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Neural Networks and Deep Learning – Summer Term 2019

Exercise sheet 1

Submission due: Tuesday, April 23, 13:15 sharp

Exercise 1 (Structure of a neuron):

Name the basic elements of a biological neuron in a neural network and briefly summarize the functional role of each element.

Exercise 2 (Type of signal transmission in neuronal components):

Name the type of signal transmission (electrical, chemical, wireless, …) at the axon, the synapses and the dendrites. Indicate whether it is a binary or an analog event (why?).

Exercise 3 (Neural codes):

What is the basic neuronal "event" of a neuron to "communicate" to other neurons? What are the basic neural codes to represent "meaningful information"? Give a brief explanation of the neural codes.

Exercise 4 (Neuron models and neuron properties):

a) Name the neuron models mentioned in the lecture in the order of descending model complexity (from complex to simple).
Optional: Briefly summarize some of their characteristics.

b) Explain the following terms characterizing the behavior of a neuron:
- Absolute refractory period
- Relative refractory period
- Gain function
- Interspike interval distribution