Networks of Noisy Neurons

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Abstract

We consider a network of integrate-and-fire models for neurons and analyse its mean field limit. The neurons are described by their membrane potential, which diffuses until a threshold is reached, when the neuron fires, that is it resets to a resting potential and transmits voltage to other neurons.

We show that in the mean field limit, the evolution of the limiting membrane potential density can be described by a stochastic non-local non-linear Fokker-Planck equation. We investigate when there can be synchronization of the firing of non-trivial proportions of the network.

*Punctual, i.e. sine tempore!