

Diploma / master thesis:

Synfire Chains and the Processing of Sequences in the Brain

Processing of sequences is a basic requirement for neural networks in the brain as well as for neural networks in technical applications. It is needed for example for language processing where sequences of phonemes or words must be analysed with respect to a certain grammatical structure to obtain information about the meaning of a sentence. Sequences are also needed for acting and achieving certain goals where usually each goal can be described as a sequence (or even a more complex structure) of subgoals.

The aim of this diploma thesis is to investigate a model for sequence processing in the brain. The basic idea is that sequences in the brain are represented by neural assemblies (or ensembles) which consist of one static and multiple dynamic parts that are coupled via sequential associations.

For this end it will be necessary to implement the model using a C++-based simulation tool developed in the department. It is also expected that the software that will be developed for this diploma thesis is integrated into the already existing libraries of the simulation tool.

After implementation the model should be tested using random patterns and/or realistic language data from a digital library.

Required skills:

- interest in biological neural networks
- some experience with neural networks is desirable
- basic C/C++ skills are also desirable

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References:

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