Séminaire de Probabilités et Statistique

Mardi 21 Novembre 2023 à 14h00

Salle de conférences - distanciel

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Replica-mean-field limit of continuous-time fragmentation-interaction-aggregation processes.

Many phenomena can be modeled as network dynamics with punctuate interactions. However, most relevant dynamics do not allow for computational tractability. To circumvent this difficulty, the Poisson Hypothesis regime replaces interaction times between nodes by independent Poisson processes, allowing for tractability in several cases, such as intensity-based models from computational neuroscience. This hypothesis is usually only conjectured, or numerically validated. In this work, we introduce a class of processes in continuous time called continuous fragmentation-interaction-aggregation processes, by analogy with previously introduced processes in discrete time. The state of each node, described by the stochastic intensity of an associated point process, aggregates arrivals from its neighbors and is fragmented upon departure. We consider the replica-mean-field version of such a process, which is a physical system consisting of randomly interacting copies of the network of interest. Generalizing results proved in discrete time and in the particular case of excitatory intensity-based neural dynamics, we prove that the Poisson Hypothesis holds at the limit of an infinite number of replicas.