SPIKE DETECTION WITH DYNAMIC SYNAPSES

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A realistic model of activity dependent dynamical synapses [1] is used to study the conditions in which a postsynaptic neuron detects temporal coincidences of spikes arriving from N different afferents. We analise the interaction between synaptic depression and facilitation, which are known to be important short-term mechanisms for synaptic transmission. Our results shows that, compared with only-depressing case, facilitation improves the detection of correlated signals arriving from a subset of presynaptic excitatory neurons, as well as presynaptic firing rate changes (cf. figure 1).
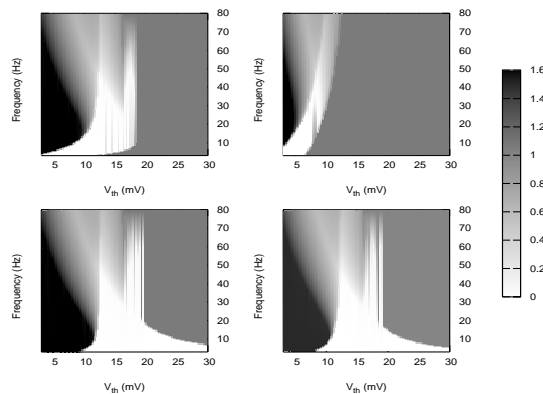
Figure 1: Maps of the space parameters of the model (light areas means good performance). For certain conditions, facilitation (left) improves the results obtained for only depressing synapses (right).

[1] Tsodyks, M. V. and Markram, H., Proc. Nat. Acad. Sci. USA, **94**, 719-723 (1997).