

Artificial Neural Network

Artificial neural network (ANN) models have been studied for many years in the hope of achieving human like performance .ANNs represent a technology that is rooted in many disciplines: neurosciences, mathematics, statistics, physics, computer science and engineering.

ANN is a system loosely modeled on the human brain. The field goes by many names, such as connectionism, parallel distributed processing, neuro-computing, natural intelligent system, machine learning algorithms and artificial neural network. It attempts to simulate within specialized sophisticated hardware. It is also defined as a computing system made up of a number of simple highly interconnected process elements which processes information by its dynamic state response to external input. Each processing element (neuron) makes its computation based upon a weighted sum of its input. The processing.

A general neuron model is illustrated in . It may be known by the following five elements: the nature of its input, the function of input which defines the preprocessing performed on its input, the activation function, the function of output which determines the neuron output as a function of its activation state. The inputs of neuron may be binary, with a value of (-1, +1) or (0, 1), or they may be continuous, or real number.

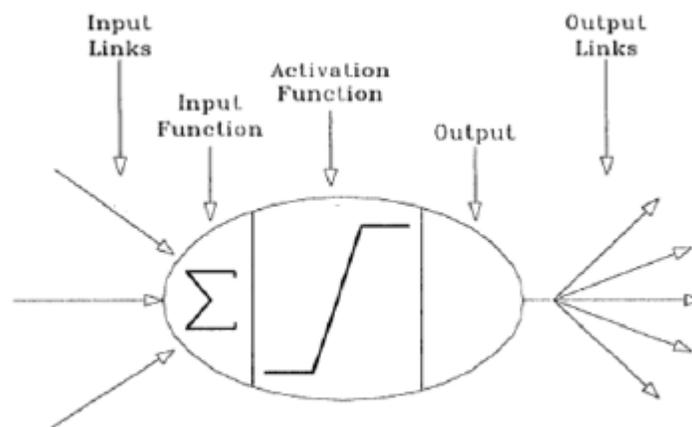


Fig. (2-8) Model of a Neuron (Node) [71].

An activation function takes the neuron input values and produces the values which become the output values of the neuron. These values are passed to other neurons in the network. A neuron is linked to other neuron via its input and output links. Every incoming neuron has an activation value, and every link has a weight associated with it. The neuron sums the incoming weighted values, and these values are input to an activation function. The output of the activation function is output from the neuron.

The neural net have training algorithm. The algorithm is a procedure for modifying the weights on the connection links in a neural net, also known as learning algorithms or learning rules Training strategy includes adjusting the weights, modifying the weights, and adding to weight a proportion of that training pattern

According to studies, a multi-layer feed forward neural network has more than fifty percent of applied studies reported in Neural Network that have been utilized with laws of propagation learning algorithm.

The back-propagation neural network is one of the most historical developments in neuro computing. It is a powerful mapping network that has been successfully applied to a wide variety of problems ranging from credit application scoring to pattern classification and recognition.

The implementation of back propagation algorithm thus involves a forward pass through the layers to estimate the error at the output, then the error is fed to backward to change the weights in the previous layer and this goes on for all the proceeding layers. Learning algorithm for back-propagation neural network has several steps for achieving it.

There is an operational problems encountered when trying to simulate the parallelism of neural network on sequential machines, such as rapid increase in processing time requirements as the size of the problems grows. The implementation of neural network directly in hardware will enable the true exploitation of the network's parallelism, but it may lose much of flexibility of software simulations. Because neural networks work as we believe the human brain does, they don't handle numbers well. Accuracy, computational power, and logic are not among their strong points. And, when they operate as "black boxes", their rules of operation are completely unknown.