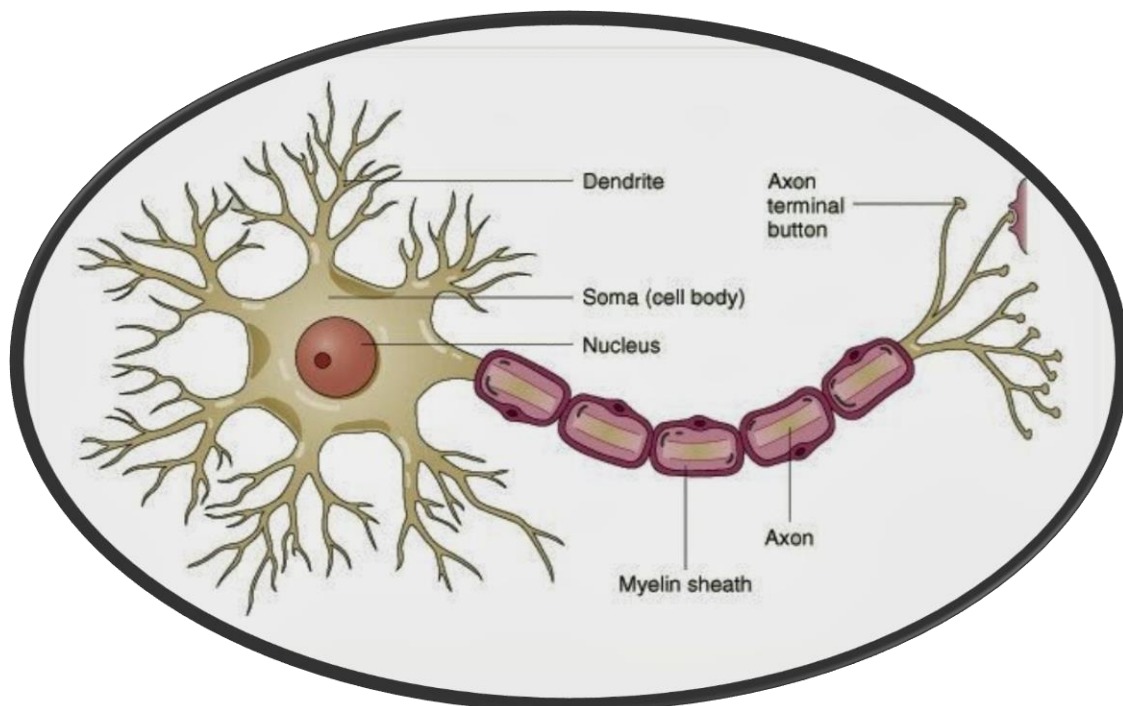


Artificial Neural Networks

(A.N.N)

Introduction:

Computational techniques are designed to simulate the way in which the human brain performs a specific task, through massive parallel processing, distributed, and is made up of simple processing units, these units are only elements of the calculation called (Nodes , Neurons) which have a nervous property, from where they store experimental practical knowledge and information to make it available to the user and by adjusting the weights.



Shape (1)

If ANN similarity with the human brain in the knowledge they gain training and store this knowledge using powers arrived within neurons

called weights interrelation. There is also a similarity nervous vital, giving the opportunity for scientists biology rely on ANN to understand the evolution of dynamic phenomena. One of the reasons outweigh the human brain lies in its ability to handle data in the form of structural in the sense that every part of his brain function and oversees the work another part manages his work and can change the action parts is called plasticity and each part of the brain works separately from the other as if it were a computer that has a very large number of processors, computers today are simulated this process in the so-called parallel computing, in spite of the high-speed resulting from this technique, but it lacks the ability independence to solve the problem, because the computer will automatically send mail too much data in digital form between each of its parts either brain who shall work in the digital image in some and other locations in the form of analog and the computer sends a large number of redundant data, but the brain to does not send repeated statements.

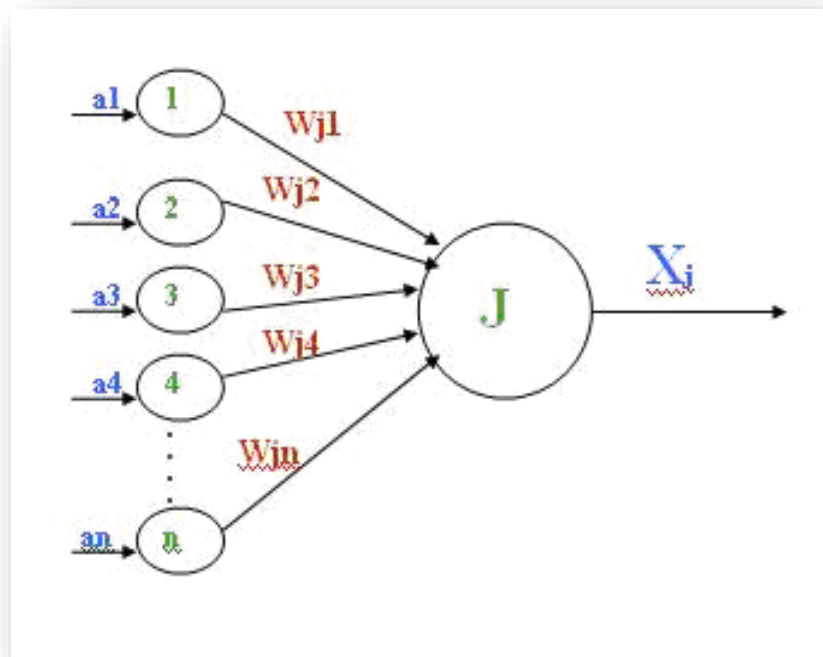
History :

In the fifties of the twentieth century has IBM's first attempt to simulate the nerve cell, and succeeded after several failed attempts, but the computer science at the time the account is heading sequential hand, which led to the neglect of the subject of nerve cells and put in drawers. At the end of the fifties, Frank Rosenblatt began work on what is called today Balpercypetron, where he was able to separate the recoverable points of separation without a written non-points to separate writing. This was considered a huge flaw in Balpercypetron. In 1959 he and Bernard Vedro Markian Hov building typical adaptive linear element This was the first appearance of neural networks in its current form. was used as filters and adaptive filter for echo cancellation of telephone lines, and is still used commercially until this time.

Artificial neural network components:

As we have seen that the neural networks consist of a set of processing units called one neuron, and shape (1) shows the model is not in writing and simple artificial neuron. The human units enter his conception of the outside world, which is the five senses, so neural networks need to enter units. The treatment units are the calculations adjust the weights and get through the apostasy appropriate action for each input to the network.

Units are to be input layer called input layer, and processing units to be treated by a layer graduated network outputs. And the class of these layers there is a layer of interfaces that link layer class that followed and in which the set of weights for each interface, the network includes only one layer of input units, but may contain more than one layer of processing layers.



Shape (2)

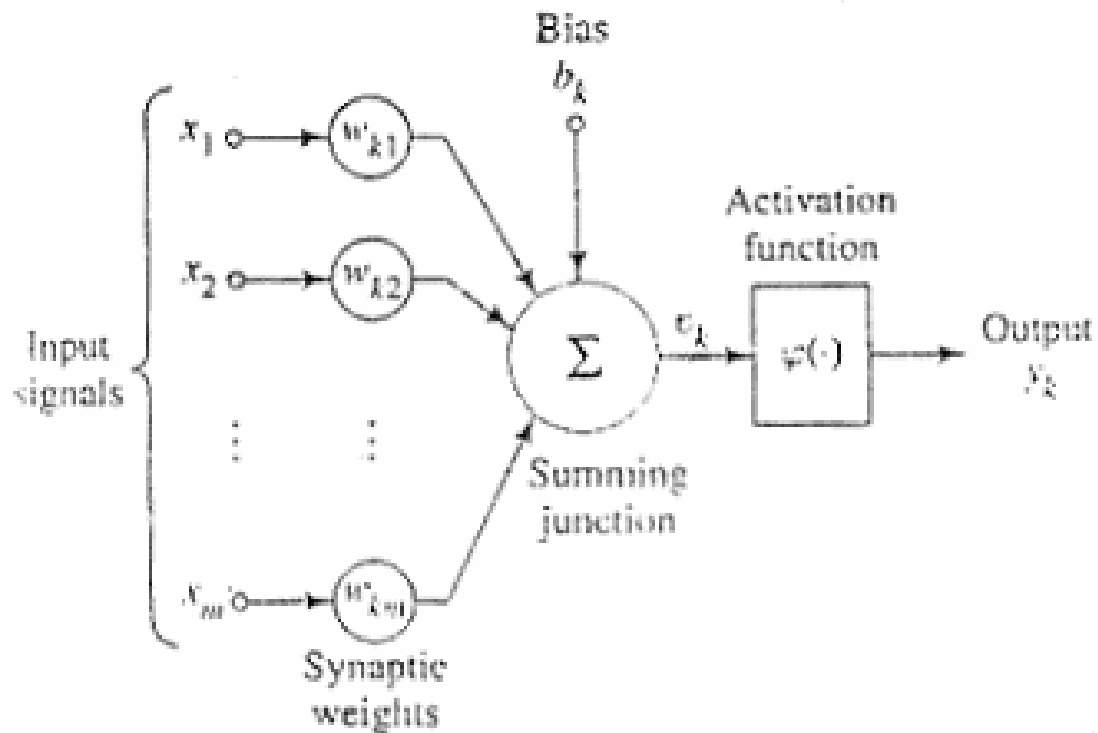
Note from figure (2) that the neuron consists of :

- 1 - input signals ($a_1, a_2, a_3, a_4, \dots, a_n$) .
- 2 - The forces of weights ($W_{j1}, W_{j2}, W_{j3}, W_{j4}, \dots, W_{jn}$) . Where crosses weight correlation between the intensity of element before and after the element.
- 3 - Processing Element (J) this element is divided into two sections :
 - a- (Adder) to collect signals in the weighted income.

b- Continued transport or continued activation. This limits the output of the neuron so-called continued damping (Squashing) which makes the output within the domain $[0,1]$ or within the domain $[-1,1]$

4- Output (X_j).

Mathematical description of the neuron :



Where:

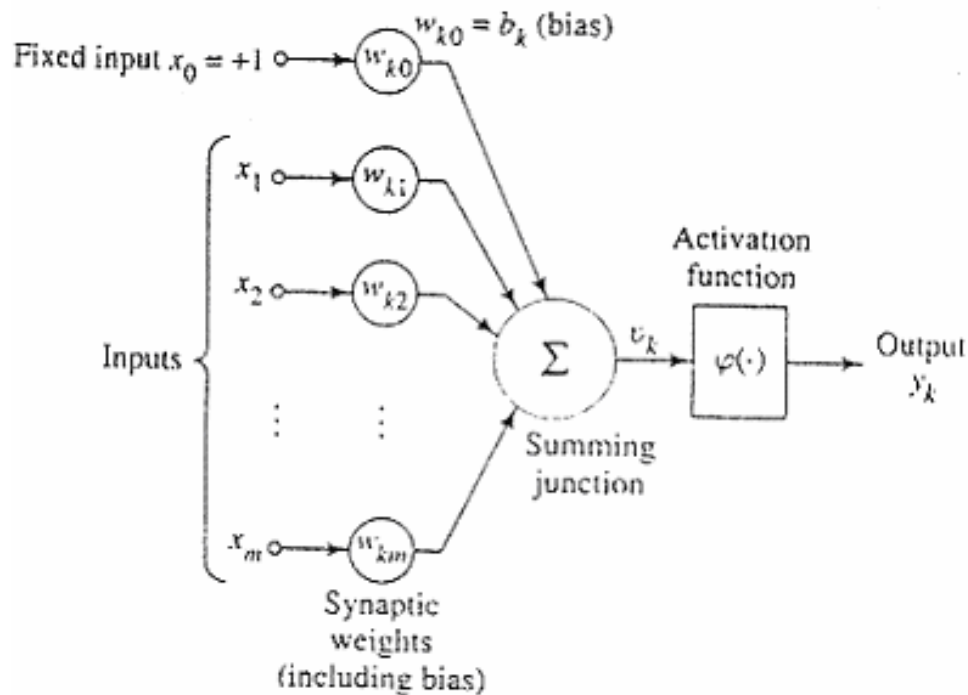
input signals (x_1, x_2, \dots, x_m)

Synaptic weights ($w_{k1}, w_{k2}, \dots, w_{km}$)

summing junction (Σ)

Bias (b_k)

Note: can be considered aligned(b_k) as a weights (w_0) and income ($x_0 = 1$) and become a neuron model as follows



Types of Artificial Neural Networks:

1- With the front nutrition Neural Networks

They networks which installed without the presence of a closed loop of the linkages between its constituent units. These networks are among the most commonly used networks, where the network of this type of at least two layers consist, as found in the often hidden layers between the input layer and output layer, and move the calculations in one direction forward from the input layer to the output layer through the hidden layers.

2- Feed Back Neural Networks

A network that you find a way to output backwards again to become the input to give the best possible results.

3 - Neural networks with self-bonding

They networks, which plays all its constituent elements exemplary role, is to receive input and transmit the output at the same time.

Learning in artificial neural networks algorithms:

Learning algorithms in artificial neural networks aims to determine the value of the weights of the network through training in one of the following three ways:

1 - Supervised Learning.

Learning depends observer artificial neural networks on the idea of offering training data to the network in the form of a pair of patterns called the input pattern and the pattern of output and both of them linked to the outputs of a target and use the network the difference between the network output and real output in the "Delta" error function used by then in modifying the weight calculation to minimize the difference between the outputs of the network and the real output, and is adjusted weight to find the best results using a function updated weights or learning function.

2- Unsupervised Learning.

The self-learning neural networks, artificial methods on the basis of their ability to exstrophy distinctive features of the structure of the input through a series of data are disseminated to the rest of the output, without prior knowledge and without displaying examples of what should be produced, as opposed to the practice principle in learning the technique of controlled in the sense that neural networks, the ability to self-regulation of weights and their Interaction conditions excitation elements according to the nature of what is being offered from patterns.

3-Learning to re- . consolidation

The consolidation process on the basis of confusion between the learning method and learning under the supervision of an observer of others, does not explain where the neural network of the real values of the outputs as in learning without supervision, but referred to the network health consequences or mistake as in the way of learning under the supervision.

Algorithms Education Network:

The weights represent the initial information that you will learn the network, so you do not need to be updated weights during the training phase, and for this update uses several different algorithms depending on the type of network. The most important of these algorithms algorithm reverse spread(Algorithm Back Propagation) which are used in the training of a complete neural networks the link with the front and multi-layered and non-linear nutrition, and this algorithm is considered generalization of the method of training error correction pattern. And the implementation of this algorithm through two major phases, namely:

1- Feed forward Back Propagation

2-Back Propagation.

Feed forward Back Propagation.

It does not get any amendment to the weights of synaptic and this stage start showing form the entrance of the network, where he majored element treatment of layer input elements of a beam components, which represents income, causing components values destined income excitability units input layer followed by a spread in front of me for those arousal through the rest of the network layers.

Back Propagation.

It set the stage weights network. The standard reverse spreading algorithm is a progressive regression algorithm, which allows the network to move the weights on the negative side of the continued performance. the role of reverse spread due to the way in which the tendency for multiple network layers nonlinear account, where it is one of the stages of education in the redeployment of the signal from the output to income in reverse, which is set weights network, and can be represented by the algorithm to repeat one.

There are two ways to calculate the gradual decline:

First, Incremental mode :

In this method the tendency account and then adjust the weights after each income gives network.

Second, Batch mode :

According to this pattern provides the network with all income rays before doing the process of upgrading the weights and can therefore say that the weights and biases in this way adjusted after the network to provide the full range of training as the orientation calculated in example training added to each other to determine changes in the weights and biases.

