Institut für Mathematik

Lehrstühle für Wahrscheinlichkeitstheorie und Statistik

Forschungsseminar : Stochastic Analysis

Sommersemester 2019, montags 12:15-13:45, Campus Golm, Haus 9 Raum 1.10

08.04.19 **Suren Poghosyan** (Yerevan, Armenia):

Existence of limiting correlation functions and their cluster representation

The traditional method for the construction of the limiting Gibbs measure uses the thermodynamic limit of the finite volume correlation functions. These limiting correlation functions are defined implicitly as a solution of a system of linear integral equations of Kirkwood-Salzburg type.

We present an alternative approach based on a representation of both finite volume and limiting correlation functions via the same function which permits efficient bounds in terms of special graphs called forests. In particular we get a convergent expansion of the limiting correlation functions in powers of the activity.

15.04.19 **Hannah Marienwald** (Berlin/Potsdam):

Incremental Cover Trees for Dynamic Diversification

Dynamic diversification – finding a set of data points with maximum pairwise distance from a time-dependent sample pool – is an important, but NP-hard problem in many different applications. Therefore, various approximation algorithms exist. The incremental cover tree (ICT) with high computational efficiency and flexibility has been applied to this task and has shown good performance. Specifically, it was empirically observed that ICT typically provides a set with its diversity only marginally (≈ 20%) worse than the state-of-the-art method for *static* diversification.

This talk will introduce you to the diversification maximization problem and how it can be solved using an incremental cover tree. We will compare its empirical performance with the results of the state-of-the-art approach. Furthermore, I will provide a theoretical bound on the worst possible performance of the ICT approach which I proved to be the *tightest possible* approximation factor.

If time allows, I will also demonstrate a new use of dynamic diversification for generative image samplers.

29.04.19 **Tanja Pasurek** (Bielefeld):

Extension of Dobrushin's uniqueness criterion and applications to Gibbs point processes

We extend the classical Dobrushin's uniqueness criterion to Markov random fields on general graphs and with single-spin spaces that need not be locally compact. As a by-product of the method, we establish the exponential decay of correlations in the uniqueness regime. The applicability of the theory will be shown for continuous particle systems (with possibly non-trivial internal structure), including Gibbs fields on (marked) configurations. In conclusion, we touch upon a complementary question about the multiplicity (phase transition) in such models. Based on a joint work with Yuri Kondratiev and Michael Röckner.

20.05.19 **Oleksandr Prykhodko** (Kyiv/Potsdam):

Random walk with lagging

We will construct a random walk with specific lagging in point 0 and prove that for appropriate scaling the limiting process is so-called sticky Brownian motion

27.05.19 **Linda Khachatryan** (Yerevan, Armenia):

Non-linear functionals preserving normal distribution and their asymptotic normality

We introduce sufficiently wide classes of non-linear functionals preserving normal (Gaussian) distribution and establish various conditions under which a sequence of such functionals is asymptotically normal. As one of a consequence we obtain a generalization and sharpening of known results on the central limit theorem for weighted sums (linear functionals) of independent random variables.

03.06.19 **Giovanni Conforti** (École Polytechnique, France)

The turnpike property, large deviations, and the Schroedinger problem

In deterministic control, the turnpike property is the fact that optimal solutions consist approximatively of three pieces. The first and third pieces are rapid transitions from the initial state to a steady state and from the steady state to the final state respectively. The second piece is a long time interval in which solutions stay exponentially close to the steady state. In this talk I will discuss how to adapt the turnpike property in stochastic control problems arising from large deviations theory and explain why one should expect it to hold. In the second part we look at the concrete example of the Schroedinger, for which the turnpike property holds. If time allows, I will treat the case of the recently introduced mean field Schroedinger problem.

01.07.19 **Paolo Pigato** (WIAS Berlin):

Precise asymptotics of rough stochastic volatility models

I will review some empirical facts on implied volatility and how they recently led to the introduction of rough (fractional) stochastic volatility models in finance. I will recall some results in asymptotic pricing and discuss a recent precise asymptotic expansion, based on the Laplace method on the space of models, which applies in particular to rough volatility models. I will show an implementation in the case of the rough Bergomi model.
(Based on joint work with P. K. Friz and P. Gassiat)

Attention: Seminar in Berlin of Sophie Pennisson at 18:00.

08.07.19 **Oleksandr Zadorozhnyi** (Potsdam):

Concentration of Weakly dependent Banach-valued sums and applications to statistical learning methods

In the talk I present a Bernstein type inequality for Banach-valued random sums under weak-dependency assumption of general kind on the variables and smoothness assumption on the underlying Banach norm. In the succeeding part this concentration inequality will be used in asymptotical regime to derive risk upper bounds for the family of spectral regularization methods for reproducing kernel decision rules, when trained on a sample coming from a τ−mixing process. This talk is based on a joint work with Gilles Blanchard.

15.07.19 **Wolfgang Löhr** (Duisburg-Essen):

Continuum limits of tree-valued stochastic processes

Markov chains on sets of (finite, graph-theoretic) trees arise in applications, e.g., as evolving genealogical trees in population models or in Markov chain Monte Carlo methods for the reconstruction of phylogenetic trees.
In order to find useful limit processes as the trees become large, we need an appropriate state space including "continuum trees". I will compare the more classical approach with metric measure trees and a new approach with algebraic measure trees. A particular example will be the Aldous chain on cladograms which converges in the new state space to an ergodic diffusion.
(Joint work with Leonid Mytnik and Anita Winter)

Interessenten sind herzlich eingeladen !

Pierre Houdebert and Sara Mazzonetto.

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