Minimising the largest mean first passage time of a Markov chain and the influence of directed graphs

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For a Markov chain described by an irreducible stochastic matrix T of order n, the mean first passage time $m_{i,j}$ measures the expected time for the Markov chain to reach state j given that the system begins in state i, thus quantifying the short-term behaviour of the chain. In this talk, we give a lower bound for the maximum mean first passage time in terms of the stationary distribution vector of T. We also discuss the characterisation of the directed graphs D for which any stochastic matrix T respecting this directed graph attains equality in the lower bound, thus producing a class of Markov chains with optimal short-term behaviour. This is joint work with Steve Kirkland.

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