



UNIVERSITETET I OSLO

Project 2: Building a Neural Network code

Applied Data Analysis and Machine Learning

UiO (FYS-STK4155)

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GitHub link to the project repository:

https://github.com/p-perrone/UiO_MachineLearning/tree/main/ml_project1

Link to DeepSeek chat:

<https://chat.deepseek.com/share/h2ifare1m1c31ud8vf>

Abstract

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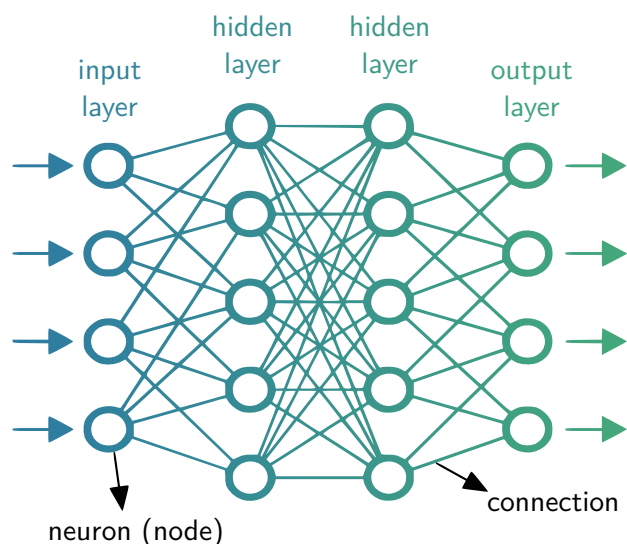


Figure 1: Neural Network | A typical structure.

3.1 Structure of a Neural Network

3.1.a Activation functions

3.1.b The Feedforward algorithm

3.1.c The Backpropagation algorithm

3.1.d Training the Neural Network

3.2 Cost functions

1 Introduction

An Artificial Neural Network is a computational model that emulates the functioning of human brain, in the way it can process several informations in parallel, resulting in a form of "intelligence" (Wang, 2003).

A typical Neural Network (NN) is represented in Figure 1. It generally consists of connected units, called, *nodes* or *neurons*. Every node receives a specific *signal*, i.e. a real number, from its connected node. Nodes can be regrouped in specific layers, and the signal travels from the input layer to the output layer, passing through an arbitrary number of *hidden layers* (Bishop, 2006). Before being transmitted from one layer to the following one, the signal is modulated by a non-linear function, called *activation function*, which can be specified for each layer.

The simplest possible neural network is given by the *perceptron model*, conceived by **rosenblatt1958_perceptron**. It is a type of linear classifier, that takes binary inputs, weights these by real numbers and yields a binary output. It is

2 Theory and methods

3 Materials and data