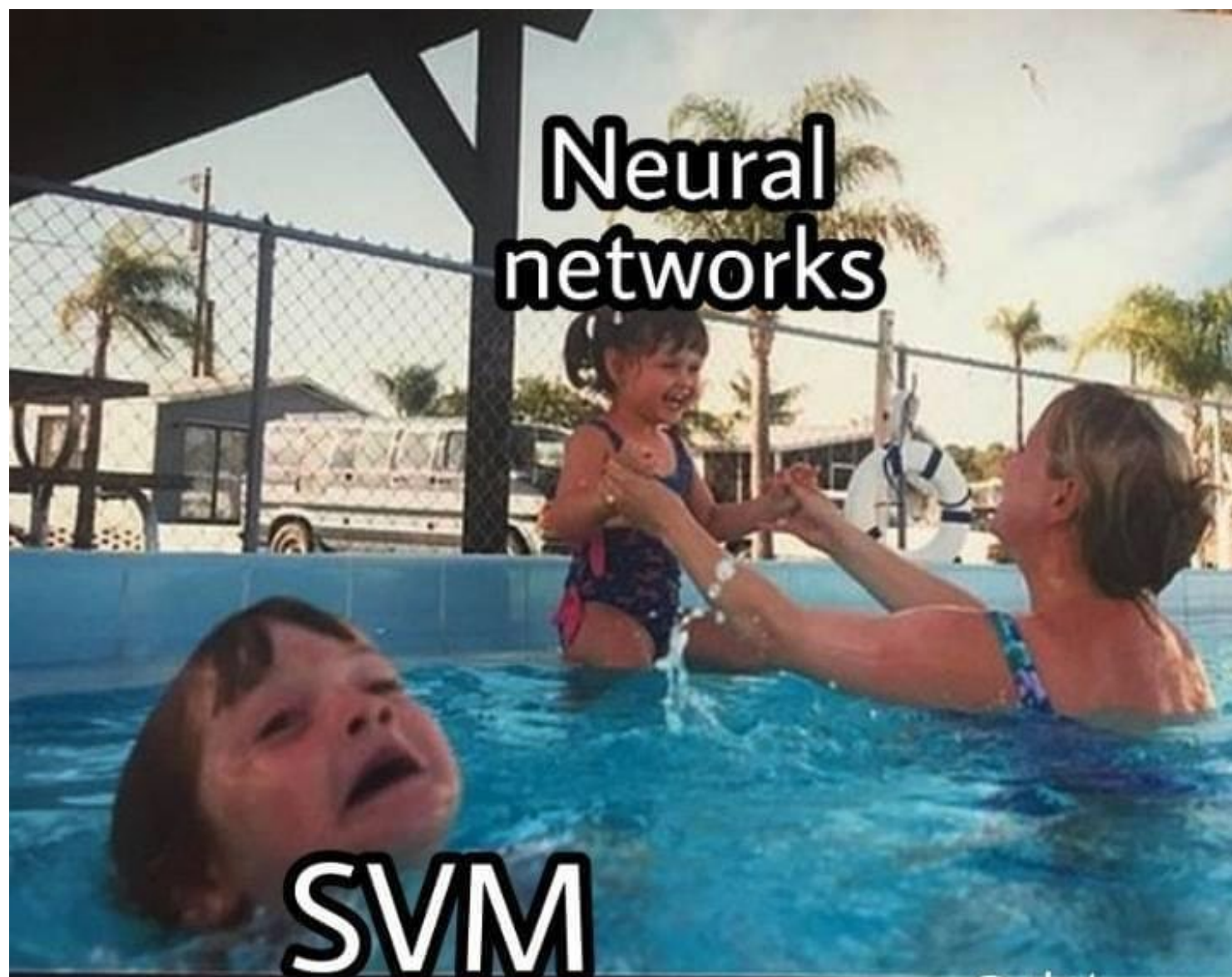


Neural Networks

Forward Pass and Back Propagation

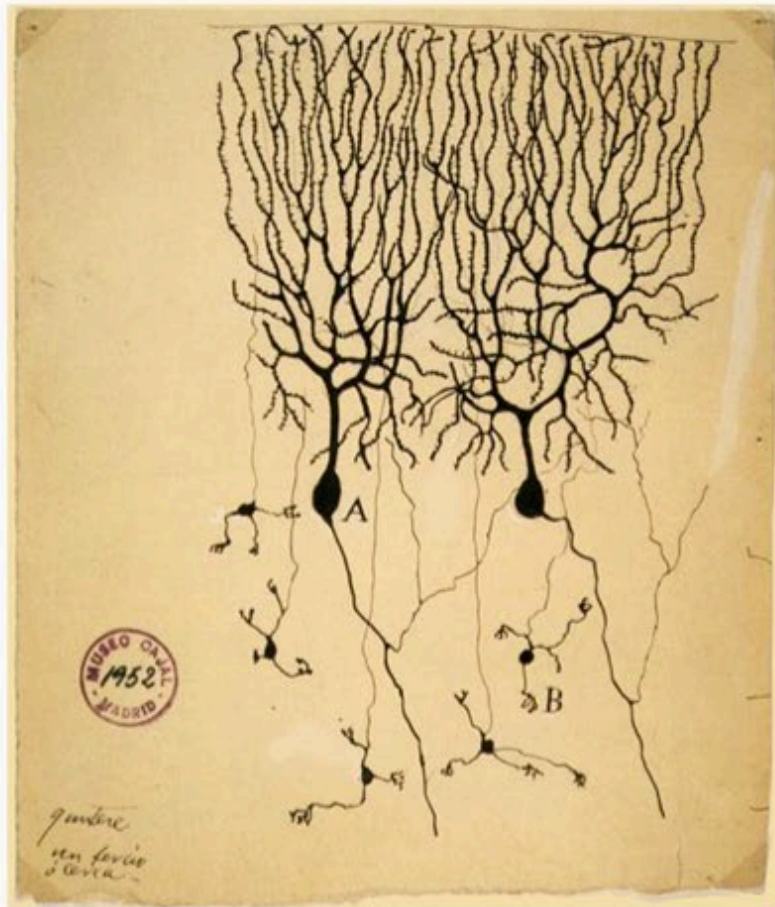
Mahdi Roozbahani

Georgia Tech



Linear
Regression

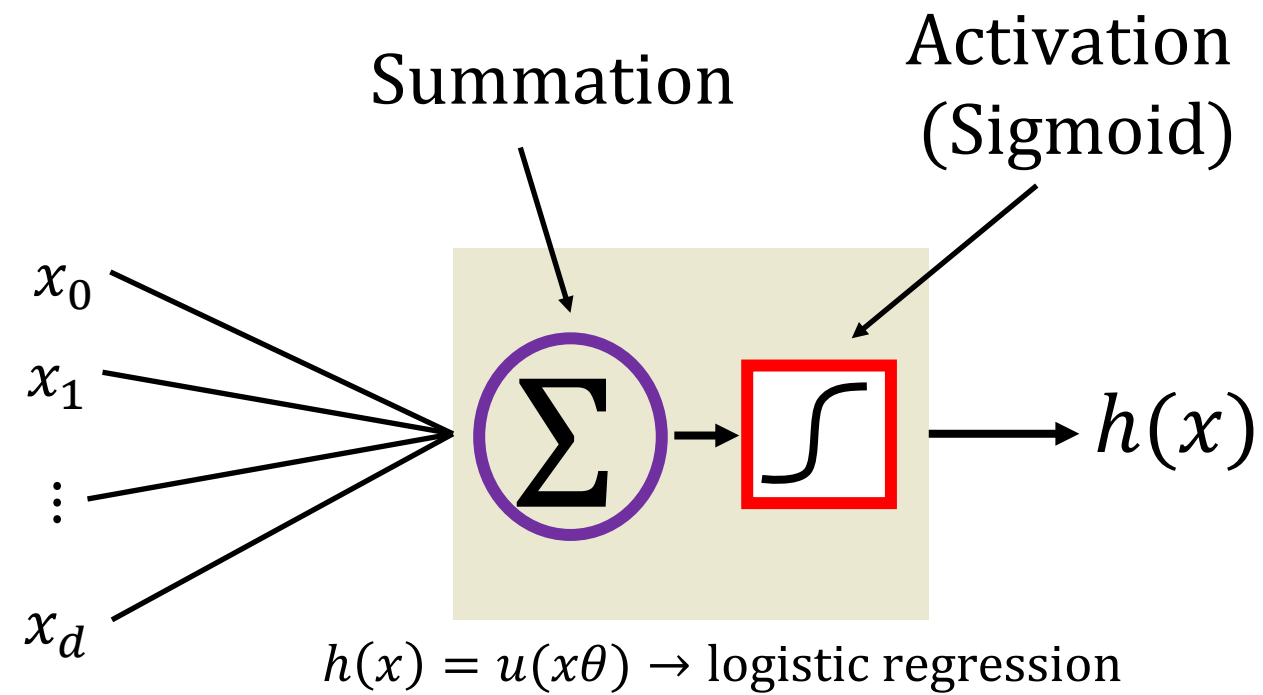
Inspiration from Biological Neurons



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

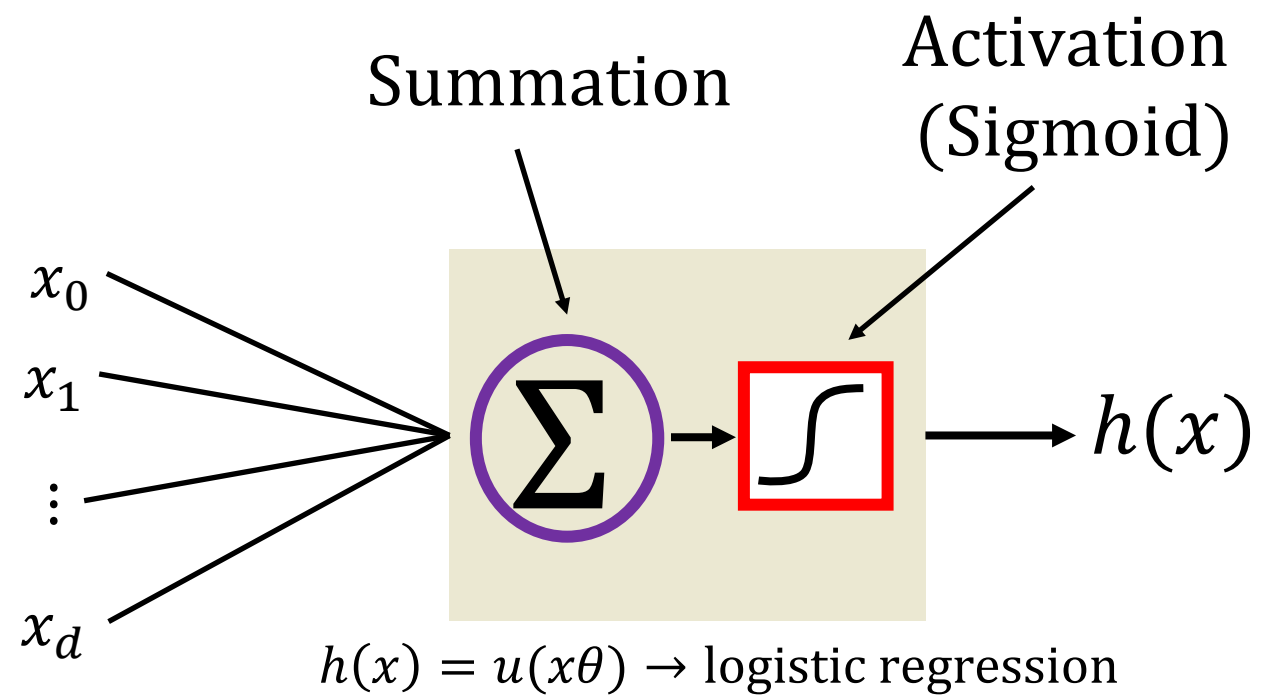
Neurons: core components of brain and the nervous system consisting of

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

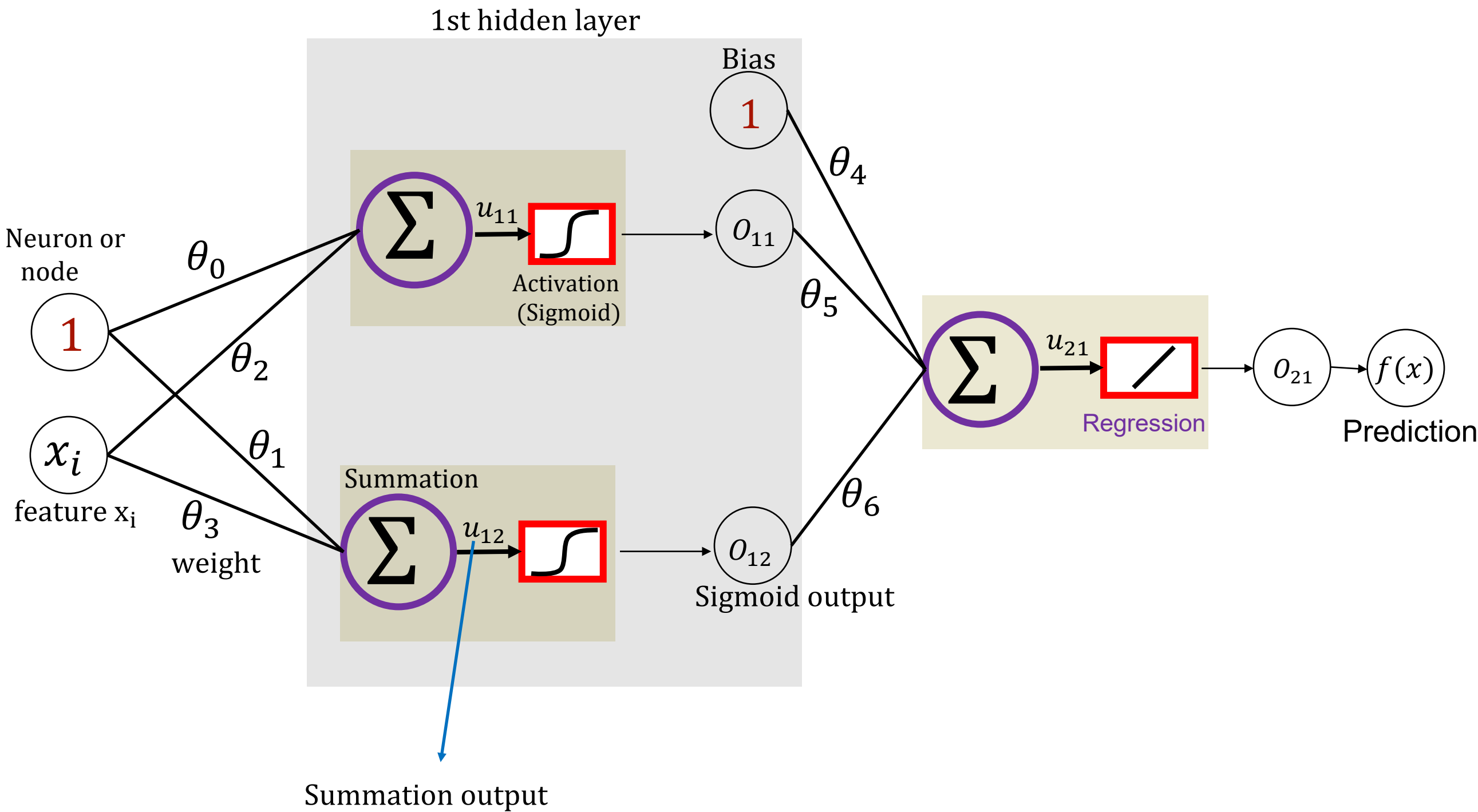
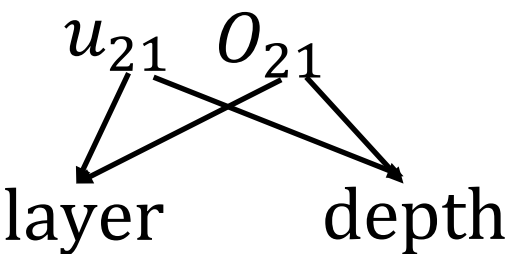


$$\text{output} = \text{activation}(x\theta + b)$$

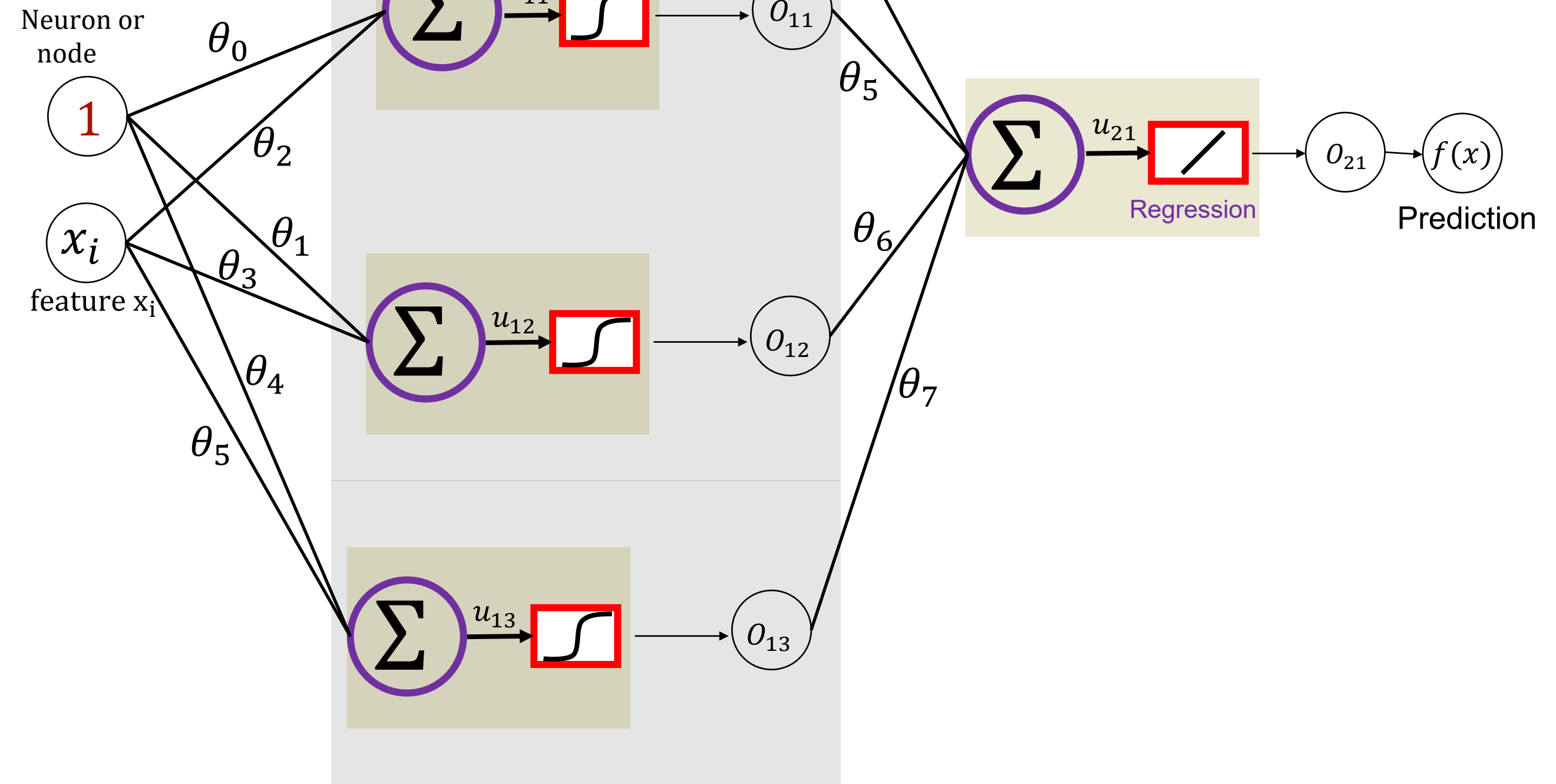
Name of the neuron	Activation function: $\text{activation}(z)$
Linear unit	z
Threshold/sign unit	$\text{sgn}(z)$
Sigmoid unit	$\frac{1}{1 + \exp(-z)}$
Rectified linear unit (ReLU)	$\max(0, z)$
Tanh unit	$\tanh(z)$



NN Regression

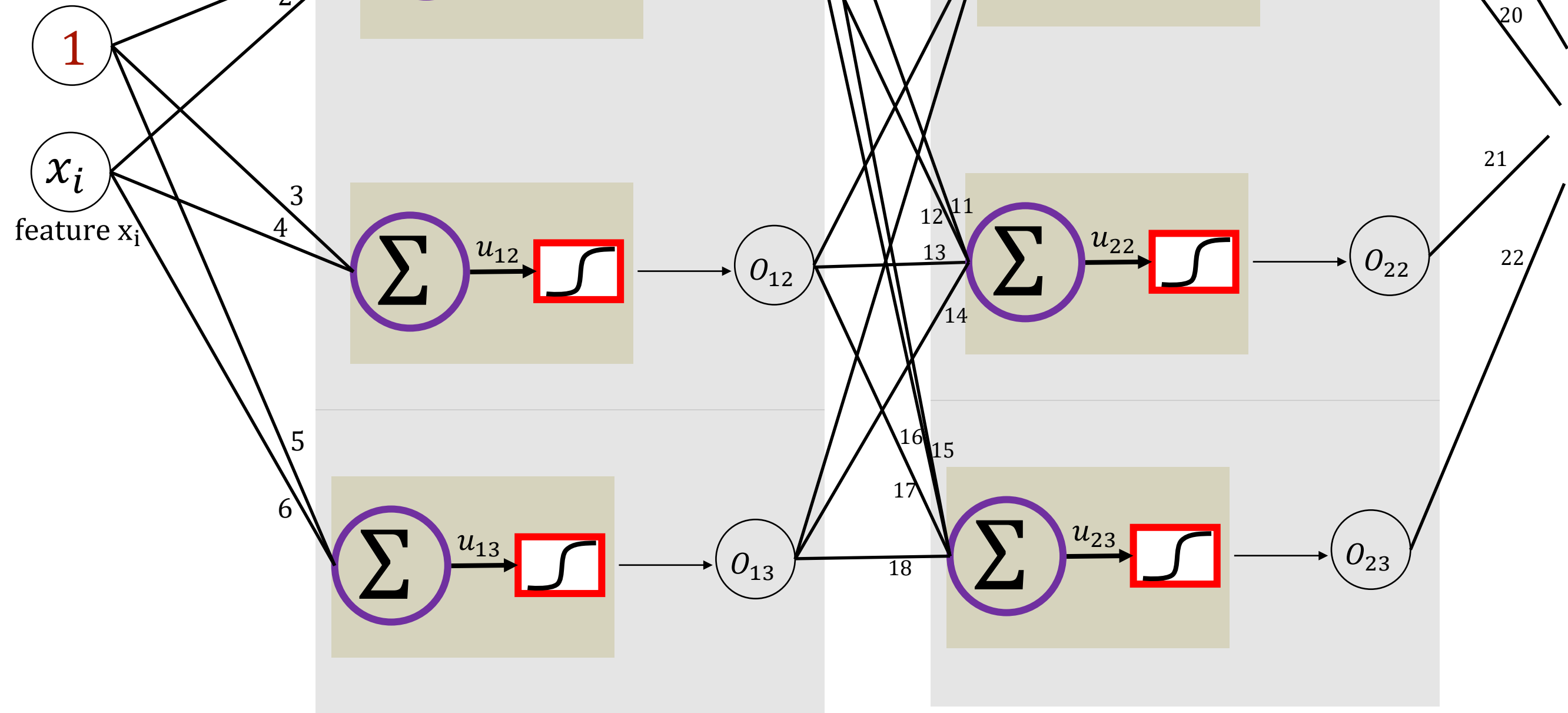


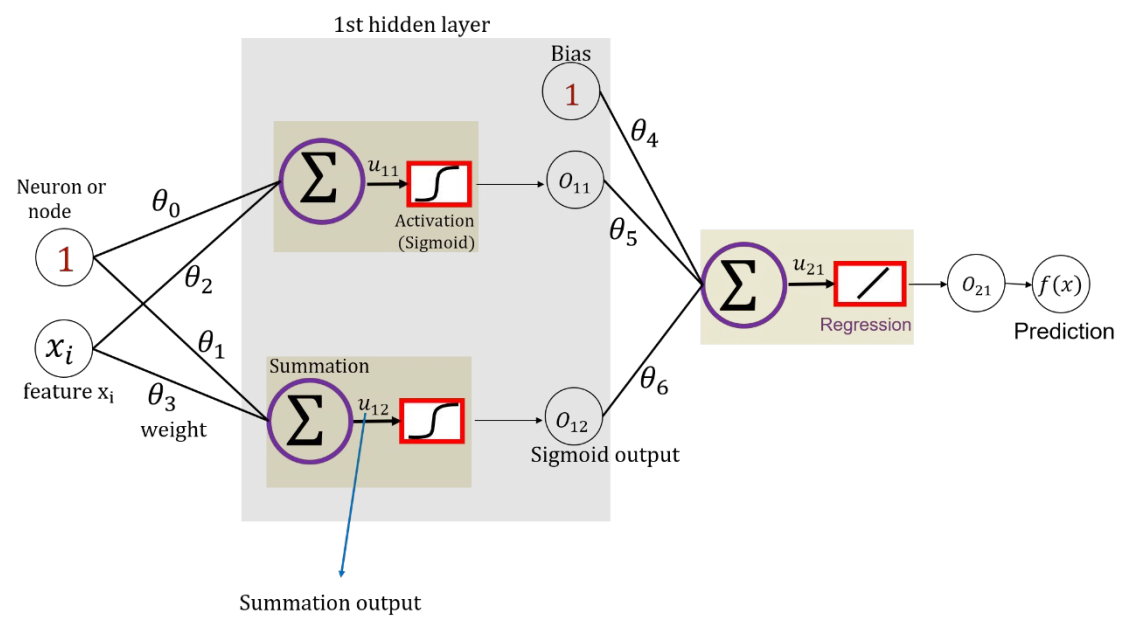
1st hidden layer



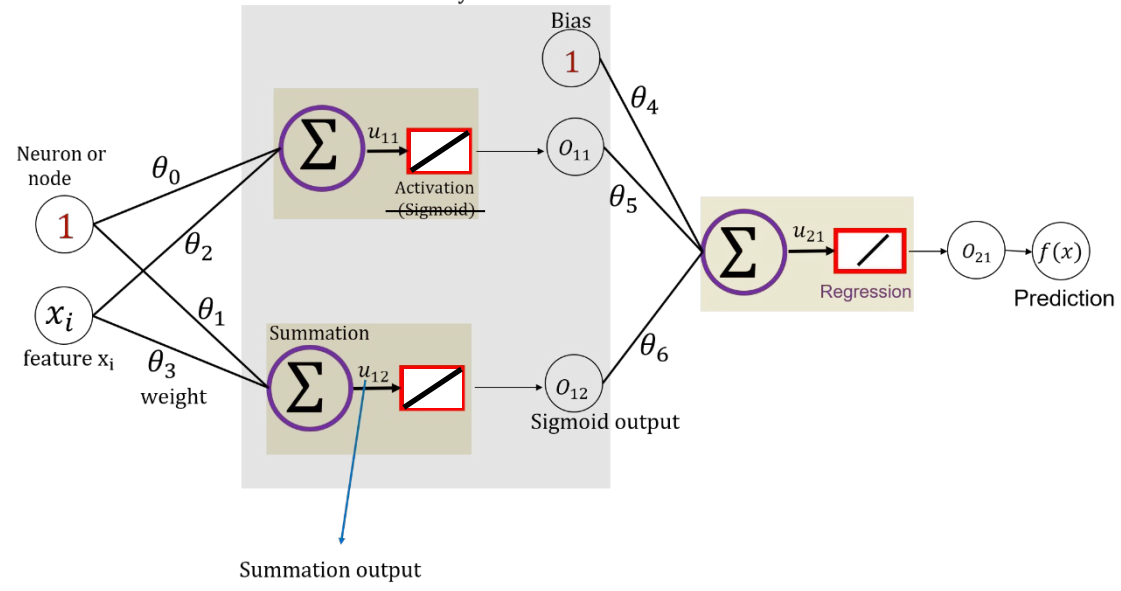
1st hidden layer

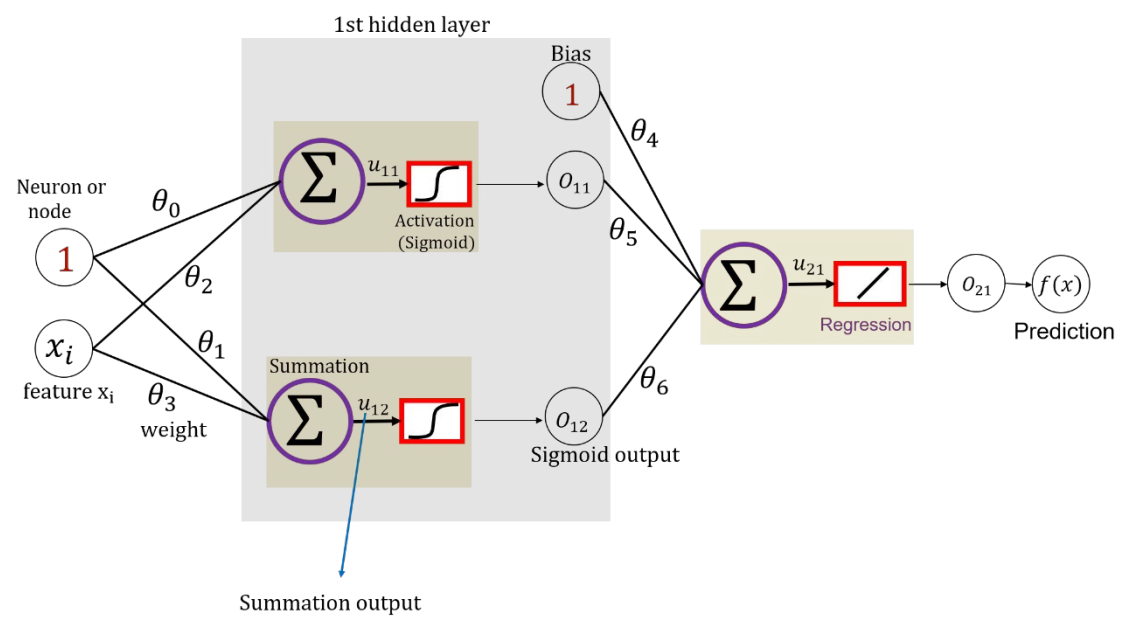
2nd hidden layer

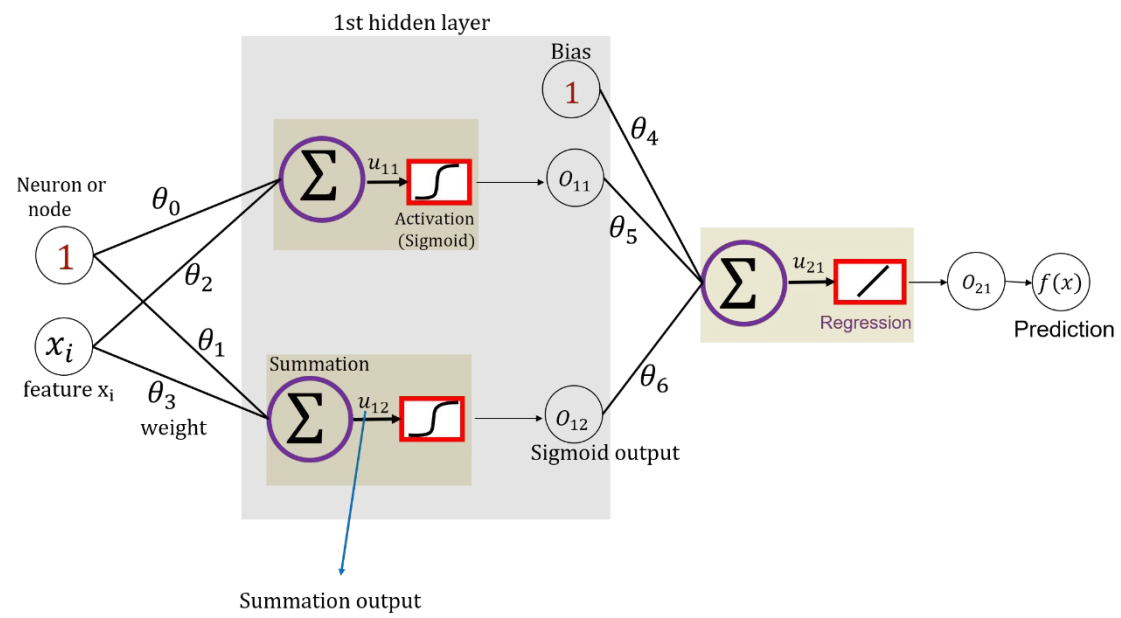
Neuron or
node



1st hidden layer







1st hidden layer

