Perceptrons: An Overview

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March 30, 2018

"We expect the perceptron to be the embryo of an electronic computer that will be able to walk, talk, see, write, reproduce itself and be conscious of its existence." - The New York Times, 1958.

1 Introduction: What is a Perceptron?

The perceptron is an algorithm for learning a binary classifier: a function that maps its input x (a real-valued **vector**) to an output value $f(x)$ (a single binary value). Shown below is a mathematical definition:

$$f(x) = \begin{cases} 1 & wx + b > 0 \\ 0 & otherwise \end{cases}$$

2 Workings: What drives a Perceptron?

2.1 Mathmatical Model

A perceptron is nothing more than a function that takes in several inputs and produces an output of either 0 or 1.

The input of perceptron is usually modeled as a column vector. Let $A(n \times 1)$ represent this column vector. The perceptron applies weights to each values in the A and then sums them together. In other words, the perceptron finds a linear combination of the matrix A as show below. At first these weights are random, however, while training the weights get set to the optimal values through a process called back propagation. The inner works of back propagation will be covered later.

$$A = \begin{bmatrix} a_1 \\ a_2 \\ a_3 \\ \vdots \\ a_n \end{bmatrix}$$

3 Applications: Why are Perceptrons useful?

4 Evolution: What has the idea of a Perceptron led to?