

Exercise 17: Classification with Neural Networks

Summer Term 2024

Pattern *classification* is a typical application area in which neural networks can yield good results. For educational purposes, this exercise resorts to the very simple *encoder* problems. Generally, the classical encoders have n input units, $m = \log_2 n$ hidden units, and n output units. An encoder maps its input patterns onto the same output pattern. Furthermore, any input pattern consists of '0's only, except one single '1'.

Review: What is an appropriate stopping criterion for this task?

To Do: Implement a simple 4-2-4 encode network and explore the influence of both the learning rate η and the momentum α on the speed of the learning process.

Tasks:

- Please, implement a 4-2-4 encoder that maps the four possible input patterns '1000', '0100', '0010', and '0001' onto identical outputs. Before doing so, discuss the following questions:
 - How many training patterns do you have in this application?
 - What is a reasonable stopping criterion?
- Explore how the learning speed depends on the parameter settings for η and α .

α	η					
	10	3	1	0.3	0.1	0.001
0.0						
0.2						
0.4						
0.6						
0.8						
1.0						

Have fun, Theo and Ralf.