

## History of Neural Networks

The neural networks have gradually evolved thanks to two fundamental aspects that are the innovation and the implementation that working together have made progress in this area.

The first studies about the Neuronal networks were given in the late nineteenth and early twentieth century with the work of scientists such as Hermann von Helmholtz, Ernst Mach and Ivan Pavlov, in the areas like physics, psychology and neuropsychology however these advances are not were very related to the computational aspect. [1]

It was in 1936 that Alan Turing came to the conception of studying the brain through a relationship with the computational aspect, with this work could be modeled in 1943 a simple neural network with electrical circuits, the designers of this network were Warren McCulloch a neurophysiologist and Walter Pitts a mathematician.

Subsequent to these events in 1949 Donald Hebb wrote "The Behavior Organization" in which he explained the learning processes by mentioning that learning occurred when certain changes in a neuron were activated.

For the year 1957 Frank Rosenblatt developed the concept of the perceptron neuron with which he could recognize patterns even though they had not been presented before, however in his book "Principles of Neurodynamics" written 2 years later he shows its limitation of not being able to solve nonlinear systems since it had a convergence towards a finite state as was the case of an Xor. [2]

A short time after the development of the perceptron neuron in 1960 Bernard Widrow and Marcial Hoff developed the Adaline model with which they solved the problem of the echoes in the telephone lines, but in both cases they failed to solve the limitations of their neural networks, having a pause in the development of this area.

In 1974 Paul Werbos retook this area with his backpropagation algorithm which was improved in 1986 by David Rumelhart and G. Hinton. In 1977 Stephen Grossberg published his Adapted Resonance Theory (ART) that can mimic the short- and long-term memory of the brain.

The event that marked the true resurgence of neural networks was the publication of the book "Neural Computation of decisions in optimization problems" of John Hopfield in which used statistical mechanics to explain the neural networks. [3]

## Bibliography

[1] M. T. Hagan, H. B. Demuth, M. Hudson Beale y O. de Jesús, Neural Network Design, Publishing company, 2014.

[2] J. M. Zurada, Introduction to Artificial Neural Systems, West publishing company, 1992.

[3] J. Gomez Perdomo y F. González Osori, Curso de Redes Neuronales, Colombia: Universidad Nacional de Colombia, 1998.