1 Introduction

The following sections present a broad overview of the history of Artificial Intelligence (AI) without specifing or detailing too much on particular topics of this theme. The main objective is to present some context by presenting important articles in order for the reader to be able to have a notion of the progress that has been made over the past decades, the hardships encountered and how important AI is in our lifes.

1.1 Philosophy

On October 1950, in his article *Computing Machinery and Intelligence*, Alan Turing questioned: "Can machines think?" [9]. At the time, the question was too meaningless to answer since not only the theory but also the technology available weren't devoleped enough. Noneotherless, Turing still predicted that in the future there would be computers that could effectively display human-like intelligence and discernment under the conditions proposed on the aforementioned article.

1.2 Relevant events to the birth of AI

The breakthroughs of AI are predominant, and its importance in our everyday life is undeniable, but the theory behind it has several early roots. The interest in the area grew immensely with, for example, all the Turing's theoretical research, the proposal of the first mathematical Artificial Neuron model in 1943 by Warren McCulloch and Walter Pitts (based of binary inputs and output) [5] and in 1949 Donald Hebb revolutionized the way the artificial neurons were treated by proposing what is known as the Hebb's

rule[1]. Taking into consideration the latter two, but specially Hebb's proposals, Belmont Farley and Westley Clark implementated in 1954 one of the first successful Artificial Neural Networks, also called Perceptron, composed of two layers of 128 artificial neurons with weighted inputs [1]. Over the span of approximately ten years, multiple researches were performed attempting to computerize the human brain. However, only in 1956, during the *Dartmouth Summer Research Project on Artificial Intelligence* [4], was the term "Artificial Intelligence" firstly proposed by John McCarthy *et al.*, beginning what is now considered to be the birth of AI [11].

1.3 The fading of general interest

The succeeding two decades following the Dartmouth conference were filled with important developments, with special emphasis in the works published in 1958 by Frank Rosenblatt (generalized the Farley and Clark training to multi-layer networks rather than only two) [8], the 1959 General Problem Solver implemented by Allen Newel *et al.* (a program intended to work as a universal problem solver that was capable of solving exercises such as the Towers of Hanoi[2]) [7] and the ELIZA a natural language processing tool program developed by Joseph Weizenbaum between 1964 and 1966 [10]. Unfortunately, part of the interest and development around AI met an unforseen fade after criticisms about the exagerated public funding [2] and the Mar-

[1] "When an axon of cell A is near enough to excite a cell B and repeatedly or persistently takes part in firing it, some growth process or metabolic change takes place in one or both cells such that A's efficiency, as one of the cells firing B, is increased." [3], meaning that when two neurons fire together their relation is strengthned.

[2] *The Towers of Hanoi* is a game with 3 stacks of increasingly smaller disks. The goal is to stack them one at a time, so that they are arranged in a decreasing radius manner.

vin Minksy and Seymour Papert 1969 book *The Perceptron: A Probabilistic Model for Infmation Storage and Organization in the Brain* that reported on the problems of the Perceptron network. The overal sentiments regarding this topic of research was of doubt and fear of no progress, mainly due to the spending and two issues raised by Minsky and Papert: the ANN couldn't stolve linear inseperatable problems (with special significance the XOR[3] and XNOR[3] functions) and there were limitations due to a lack of sufficient computing power to handle the processing of multi-layer large networks [6].

1.4 A better approach

Minksy and Papert raised important questions, but it shouldn't have discouraged other researchers from further trying since they failed to acknowledge other approaches that already solved those exact problems. AS previously stated, the model proposed by McCulloch and Pitts and later improved by the Farley-Clark implementation and, finally, Rosenblatt couldn't handle linearly inseparable classes, meaning that there's only a continue here ¡——

Hinton *et al.* (Backpropagation), Waibe *et al.* (Time Delay Neural Network for speech recognition, considered a one-dimensional convolutional neural network), Zhang (first two-dimensional CNN - SIANN), LeCun *et al.* (network for handwritten zipcode recognition and used the term "convolution" for the first time which is the original version of LeNet)

[3] Exclusive Or

[3] Exclusive NOR (negation of the Or)

2 Background Section

2.1 The domains of Artificial Intelligence

Artificial Intelligence is an extensive term that can be broadly described as the ability of a computer to simulate or mimic human-like behaviors, such as decision-making, judgement and, most importantly, learning [11].

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