

Misha TSODYKS

Jeudi 23 juin 2005

Conférence Systèmes Dynamiques

15h00 – 15h45

Asymmetric synaptic plasticity and learning of context in recurrent neural networks

I will describe a mathematical learning rule for an activity-dependent modification of cortical synapses that is inspired by the experimental results on spike time dependent plasticity. This rule can be applied to recurrent cortical networks that respond to external stimuli. The model predicts that repeated presentation of the same stimulus leads to saturation of synaptic modification, such that the strengths of recurrent connections depend on the configuration of the stimulus but not on its amplitude. When a new stimulus is introduced, the modification is rekindled until a new equilibrium is reached. The stability of equilibrium is guaranteed if synapses of different types have proper plasticity rates, otherwise the network can enter into long-term oscillatory regime. I will demonstrate that the model can be used to explain the recent results on context-enabled perceptual learning. It was shown that learning a task (contrast discrimination) that has already reached saturation could be enabled by a contextual change in the stimulus (the addition of surrounding flankers) during practice. Psychophysical results with varying context show a behavior that is compatible with the neural network model.

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