Title: Random functions on trees

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Numerous biological processes lead naturally to mathematical or statistical models that take the form of branching random walk or, equivalently, an additive process on a binary tree.

J Abernethy proposed a theory of biological ageing that combines extreme-value theory with a branching process. An individual is supposed to have a population of stem cells that fission a finite number of times, at independent random intervals, with survival time identified with the maximum survival time of the last stem cell. The conclusions of the paper are wrong, because it treats the survival times as independent. A very different sort of model of biological ageing in single-celled organisms by Bansaye et al. considers the estimation of differences in survival rates between the two daughter cells in a fissioning population.

The project would look at appropriate ways of analysing these kinds of processes, and could be done primarily through mathematical theory, simulation, or some combination.

Reference:
