Celebration of Ib Skovgaard

Seminar with four presentations.

Organized by the Danish Society of Theoretical Statistics, Department of Mathematical Sciences and Section of Biostatistics, University of Copenhagen.

Date: June 16th 1-5 PM.
Place: Aud. A2-70.04, Thorvaldsensvej 40, 1871, Frederiksberg C.

Ib Skovgaard obtained his Ph.D. degree in statistics from the Department of Mathematical Statistics at the University of Copenhagen in 1982. From 1981 Ib was employed by the Royal Veterinary and Agricultural University in Copenhagen, first as assistant and associate professor, and from 1996 as full professor. He was Head of the Department of Mathematics, 1986-1989, and Dean of the Faculty of Basic Science and FoodScience, 1989-1991. In 2007 the Royal Veterinary and Agricultural University merged with the University of Copenhagen, and in 2012 most of the statistics group merged with the Statistics Section of the Department of Mathematical Sciences. In 2014 he retired from his professor position.

In his theoretical research, Ib made seminal contributions to the vigorous developments in neo-Fisherian statistical theory and asymptotic theory that took place in the 1980s and 1990s. In particular, he worked on higher-order asymptotics and saddlepoint methods, but also on likelihood inference and principles of statistical inference. Biostatistical applications and development of appropriate statistical methods for this work have played a prominent role in Ib's research over the years.

In admiration of Ib's great achievements there will soon be published a book containing most of Ib's innovative research with introductions by colleagues. To celebrate Ib and the publication of this book we are happy to announce this seminar. You can see more details about the book here:

http://www.worldscientific.com/worldscibooks/10.1142/10390

There will be four presentations with details given below. After the presentations there will be a reception where all participants are invited to join.

Program

13.00-13.45 Sensometrics - 25 years of Ib Skovgaard impact. Per Bruun Brockhoff. DTU.

13.45-14.30 Asymptotic theory with non-standard limits. Nina Munkholt. University of Copenhagen

14.30-15.00 Coffe break

15.00-15.45 An R package implementing Skovgaard's version of r*. Ruggero Bellio. University of Udine.

15.45-16.30 Maximum likelihood estimation in Gaussian models under total positivity. Steffen L. Lauritzen. University of Copenhagen.

16.30- Reception

Abtracts

Sensometrics - 25 years of Ib Skovgaard impact. Professor Per Bruun Brockhoff Section for Statistics and Data Analysis, DTU.

Ib Skovgaard presented the paper Modelling relations between instrumental and sensory measurements in factorial experiments at the 2nd Sensometrics Meeting in Edinburgh, 16-18 September 1994. The paper is an introduction to and application of the ultrastructural model as a way to model the linear relation between twodimensional means of a number of treatment levels. The model is shown to be related to another contribution of Ib's to the sensometrics field, that is now part of standard software used and still today impacts ongoing research in sensometrics andin mixed multiplicative modelling.

Asymptotic theory with non-standard limits. Nina Munkholt Jakobsen, Department of Mathematical Sciences, University of Copenhagen.

This talk is composed of two separate parts under the common topic of asymptotic theory with ``non-standard'' limit distributions. The first part takes place in an exponential family framework. We consider the problem of testing a hypothesis when the model contains a nuisance parameter identifiable only under the alternative. The usual asymptotic results fail to hold for the likelihood ratio statistic Q. Instead, it was shown by (Ritz and Skovgaard, 2005) that -2\log Q is asymptotically distributed like the supremum of a squared Gaussian process. This process has a covariance structure determined by the geometric structure of the parameter space of the model. We investigate examples of the limit distributions that occur in this setup, comparing them to chi-squared distributions and more general gamma distributions. In particular, we see that the asymptotic distribution of -2\log Q does not always behave as the extrapolation of standard asymptotic theory might suggest it should. This part of the talk is based on the work in (Munkholt, 2012), supervised by Ernst Hansen.

The second part of the talk concerns estimation of the diffusion parameter of a diffusion process observed over a fixed time interval. We present conditions on approximate martingale estimating functions under which estimators are consistent, rate optimal, and efficient under high frequency (in-fill) asymptotics. Here, limit distributions of the estimators are non-standard in the sense that they are generally normal variance-mixture distributions. In particular, the mixing distribution

depends on the full sample path of the diffusion process over the observation time interval. Making use of stable convergence in distribution, we also present the more easily applicable result that estimators normalized by a suitable data-dependent transformation converge in distribution to a standard normal distribution. The theory is illustrated by a simulation study. The work presented in the second part of the talk is joint work with Michael Sørensen, and published in (Jakobsen and Sørensen, 2017).

An R package implementing Skovgaard's version of r*. Ruggero Bellio.
Department Of Economics and Statistics of the University Of Udine.

This talk illustrates the R package likelihoodAsy that implements the important Skovgaard version of Barndorff-Nielsen's modied directed deviance r*. The main point of this is to compute the samples pace derivatives that held up this theory for a decade. The user needs only to provide R code for the likelihood function, for the interest parameter, and for generating a sample from the model. A noteworthy feature of the package is the possibility to draw inferences on general scalar functions of the model parameters. Also presented is a working paper Modern Likelihood-Frequentist Inference, intended to be an exposition of the development of this topic by many workers. The exposition is intended to be accessible to a wide audience. It does this by charting a narrow course through the developments over more than 30 years. This covers the likelihood ratio approximation (p* formula), approximate ancillary conditioning, transformation to a highly accurate approximation to the likelihood ratio test, and related topics. This is a joint work with Donald A. Pierce, Oregon State University.

Maximum likelihood estimation in Gaussian models under total positivity. Steffen L. Lauritzen. Department of Mathematical Sciences, University of Copenhagen.

The problem of maximum likelihood estimation for Gaussian distributions that are multivariate totally positive of order two (MTP2) is investigated. The maximum likelihood estimator (MLE) for such distributions exists based on just two observations, irrespective of the underlying dimension. It is further demonstrated that the MTP2 constraint serves as an implicit regularizer and leads to sparsity in the estimated inverse covariance matrix, determining what we name the ML graph. We show that the maximum weight spanning forest (MWSF) of the empirical correlation matrix is a spanning forest of the ML graph. In addition, we show that we can find an upper bound for the ML graph by adding edges to the MSWF corresponding to correlations in excess of those explained by the forest. This also gives new theoretical results in the study of inverse M-matrices. We provide globally convergent coordinate descent algorithms for calculating the MLE under the MTP2 constraint which are structurally similar to iterative proportional scaling. The lecture is based on recent joint work with Caroline Uhler and Piotr Zwiernik.