

The Cutoff Phenomenon for Typical Birth and Death Chains

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Some Markov chains show a sharp cut-off in their convergence to stationarity. In joint work with Phillip Wood, we investigate this for typical birth-death chains. Fix the stationary distribution as uniform on $\{0,1,\dots,n\}$. We thus study random, tri-diagonal, doubly stochastic matrices. We determine the distribution of the spectral gap and mixing time and verify a conjecture of Yuval Peres in these cases. The Mathematics of such matrices has all kinds of connections to combinatorics and other areas of mathematics. These work of Aaron Smith extends these results to quite general stationary distributions. He finds that (roughly) if the Metropolis algorithm for nearest neighbor walk on a path has a cutoff, then most birth and death chains with the given stationary distribution have a cutoff.