

S2F2 Hauptseminar Stochastische Prozesse
S4F1 Graduate Seminar on Probability Theory

Mixing times of Markov processes

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Fridays 14-16, WS 2021/22

Mixing times quantify the speed of convergence of a Markov process to its invariant distribution. In the seminar, we will discuss various approaches to derive upper and lower bounds for mixing times, and consider many examples and applications. There will be both more basic and more advanced topics available, so that the seminar is suitable both for third year Bachelor and for Master students. It requires a basic background on probability theory and stochastic processes.

Part 1: Mixing times for Markov chains on discrete state space:

Levin/Peres/Wilmer: Markov chains and mixing times.

<https://pages.uoregon.edu/dlevin/MARKOV/mcmt2e.pdf>

Part 2: Bounds by functional inequalities and conductance:

Montenegro/Tetali: Mathematical aspects of mixing times in Markov chains.

https://www.stat.berkeley.edu/~aldous/260-FMIE/Papers/montenegro_tetali.pdf

Part 3: Couplings and convergence for diffusions:

Lindvall: Lectures on the coupling method.

Lindvall/Rogers: Coupling of multidimensional diffusions by reflection.

Part 4: Applications to Markov Chain Monte Carlo:

Vempala: Geometric Random Walks: A survey.

<https://www.cc.gatech.edu/~vempala/papers/survey.pdf>

Bou Rabee/Eberle: Lecture notes on MCMC methods.

Part 5: Applications to spin systems:

Blanca, Caputo, Chen, Parisi, Stefankovic, Vigoda: On mixing of Markov chains: Coupling, spectral independence and entropy factorization.

Preliminary meeting: Friday 16.7., 14.15

Zoom Meeting-ID: 956 8729 4712 Password: 007874