Intro

An Artificial Neural Network (ANN) is an information processing paradigm that is inspired by the way biological nervous systems, such as the brain, process information.

The key element of this paradigm is the novel structure of the information processing system. It is composed of a large number of highly interconnected processing elements (neurones) working in unison to solve specific problems.

ANNs, like people, learn by example. An ANN is configured for a specific application, such as pattern recognition or data classification, through a learning process. Learning in biological systems involves adjustments to the synaptic connections that exist between the neurones. This is true of ANNs as well.

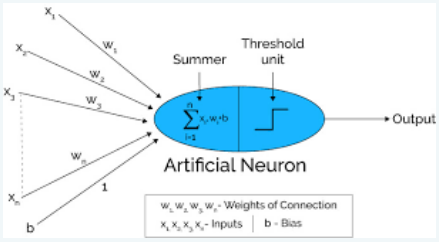
Advantages

Adaptive learning: An ability to learn how to do tasks based on the data given for training or initial experience.

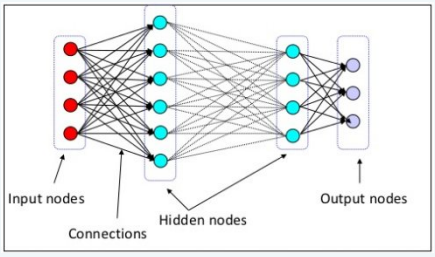
Self-Organisation: An ANN can create its own organisation or representation of the information it receives during learning time.

Real Time Operation: ANN computations may be carried out in parallel, and special hardware devices are being designed and manufactured which take advantage of this capability.

Neural Model



Neural Net



Learning Process

Activation Function

Each neuron has an activation function that defines the output of the neuron

The activation function is used to introduce non-linearity in the modeling capabilities of the network

forwardpropagation

occurs when the network is exposed to the training data and these cross the entire neural network for their predictions (labels) to be calculated.

loss function

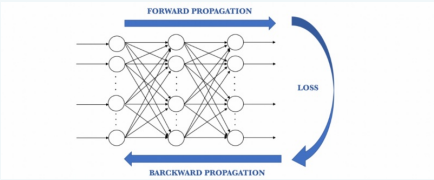
to estimate the loss (or error) and to compare and measure how good/bad our prediction result was in relation to the correct result (remember that we are in a supervised learning environment and we have the label that tells us the expected value). Ideally, we want our cost to be zero

as the model is being trained, the weights of the interconnections of the neurons will gradually be adjusted until good predictions are obtained.

backpropagation

Once the loss has been calculated, this information is propagated backwards.

Visual Scheme



Learning process of one perceptron