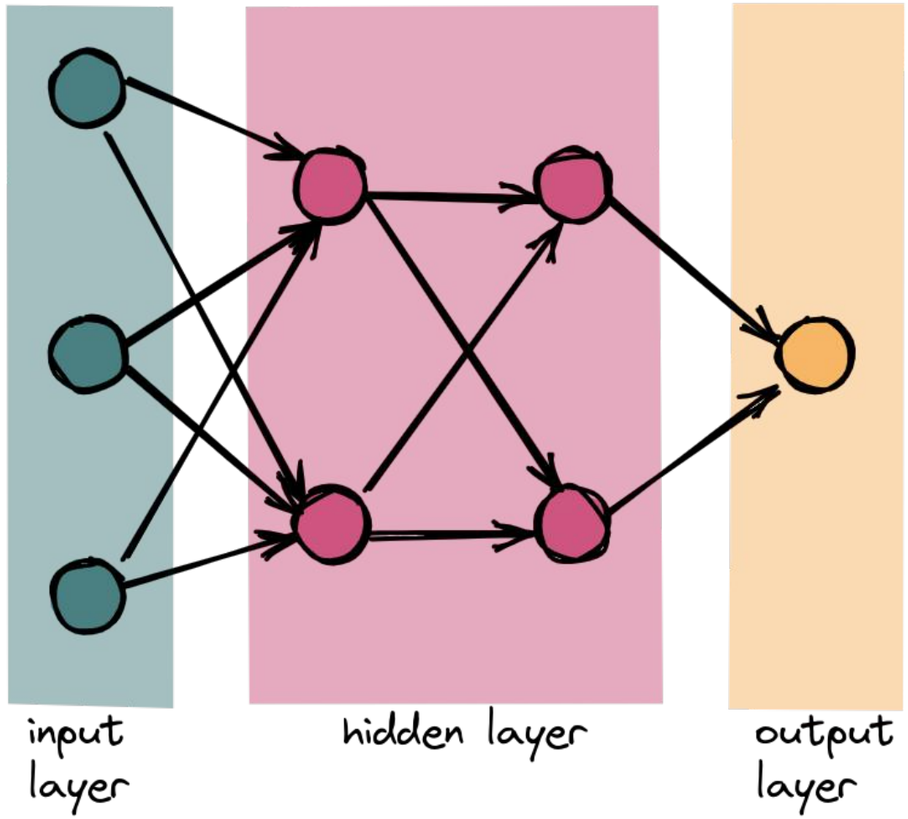


Neural Networks

Week 15

Introduction to Neural Networks

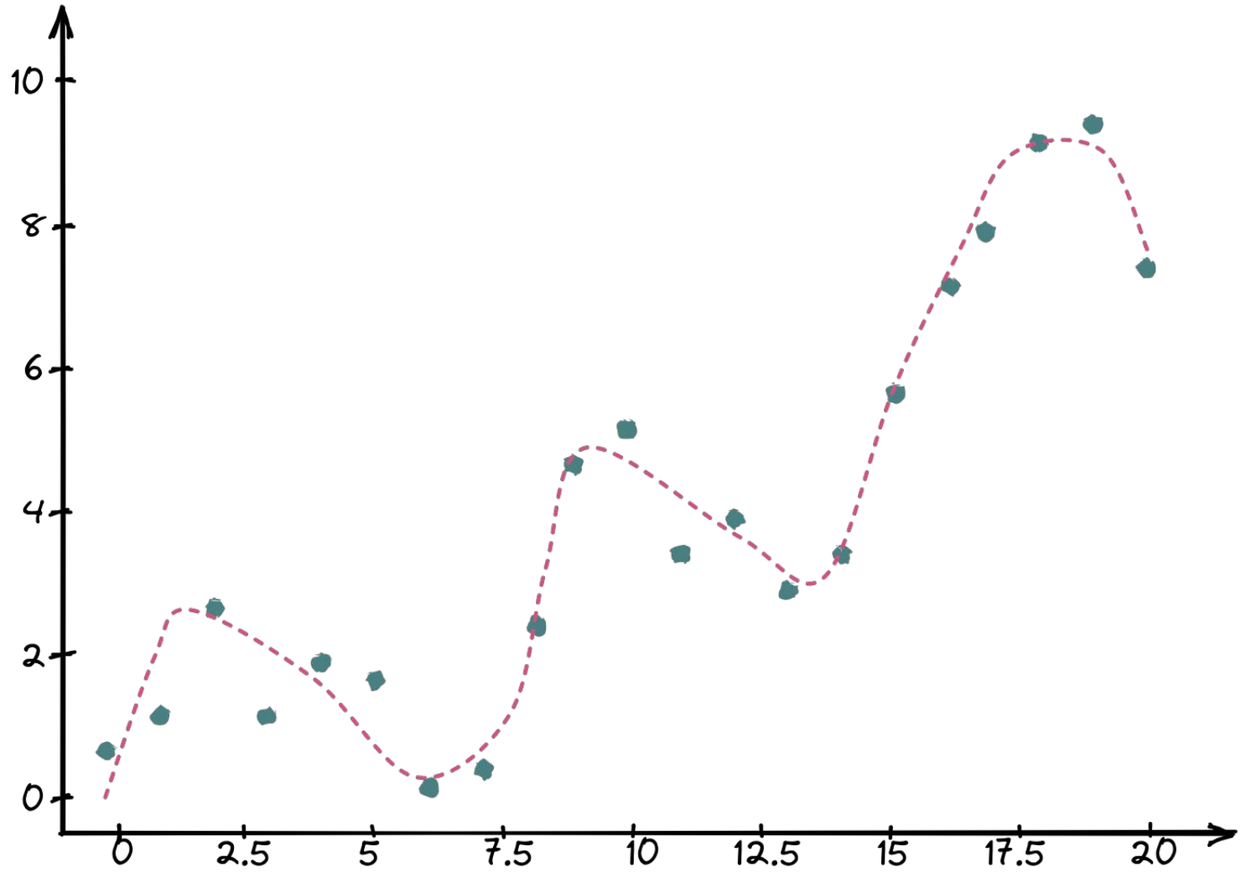
Middlesex University Dubai; CST4050 Fall21;
Instructor: Ivan Reznikov

Neural Networks

Neural networks are an extremely popular ML technique.

Their popularity is the result of high-quality predictions neural networks make.

Methods studied previously allowed us to find N-dimensional dependencies where N wasn't significant. But for most neural networks finding complex fitting curves is possible.

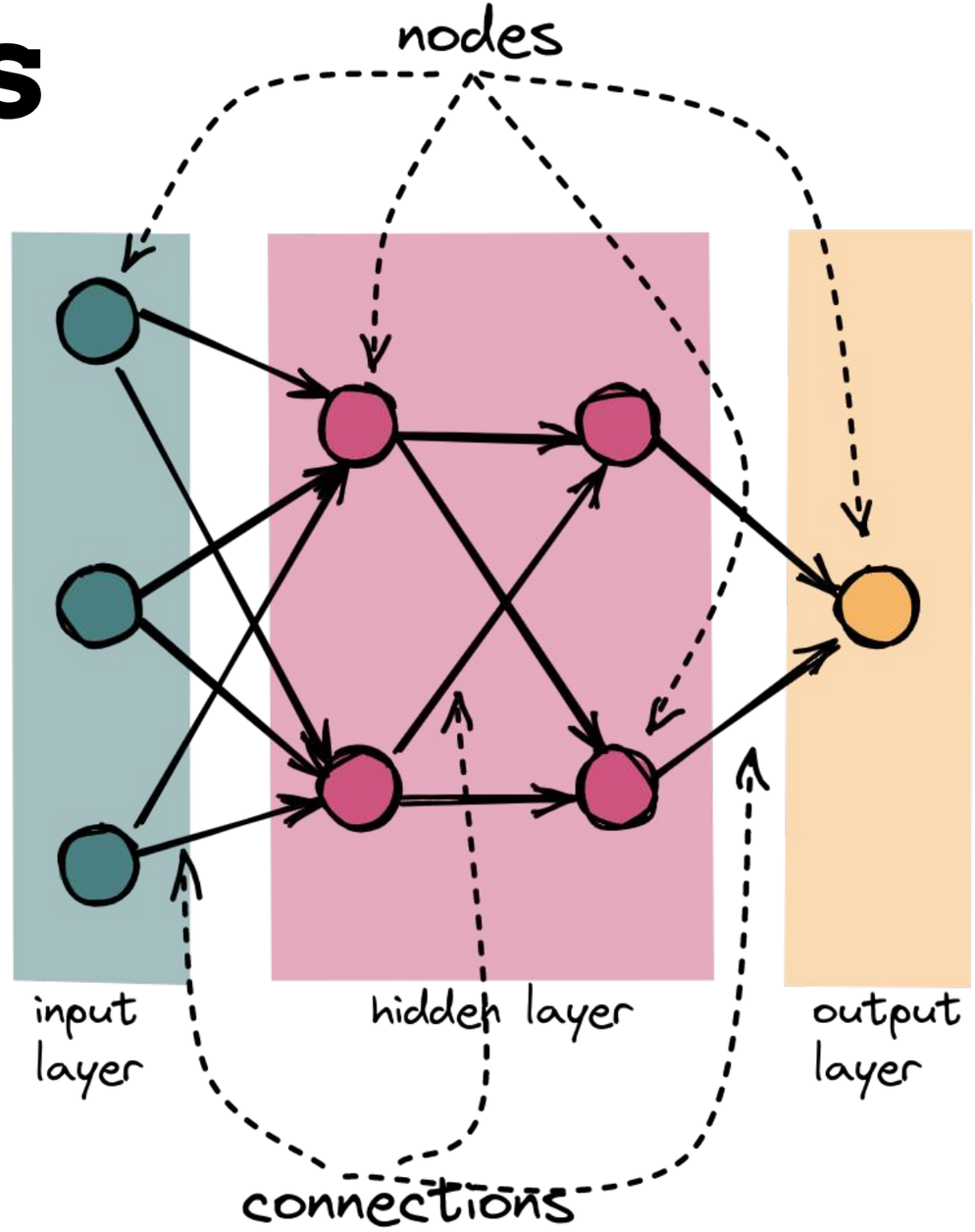


Neural Networks

Modern neural networks have nothing to do with biology.
It's more like the "broken phone" game. But in neural networks, transforming information leads to better results, though.

Neural networks consist of an input layer, one or more hidden layers, and one output layer.

A neural network consists of nodes and connections.

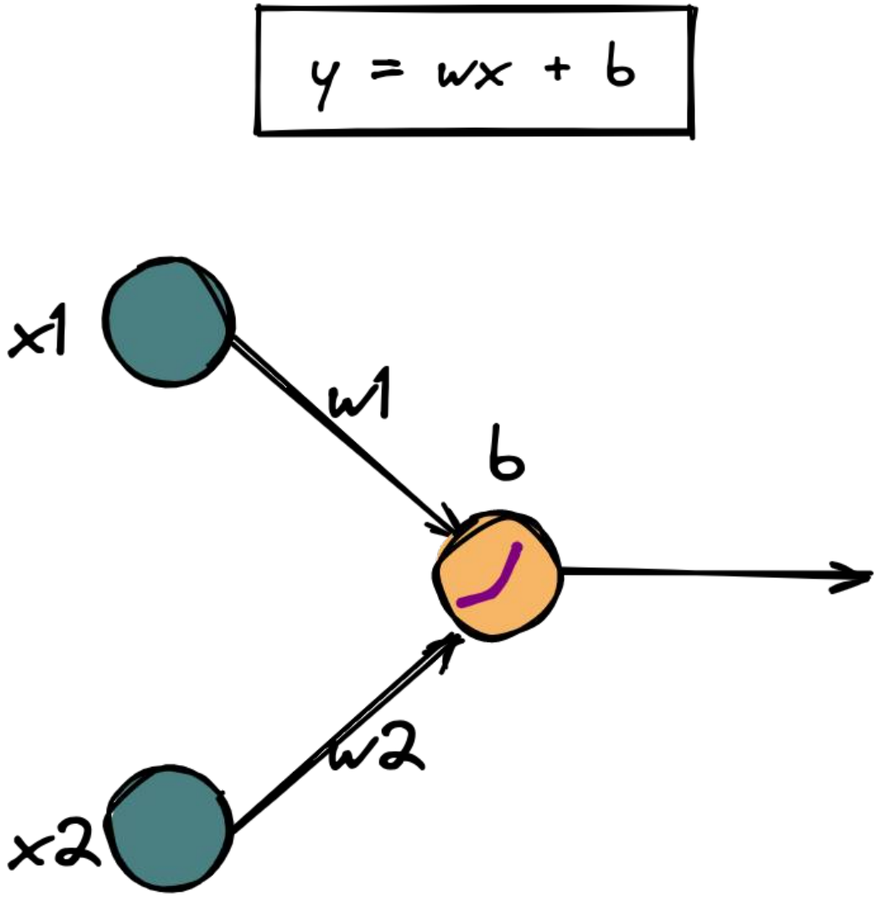


Perceptron

A **perceptron** is a simple unit that takes several inputs, aggregates them, and passes the result through a function to give a single result.

The aggregation is usually the combination of linear equations for different node values. Each child node has its "**weight**," which is summed up with the parents' "**bias**."

As the equation describes the line, we can say perceptron is a linear classifier.

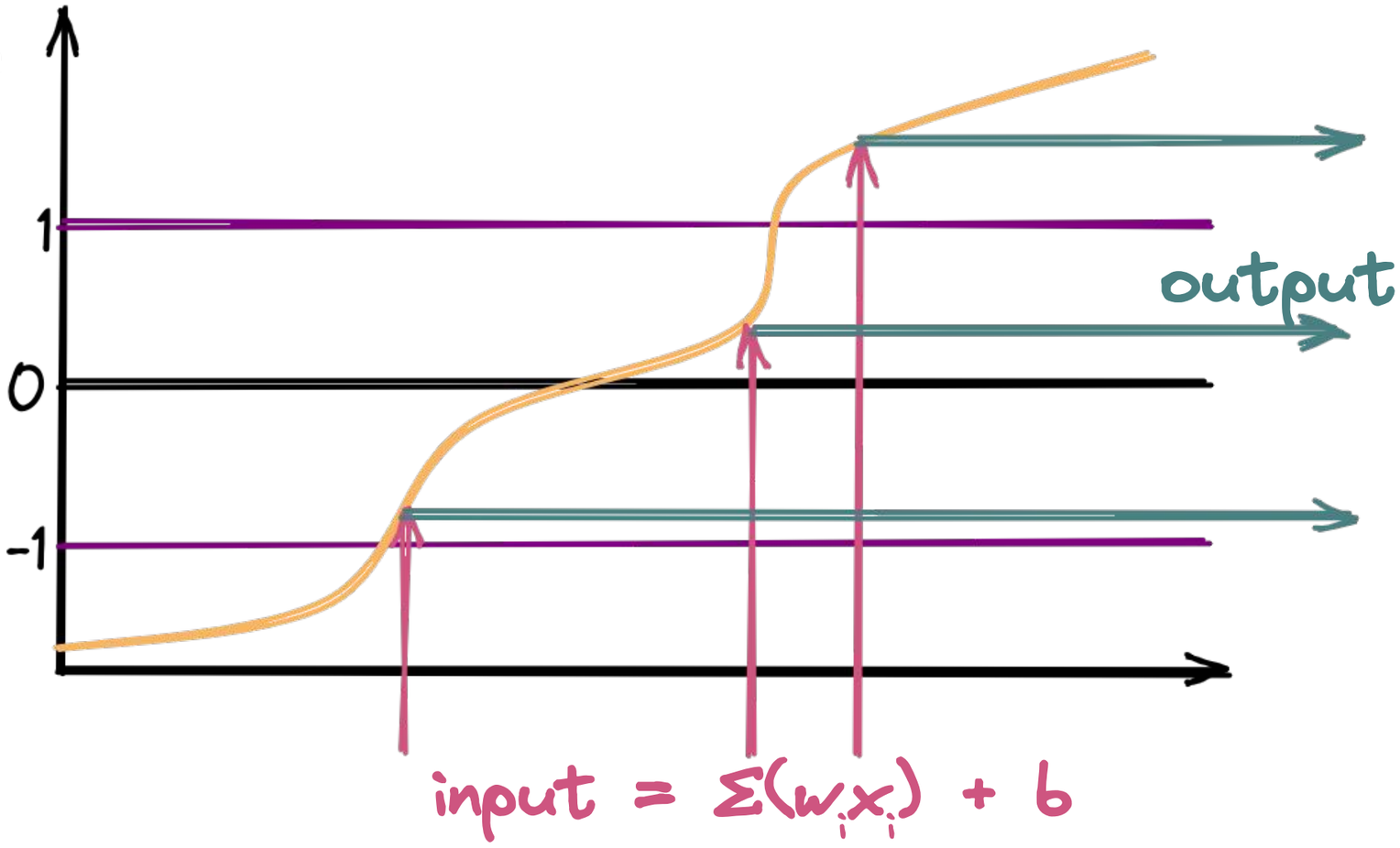


$$y = w_1x_1 + w_2x_2 + b$$

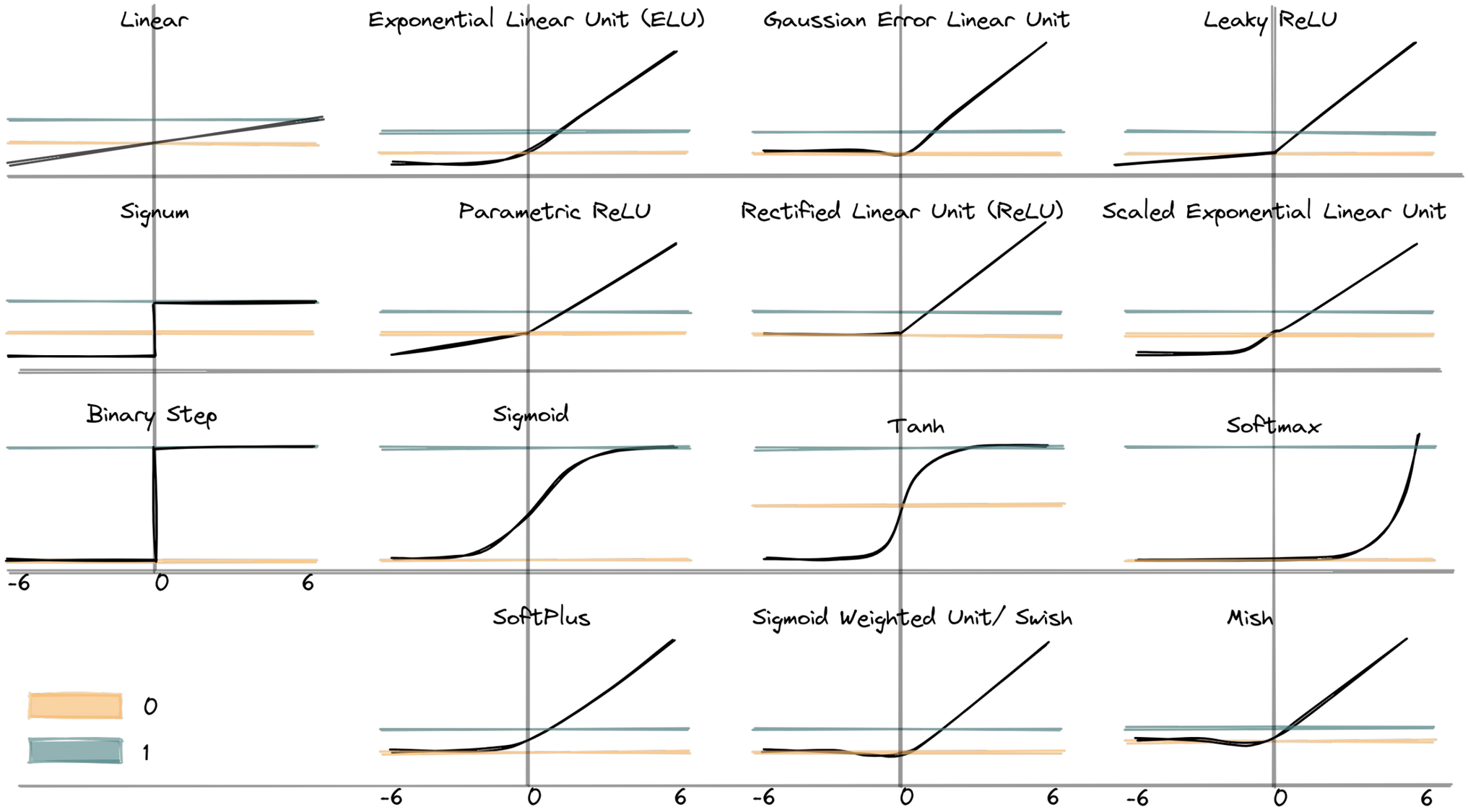
Activation function

An activation function is the key for a neural network to learn complex patterns in the data.

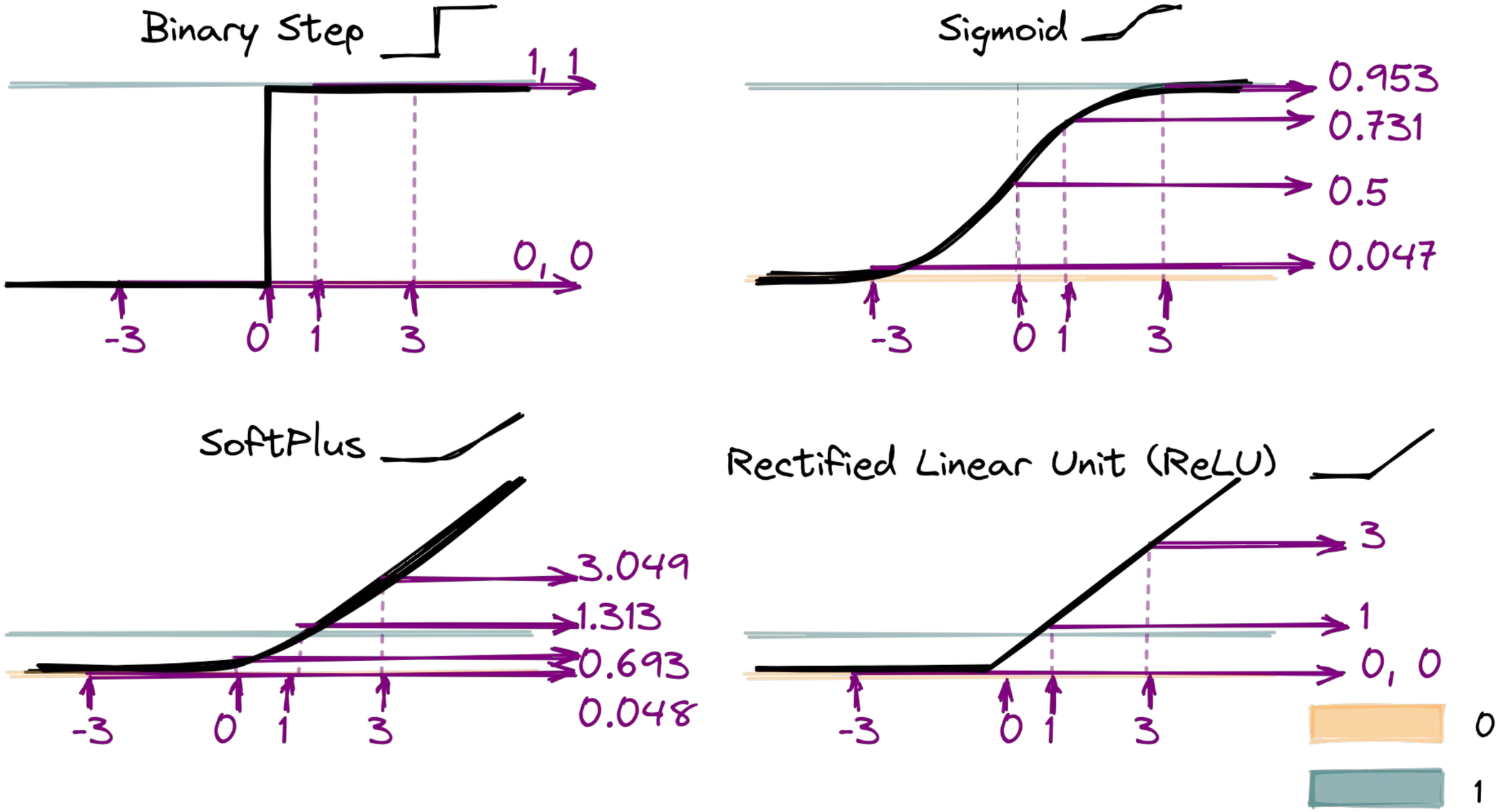
The most crucial ability of activation functions is adding non-linearity to a neural network.



Activation functions



Activation functions: examples



Activation functions: nonlinear

An example of how some linear data can be transferred to non-linear dependencies is shown on the example of several activation functions on the range [-6, 6]