Check Points: Neural Systems, unsupervised and supervised learning

If you are not able to answer some of these questions, first check the slides and lecture notes. If you still do not understand the question, send me an e-mail at Dario.Floreano@epfl.ch

- What are the advantages of nervous systems?
- Describe main elements of a biological neuron
- Describe membrane dynamics
- Describe types of biological neurons
- What is firing rate and firing time?
- What are the principles of synaptic plasticity in biology (Hebb and STDP)?
- What are hidden units?
- Describe McCulloch-Pitts neuron
- Different types of output functions
- What does a neuron signal? Why?
- Describe the separation of input space
- What is a bias unit?
- Describe types of neural architectures
- What is local and distributed encoding?
- What do convolution filters detect in input?
- What is a receptive field?
- What is learning in an artificial neural network?
- What does Oja's rule do?
- What is pattern of interconnection weights in Self-Organising Maps?
- Describe the delta rule
- What is an error function?
- Why is linear separability important?
- What is a multi-layer perceptron (MLP)?
- What functions should we use for hidden and output units of MLP?
- What is Back-Propagation of error?
- Describe the main steps of activating the network and modifying the weights
- What is learning rate and momentum? How can we prevent over-fitting?
- Describe different architectures for processing time-series data
- What type of temporal encoding does NetTalk use?
- Does the network for odor discrimination use local or distributed encoding of the input?
- What is an Autoencoder?
- How are Autoencoders used in Deep Learning architectures?
- How does a 2D convolution filter operate?
- What are the Max Pool and Mean Pool operators used for?