New Lecture Location: Meckenheimer Allee 176, HS-IV

Exercises for module
Technical Neural Networks (MA-INF 4204), WS1920

Exercises sheet 6, due: Monday 18.11.2019

11.11.2019

Group	Name	32	33	34	35	36	37	$\sum$ Sheet 6

Assignment 32 (3 Points)
Propose an extension of an RBF network approach from radial symmetry of the RBF-neuron characteristics, to a characteristic that have different extensions in the different axes of the input space (going from a radial to an elliptical characteristic).

Please describe what part of the RBF approach is to be changed.
Include formulas into your explanation.

Assignment 33 (2 Points)
Describe the major steps of training a *Self Organizing Feature Map* (SOM).
Make use of formulas whenever possible.
Define all variables and parameters.

Assignment 34 (1 Point)
Write down a formula that implements an exponential decay for the learning rate $\eta(t)$, starting with η_{init}, and converging towards η_{final} after t_{max} steps
(e.g. see https://demogng.de/papers/sclm.pdf).
Depict the decay of $\eta(t)$ using a diagram.

Assignment 35 (2 Points)
Describe a criterion that measures the quality of the SOM, mapping a given area V of the N-dimensional input space. Write down a formula that implements your criterion.

Assignment 36 (3 Points)

During the training procedure of a SOM (N-dimensional input space, g-dimensional grid of K neurons) it is responding to a stimulus ^pX with the winner neuron i.

The center vectors $\mathbf{C}_k$ have been adjusted following the learning rule, and the neighborhood function $h(dist(i,j),t)$ and the distance measure $dist(i,j)$ on the grid G.

When the same stimulus ^pX is presented to the network directly again, and the winner shall be again neuron i. What conditions must be met by the neighborhood function $h(dist(i,j),t)$, by the distance measure $dist(i,j)$ and by the learning rate $\eta(t)$ to guarantee that i will be the winner again?

Assignment 37 (4 Points)

Classification and **clustering** are two tasks of information processing, that are sometimes mixed up. Define both tasks, and indicate explicitly how **clustering** differs from **classification**.

Find and explain an example that shows the differences between these two tasks explicitly.

To support your explanation use scientific literature (NOT Wikipedia) and cite the literature in a scientific way.