# Bernoullis Tafelrunde

Math Student and PhD Seminar

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Seminar Room 00.003, Spiegelgasse 1


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# Markov Chains and Mixing Times


Abstract

In the study of Markov Chains, a quantity that has attracted great interest is the so-called "mixing time": The time it takes for the Markov chain started at a specific point to forget about its initial location and for its distribution to approach the invariant distribution $\pi$ of the chain. For time-homogeneous Markov Chains, mixing time is fairly well-understood.

One can also study mixing behavior of time-inhomogeneous Markov Chains, which use potentially different transition matrices on each step. Such chains provide a good representation for processes in dynamic environments, which are more generally interesting.

This scenario poses technical challenges - for one, mixing time in its classical definition requires the existence of an invariant distribution, which is not given for most time-inhomogeneous Markov Chains. Rather than only studying those that do have an invariant distribution, we go down a rarely trodden path: In this talk, I will propose a new definition of "mixing time" which not only seamlessly extends the term from the time-homogeneous case, but also stays true to the intuitive meaning of mixing - the time it takes for a process to get lost. Finally, we will take a brief look at what kinds of results this new definition can produce.