Global solvability of a network of integrate-and-fire neurons of McKean-Vlasov type

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Abstract:

We consider a network of neurons as follows: each neuron evolves as a simple Leaky Integrate and Fire neuron but with interaction. Each time a connected neuron spikes, all their neighbours have small jumps.

In this work, we prove existence and uniqueness of solution to the limit equation, which is of McKean Vlasov type but with a totally new structure: the interaction involves the spiking times, that is the first hitting time of a boundary by a diffusion process.

We also study the interacting particle system, which represents a (large) finite number of neurons.

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