



Eidgenössische Technische Hochschule Zürich



# Research Seminar in Statistics

organized by Proff. A.D. Barbour, P. Bühlmann, L. Held, H.R. Künsch, M. Maathuis, W. Stahel, S. van de Geer

Title "Maximum likelihood estimation of a multidimensional log-concave density"

Speaker **Richard Samworth**  
Cambridge University, UK

Date, Time Friday, December 4, 2009, 15.15-16.00

Room HG G 19.1, Rämistrasse 101, 8092 Zürich

## Abstract

We show that if  $X_1, \dots, X_n$  are a random sample from a density  $f$  in  $\mathbb{R}^d$ , then with probability one there exists a unique log-concave maximum likelihood estimator  $\hat{f}_n$  of  $f$ . The use of this estimator is attractive because, unlike kernel density estimation, the estimator is fully automatic, with no smoothing parameters to choose. We exhibit an iterative algorithm for computing the estimator and show how the method can be combined with the EM algorithm to fit finite mixtures of log-concave densities. Applications to classification, clustering and functional estimation problems will be discussed, as well as recent theoretical results on the performance of the estimator. The talk will be illustrated with pictures from the R package LogConcDEAD.

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