Institute for Applied Mathematics, Bonn University

Oberseminar Stochastik

Thursday, April 25, 2024, 16:30
Lipschitz-Saal (LWK 1.016)

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Fastest-Mixing Markov Chain on a Graph

Given a graph $G = (V, E)$, consider the set of all discrete-time, reversible Markov chains with equilibrium distribution uniform on V and transitions only across edges E of the graph. We establish a Cheeger-type inequality for the *fastest mixing time* τ^* using the *vertex conductance* Ψ of G: namely, $\Psi^{-1} \lesssim \tau^* \lesssim \Psi^{-2}(\log |V|)^2$. We also consider chains with *almost-uniform* invariant distribution π: let $\varepsilon > 0$ and impose that $\pi(x) \geq |V|^{-1}(1 - \varepsilon)$ for all $x \in V$. We construct a chain with mixing time $\tau \lesssim \varepsilon^{-1}\text{diam}(G)^2$, valid for any graph.
Time permitting, we also discuss a construction of a continuous-time chain with *exactly-uniform* invariant distribution and average jump-rate 1, and mixing time $\tau \lesssim \text{diam}(G)^2 \log |V|$, valid for any graph.