UNIVERSITÀ DI PISA

Computer Engineering

Electronic and Communication Systems

Perceptron

Project Report

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Contents

1 Introduction

1.1 Problem Description

The main goal of the activity described in this report is the following: realizing a network implementing a **perceptron** with a **sigmoid activation function**.
Before describing the whole design and implementation process a very little introduction about the architecture must be done.

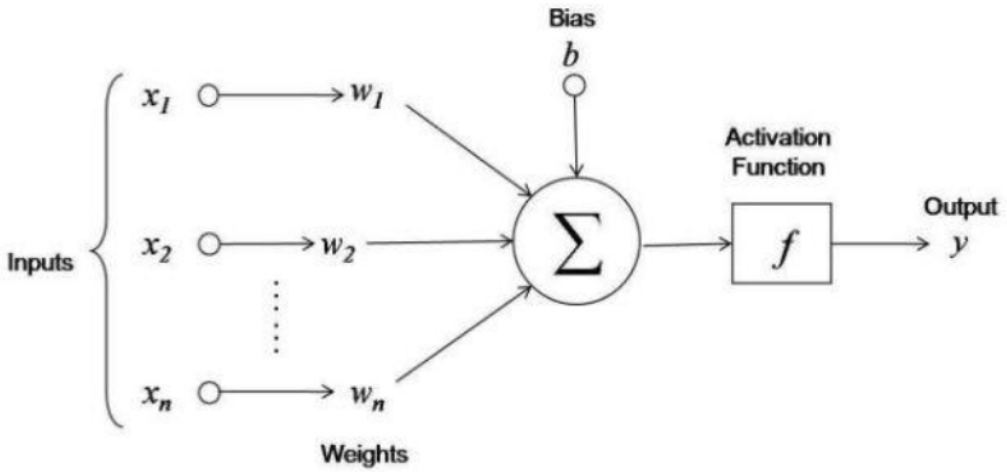


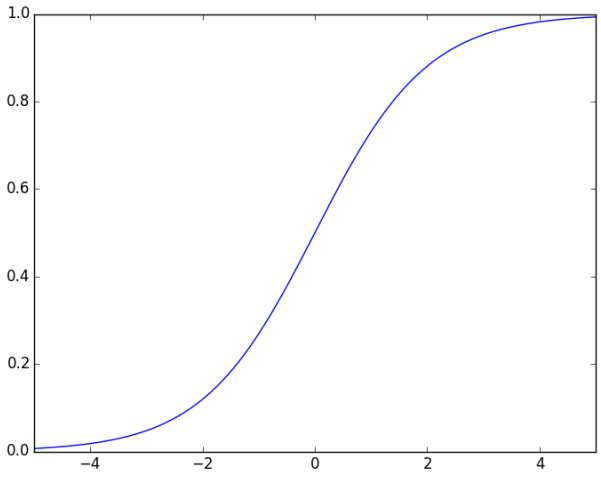
Figure 1.1: Perceptron Architecture

A **Perceptron** is a *binary classifier that maps his inputs to a specific output y = f(z), where f() is the* ***activation function*** *of the perceptron.* The inputs are real numbers and the input z of the activation function is obtained as:

$$z = b + \sum_{i=0}^{N_L - 1} w_i * x_i \tag{1.1}$$

Every input x_i, every weight w_i and the bias b are real numbers in the range of $[-1, 1]$.
The **activation function**, in our case, will be a **sigmoid function**, described as follows:

Figure 1.2: Sigmoid Function Plot



$$y = \frac{1}{1 + e^{-z}} \tag{1.2}$$

Where z is the result of the equation (1.1).

1.2 Applications

1.3 Possible Architectures

2 | Architecture

3 | VHDL CODE

4 | Test Plan

5 | XILINX VIVADO Report

6 | Conclusion