Institute for Computer Science VI, Autonomous Intelligent Systems, University of Bonn

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Exercises for module Technical Neural Networks (MA-INF 4204), WS22/23

Assignments Sheet 8, due: Monday 12.12.2022

5.12.2022

Group	Name	46	47	48	49	50	51	52	$\sum$ Sheet 8

Assignment 46 (2 Points)

Consider a single ROLF neuron, that will be trained continuously with the same training vector $\mathbf{X}$.

Determine the value of σ for that neuron if the initial value was $\sigma = 0.1$.
Discuss the result: is this favorable, or causing a problem?

Assignment 47 (2 Points)

Please work on this assignment on your own. For the assignemnt 47 **no teamwork** is allowed. On eCampus you will find two files containing 20 coloured pictures each. **Pics_A.pdf** with 20 drawings, and **Pics_B.pdf** with 20 pictures of trees.

First you have to decide what set of pictures you would like to work with.
Then, please have a brief look at the pictures and try to classify the pictures spontaneously into exactly two classes.

Describe the criterium you have used for classification.
What other possibilities to classify the pictures can you think of?
Please name at least two further ways to classify the pictures.

Remark: Since the classification into two classes is arbitrary, and only depends on you, there is no unique solution in classifying these pictures and thus, you can't do wrong.

Assignment 48 (2 Points)

Describe the task and the structure of the *forward matrix* and the *backward matrix* within an ART-1 network.

Assignment 49 (2 Points)

Find an application, that is using a network from the ART family.
Describe the task of the application, and how the ART network has been used to solve the task.
What type of ART has been used?
Give the citation in a scientific format.

Assignment 50 (3 Points)

Explain the functionality of one of the simple-feature extractors from one of the first two information processing steps in a *Neocognitron*.
Draw a sketch depicting the functionality to support your explanation.

Assignment 51 (3 Points)

Explain the task and the structure the *complex cells* from a *Neocognitron*.
Provide a formula and a sketch to support your description.

Assignment 52 (3 Points)

In some cases, the mathematical operation *convolution* can be expressed as a weighted sum.
Explain how this is used as part of the *Neocognitron* functionality.