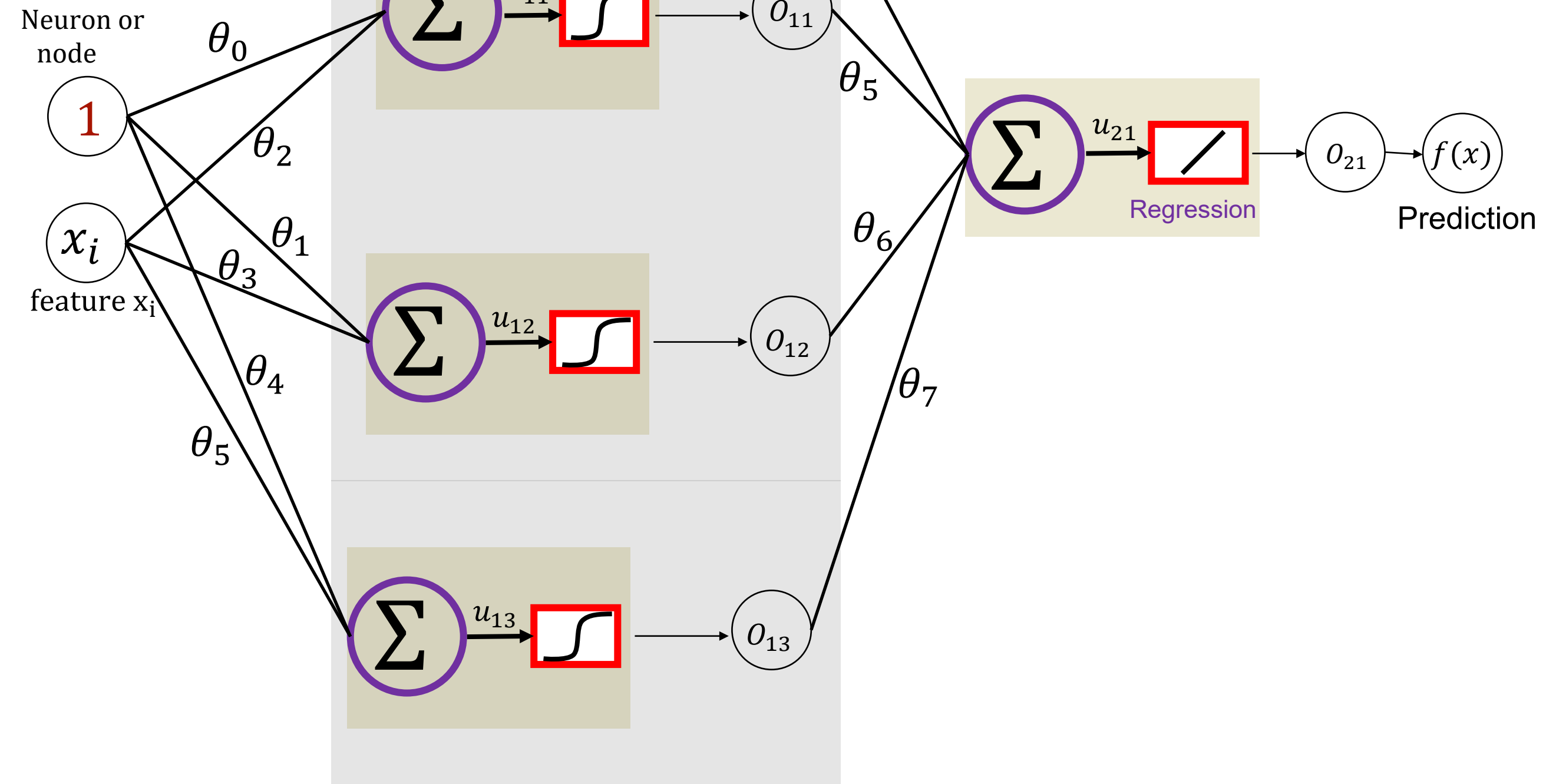
Name of the neuron	Activation function: $\text{activation}(z)$
Linear unit	z
Threshold/sign unit	$\text{sgn}(z)$
Sigmoid unit	$\frac{1}{1 + \exp(-z)}$
Rectified linear unit (ReLU)	$\max(0, z)$
Tanh unit	$\tanh(z)$



NN Regression



1st hidden layer



1st hidden layer

2nd hidden layer

Neuron or
node