INF3490/INF4490 Exercises - Week 5

Eivind Samuelsen, Ole Herman S. Elgesem

October 3, 2016

$\mathbb{P}$ marks the programming exercises, we strongly recommend using the python programming language for these. Exercises may be added/changed after publishing.

1 Single Layer Perceptron

1.a

In the perceptron below, what will the output be when the input is (0, 0)? What about inputs (0, 1), (1, 1) and (1, 0)? What if we change the bias weight to -0.5?
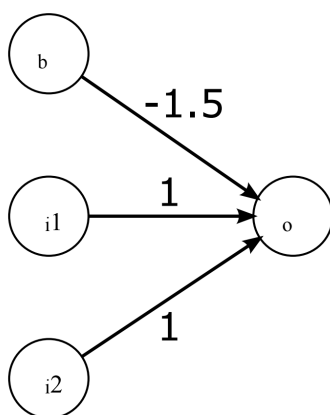
Figure 1: Single Layer Perceptron. b = 1

1.b

Starting with random weights, how do you proceed in order to train the perceptron above to perform any given binary operation? Explain.

$\mathbb{P}$ 1.c

Implement the perceptron, and train it to perform the logical functions NOT (use only one of the inputs), NAND, and NOR. What happens when you try to train it do the XOR function?

2 Multi Layer Perceptron (MLP)

The figure below shows a multilayer perceptron that constructs the XOR function. How would you rewrite it to construct the binary equivalence function (i.e. the output is above threshold when both inputs are either 0 or 1)? Can you construct it so that it will detect equivalence for any combination of integer inputs?
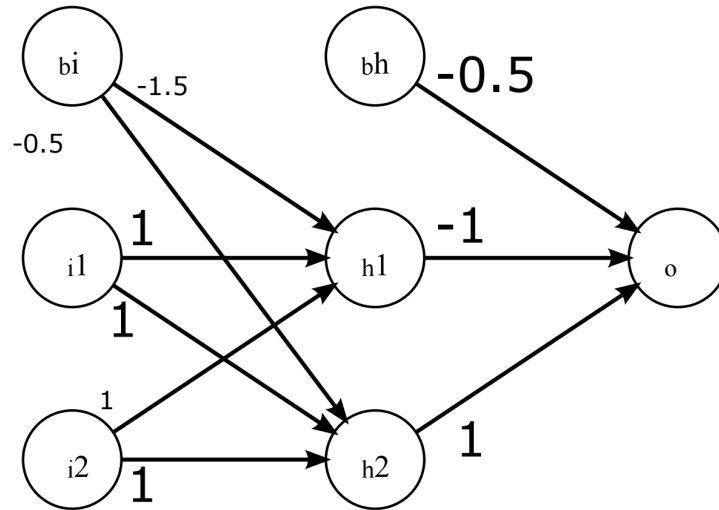
Figure 2: An illustrated example of a multi layer perceptron

Contact and Github

Corrections of grammar, language, notation or suggestions for improving this material are appreciated. E-mail me at **olehelg@uio.no** or use **GitHub** to submit an issue or create a pull request. The **GitHub repository** contains all source code for assignments, exercises, solutions, examples etc. As many people have been involved with writing and updating the course material, they are not all listed as authors here. For a more complete list of authors and contributors see the **README**.