

Perceptrons: An Overview

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"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 What this report entails

It's monday morning. You're sitting in your mathematics lecture. The professor asks you to solve the following equation:

$$5 + 2 = ?$$

Within a fraction of a second, you yell "It's seven!" and the professor lauds you. You lean back, thinking "Pfsh! That was easy." We believe that you just undervalued one of the most incredible tools that you have been blessed with: the human visual system.

2 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:

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

3 Workings: What drives a Perceptron?

3.1 Mathematical 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

- 4 Applications: Why are Perceptrons useful?
- 5 Evolution: What has the idea of a Perceptron led to?