Einladung

zum

Mathematischen Kolloquium

Am Donnerstag, dem 2. Februar 2012, spricht

Herr Dr. habil. Peter Ruckdeschel,
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Fraunhofer ITWM, Kaiserslautern
Gast am Lehrstuhl für Stochastik
bei Prof. Dr. Helmut Rieder

über das Thema

**Optimally-Robust Filtering**

Abstract

We present optimality results for (distributionally-)robust filtering, building up on, and extending results obtained in my PhD thesis in Bayreuth: Following the general spirit of robust statistics, in a general state space model framework, we extend the ideal model and allow for both system-endogenous and -exogenous outliers, which induces the conflicting goals of tracking and attenuation.

We solve corresponding minimax MSE-problems for both types of outliers separately, resulting in corresponding saddle-points. As operational solution, insisting on recursivity, we obtain the rLS filter and variants of it specialized to endogenous and to exogenous outliers, respectively, and a hybrid version that can cope with both types –after a certain delay.

In context of linear, time discrete, and time-invariant Euclidean state space models, these results assume knowledge of hyper parameters, i.e.; innovation and error covariances, as well as transition and observations matrices, which in many applications have to be estimated. The standard approach is an EM algorithm, which is non-robust, though. For computational reasons, we discuss a stepwise robustification where each stage of the algorithm is robustified separately.

A similar situation can be found in a Hidden Markov Model (HMM) context where we head for a robustification of an online EM-type algorithm due to Elliott. This algorithm involves a change of probability measure technique, which we show to be prone to exogenous outliers. The corresponding M-step produces adaptive estimates for the model parameters, using recursive filters for processes of the underlying Markov chain. We propose a robustification which in the filtering step extends results presented in the first part and in the M-step uses strategies known to be useful in the context of Gaussian location-scale models.

We apply this algorithm in an asset allocation problem in discrete time and develop trading strategies to optimally invest in growth or value stocks.

**Beginn:** 16.30 Uhr (Kaffee/Tee ab 16.00 Uhr im Seminarraum 748)
**Ort:** Hörsaal H 19, Gebäude Naturwissenschaften II, Universitätsgelände

gez. A. Christmann