Title:

Scaling limit of an adaptive contact process

Abstract:

We introduce and study an interacting particle system evolving on the d-dimensional torus Z^d_N. Each vertex of the torus can be either empty or occupied by an individual of a given type; the space of all types is the positive real line. An individual of type \lambda dies with rate one and gives birth at each neighbouring empty position with rate \lambda. Moreover, when the birth takes place, the new individual is likely to have the same type as the parent, but has a small chance to be a mutant; the mutation rate and law of the type of the mutant both depend on \lambda. We consider the asymptotic behaviour of this process when the size of the torus is taken to infinity and the overall rate of mutation tends to zero fast enough that mutations are sufficiently separated in time, so that the amount of time spent on configurations with more than one type becomes negligible. We show that, after a suitable projection (which extracts just the dominant type from the configuration of individuals in the torus) and time scaling, the process converges to a Markov jump process on the positive real lines, whose rates we determine. Joint work with Adrián González Casanova and András Tobias.