Bern-Fribourg Graduate Seminar

a seminar for Master and PhD students

Thursday 5th December, 2024: 17:15 - 18:00

Room 2.52, Perolles 08, Fribourg

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Simulating Glauber dynamics for the Ising model

Abstract

Algorithms such as Metropolis-Hastings or Glauber Dynamics offer great insight for the Ising model on a graph $G = (V, E)$ and guarantee convergence to samples of a stationary distribution of the system for infinite runtime ($t \to \infty$). However, a feasible implementation on a large graph ($|V| \gg 0$) with finite computer memory and finite runtime comes at the drawback of a non-exact sample with few means of estimating its runtime to produce a negligible error. With technical modifications of the Glauber Dynamics algorithm in the form of *Coupling from the Past* and *Sandwiching*, these algorithms can be rendered exact, decideable, and memory-efficient. We will discuss the algorithms based on a small introduction to Markov chains, demonstrate their convergence and show how Glauber dynamics can be improved for the Ising model, specifically, due to results found by Propp and Wilson in 1996.