

Non-reversible Markov chain speedup on the cycle by a single random edge

Balázs Gerencsér

We are interested in the better understanding of mixing time improvement possibilities for Markov chains on the cycle, considering the ones with uniform stationary distribution. For any reversible Markov chain, it is easy to see that the mixing time is $\Omega(n^2)$.

We are broadening the class of Markov chains in two directions, first by relaxing the reversibility requirement, and second by adding an extra random edge to the cycle graph. If we use only one of the two modifications, still only $\Theta(n^2)$ is achievable.

Interestingly, when we combine the two, the mixing time can drop to $\Theta(n^{3/2})$, provided that the added edge is appropriate in some sense.

In this talk, besides specifying the results, we will get a glimpse on the proof techniques and have an overview on the intuitions which confirm that this has to be the growth rate for the mixing time.