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General pruning and immigration for continuum random trees

Pruning and immigration for Galton–Watson trees are well known. I will present the analogue for critical or sub-critical continuum random trees (CRT). The pruning mechanism relies on a representation of the CRT based on Lévy snake. After introducing a general pruning procedure for CRT, I will present the dual process of immigration with intensity proportional to the size of the population. This immigration can be studied through the continuous state branching process. This process does not keep track of the genealogy, but it is easier to handle.

The pruning or immigration allow to describe a population undergoing neutral mutations. In the case of extinction in finite time, using a decomposition of Williams type, it is easy to compute the probability for the last individual of the population to be of the same type as its original ancestor.

Then I will recall the link between a particular family of pruning mechanism and some fragmentation processes. This family of pruning yields a nice way to reduce a CRT. Using a Girsanov formula, it is possible to define a super-critical CRT and to extend the pruning to such CRT. I will present another approach for the case of CRT with quadratic branching mechanism, based on reflected Brownian motion with drift.