Mathematics > Probability

Branching Markov processes on fragmentation trees generated from the paintbox process

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A fragmentation of a set A is a graph with vertices labeled by subsets of A which obey a certain parent-child relationship. A random fragmentation tree is a probability distribution on the space of fragmentations of a set. It is often convenient to regard a fragmentation tree as a collection of subsets such that each subset is associated with a non-trivial partition of itself, called its children. In this paper, we study a Markov process on the space of fragmentation trees whose transition probabilities are a product of consistent transition probabilities on the space of partitions. The result is a consistent family of transition probabilities on fragmentation trees which characterizes an infinitely exchangeable process on trees labeled by subsets of the natural numbers. We show that this process possesses a unique stationary measure and can be extended to a process on weighted trees, or trees with edge lengths, as well as mass fragmentations.

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