Institut für Mathematik

Lehrstühle für Wahrscheinlichkeitstheorie und Statistik

(Online) **Forschungsseminar**

Wintersemester 2020-2021, mittwochs 13:00-13:45

Zoom: https://uni-potsdam.zoom.us/j/69067420670 (Kenncode: 49220780)

02.12.20 **Jens Fischer** (Toulouse/Potsdam):

Consensus Dynamics and Exclusion processes

The voter model and the Deffuant model are two well known models on networks where individual opinions influence the relationsship dynamics. Recent work related to social networks focuses entirely on establishing and breaking up of relationships within social networks based on difference of opinions of individuals involved. I am going to present one possible model for this behviour, which can be observed in the data, and propose and link to exlcussion processes in discrete time within a random environement.

09.12.20 **Joseph Lam** (Magdeburg):

Minimax optimal goodness-of-fit testing under local differential privacy

The consequences of local differential privacy constraints on goodness-of-fit testing are considered, i.e. the statistical problem assessing whether sample points are generated from a fixed density or not. The observations are hidden and replaced by a stochastic transformation satisfying the local differential privacy constraint. The focus will be on the lower bound, leading to the minimax optimality of our result over Besov balls.

16.12.20 **Alexander Zass** (Potsdam):

An explicit uniqueness region for Gibbs point processes

We present a uniqueness result for Gibbs point processes with repulsive pair interaction; in particular, we provide an explicit uniqueness region in terms of the activity and inverse temperature parameters. The technique used relies on applying to the continuous setting the classical Dobrushin criterion. We also present a comparison to the two other uniqueness methods of cluster expansion and disagreement percolation.

06.01.21 **Peter Keller** (Potsdam):

Mastering the Maze - Reinforcement Learning in Grid-World-Setup

Imagine, a robot is moving through a maze that consists of equal sized rooms. Adjacent rooms are connected by doors. The robot can now perform actions, choosing the next door with respect to a given policy (discrete probability distribution on the available doors). After a new room is entered, the next room is chosen only with respect to the current position. Penalizing the robot's movement with a negative reward (for example -1 for each room change), the robot can learn the optimal policy that leads him through the maze as quickly as possible.

We give an introduction to the solution methods of this type of problem via Markov Reward- and Decision-Processes optimizing a discrete Bellman-type equation and show some basic simulations/implementations of Q-Learning.

13.01.21 **Han Cheng Lie** (Potsdam):

Stochastic optimal control of SDEs for importance sampling of path functional

The estimation of statistics of functionals of a diffusion process is a problem that arises in multiple applications. An example of such a problem involves estimating the expected value of the first exit time of a diffusion process from a bounded domain. One approach to estimating such statistics involves importance sampling via a change of measure, where the optimal change of measure is unique and yields a zero-variance estimator. Finding the optimal change of measure can be formulated as a stochastic optimal control problem, which can be solved computationally using gradient descent-based methods. We analyse a class of stochastic optimal control problems with the aim of understanding the convergence of gradient descent-based methods.

20.01.21 **Oleksandr Zadorozhnyi** (Potsdam):

Concentration inequalities for dependent random fields

In this talk I firstly discuss a general martingale-difference approach which can be used to obtain some of the existing concentration inequalities for 1-dimensional weakly-dependent random processes. In this framework a martingale-difference approach and a (martingale-like) dependence conditions can be generalised to the case of high dimension. Using one of such weak-dependency conditions of projective kind I present the variants of Azuma-Hoeffding's and Burkholder's inequalities for random fields indexed with d-dimensional rectangles and compare it to the existing results in the field.

27.01.21 **Angelina Henning** (Potsdam):

Wilcoxon-Test: Ein Rangtest für zwei unverbundene Stichproben

In diesem Vortrag wird das Testverfahren von Wilcoxon betrachtet, welches eine Alternative zum 2-SP-t-Test liefern kann. Dieses Verfahren gehört zu den sogenannten Rangtests. Neben der theoretischen Betrachtung der Vorgehensweise (u.a. Herleitung der Teststatistik und deren Verteilung) wird auch die Anwendung auf ein Beispiel enthalten sein.

03.02.21 **Anne Manegueu** (Magdeburg):

Generalized non-stationary multi-armed Bandits

Recent decades have seen rapid advances in multi-armed bandits (MAB) algorithms, due to their ability to optimize with the presence of uncertainty. Classical MAB problems are studied based on the assumption that the data generating mechanism does not change over time. This assumption is often violated in real-world applications, since the distributions of rewards themselves may change over time, and more generally the environment might be non-stationary. A large part of the bandit literature has devoted to the question of finding models that capture the non-stationarity of the environment, giving hence birth to two classes of multiarmed bandits: the rested bandits and the restless Bandits. In our work, we proposed a generalization of the switching bandits, which is a subclass of the restless bandit-where the reward distribution is assumed to be piecewise stationary. To be specific, we consider a multi-armed bandit setting that unifies the following settings: (a) the switching bandit problem, (b) the MAB problem with locally polynomial mean reward, (c) the MAB problem with locally smooth mean rewards, and (d) the one, where the gaps of the arms have a bounded number of inflextion points and the highest arm's mean cannot vary too much in a short-range. We propose two algorithms in this general setting termed "the selectivebandits" and the "the prudentbandits", that solve in an efficient and unified way the four problems (a)-(d) mentioned.

10.02.21 **Sara Mazzonetto** (Nancy):

Threshold Ornstein-Uhlenbeck process: drift parameters estimation

With the term threshold diffusion we denote diffusion processes which follow different dynamics in different space intervals. We focus on the one-dimensional case of two Ornstein-Uhlenbeck dynamics in two semi-axes: Threshold Ornstein-Uhlenbeck process. We discuss (quasi)-maximum likelihood estimation of the drift parameters based on continuous and discrete time observations. We study the convergence - in high frequency and/or in long time - of these estimators. We conclude by analyzing an application to short term US interest rates. This is a joint work with Paolo Pigato.

Interessenten sind herzlich eingeladen !

Prof. Dr. Sylvie Roelly