



Minisymposium 7 - Stochastic algorithms and Markov processes

Metric Construction for Path Coupling, Rapid Mixing, and Approximate Counting

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Coupling techniques have a long history in the theory of Markov chains, and can be used to obtain quantitative estimates of their convergence times, and rapid mixing. Good coupling are usually difficult to design, but path coupling has recently proved a very useful technique for constructing and analysing them. The basic idea here is to restrict the design of the coupling to pairs of states which are close in some suitable metric on the state space. We prove a general theorem for path coupling using stopping times based on a particular construction of metric which enables us to work with the standard one-step path coupling. We apply this result to design efficient approximation algorithms for several hard counting problems, like counting hypergraph independent sets and colorings. (Joint work with M. Bordewich and M. Dyer)