Neural Networks and Deep Learning: Exercises

Somnath Sikdar

January 7, 2020

Contents

Chapter 1

Using Neural Networks to Recognize Handwritten Digits

Exercise 1. Consider a network of perceptrons. Suppose that we multiply all weights and biases by a positive constant $c > 0$. Show that the behaviour of the network does not change.

Solution. First consider a single perceptron. Assume that weights and bias are $w_1, \ldots, w_n$ and b, respectively. Then $\sum_i w_i \cdot x_i + b > 0$ and $c \cdot (\sum_i w_i \cdot x_i + b)$ and exactly the same sign and hence multiplying the weights and the bias by c will not change the behaviour of this single perceptron. Now if all perceptrons in a network have their weights and biases multiplied by $c > 0$, then each individual perceptron behaves as before and hence the network behaves as before. ■