UNIVERSITY OF CYPRUS
DEPARTMENT OF MATHEMATICS AND STATISTICS

INVITATION

The Department of Mathematics and Statistics
of the University of Cyprus
invites you to the

6th Probability and Statistics Seminar Series

Fall Semester
Academic Year 2010-2011

(Organised by: T. Christofides, K. Fokianos, E. Paparoditis, T. Sapatinas)

UNIVERSITY OF CYPRUS
DEPARTMENT OF MATHEMATICS AND STATISTICS

SPEAKERS:

Wednesday, 20th October 2010
World Statistics Day
Professor Risto Lehtonen
Department of Statistics
University of Helsinki

Friday, 22nd October 2010
Professor Anthony C. Davison
Institute of Mathematics
EPFL

Wednesday, 27th October 2010
Professor B. L. S. Prakasa Rao
Department of Mathematics and Statistics
University of Hyderabad

Friday, 29th October 2010
Professor Alexander Goldenshluger
Department of Statistics
University of Haifa

Friday, 12th November 2010
Professor Rainer Dahlhaus
Institute of Applied Mathematics
University of Heidelberg

Friday, 19th November 2010
Professor Laurent Cavalier
Centre de Mathematiques et Informatique
University Aix-Marseille

Friday, 26th November 2010
Professor Yiannis Yatrakos
Department of Hotel and Tourism Management
TEPAK

UNIVERSITY OF CYPRUS
DEPARTMENT OF MATHEMATICS AND STATISTICS

World Statistics Day

Professor Risto Lehtonen

(Department of Statistics, University of Helsinki, Finland)

"Scientific cooperation between academic statisticians and statistical services: international experiences"

Wednesday, 20th October 2010, 16:00-18:00
Conference Room, Ministry of Finance

Abstract:

This paper discusses international experiences on scientific cooperation between academic statisticians and statistical services. Two related aspects are considered: the infrastructure available for research and development (R&D) work within a National Statistical Institute (NSI), and networking and similar scientific co-operation arrangements of a NSI with the universities.

Certain specific forms of research cooperation or networking of a NSI with universities are considered important, such as the use of university experts to contribute to the R&D or as consultants on methodology, long-term frame contracts, joint academic posts, various fellowship schemes, and joint research projects. International experiences indicate that successful and productive networking of a NSI with universities involves a well-developed research infrastructure within the statistical agency. Preferably, an infrastructure should include such components as a well-documented research plan that fits with the agency's objectives, a scientific or professional board with representation from the academic community, and funds and procedures to support scientific research by staff members. Procedures and technologies implemented to grant access to the agency's anonymized microdata files by researchers located outside the NSI constitutes an increasingly important component of infrastructure.

A strong R&D infrastructure often accompanies a high level of networking. When both infrastructure and networking are well developed, the chances of a successful implementation of research results into the production of statistics tend to improve. The state-of-the-art in research cooperation of NSI's with universities will be highlighted in the paper. Case studies will be given. The main focus is in the EU countries. Empirical results are based on Lehtonen, Pahkinen and Särndal (2002) and Lehtonen and Särndal (2009).

In the paper, R&D work is defined according to the definition of the 2002 Frascati Manual (OECD, 2003). It is emphasized that the application of the concept of R&D in the context of Official statistics is not straightforward. Scientific research is carried out mainly in universities and other scientific communities. Statistical agencies, on the other hand, do not view scientific research as their main duty. However, they do consider scientific research to be an important basis for improving the quality of the Official statistics that they produce. Through their R&D work they strive to implement the results of scientific research into their statistics production processes. It can be seen that in the future, scientific networking with universities will be of increasing importance for small agencies in particular. One important recent feature is the increased visibility of Eurostat in fostering networking and similar cooperation activities between NSI's and universities.

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Professor Anthony C. Davison

(Institute of Mathematics, EPFL, Switzerland)

"Statistical Models for Spatial Extremes"

Friday, 22nd October 2010, 16:00-18:00
Room 037

Abstract:

As human society becomes more complex, it becomes more vulnerable to rare but catastrophic events, such as forest fires in Russia, the oil spill in the Gulf of Mexico, massive flooding in Pakistan, or the continuing turbulence in the financial markets. Assessment of the risks of such events involves the estimation of small probabilities and hence entails extrapolation into the tails of multivariate distributions, perhaps beyond any existing data. Proper assessment of such risks has become urgent as it becomes more and more apparent that climatic change will lead to events now seen as extreme becoming much more common. The mathematical basis for such extrapolation is the statistics of extremes. In this talk I shall first sketch the basis of the statistics of univariate extremes, based on the theory of regular variation, and then I will describe recent work on how these models may be extended to the multivariate and spatial settings, with applications to extreme rainfall and temperatures.

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Professor B. L. S. Prakasa Rao

(Department of Mathematics and Statistics, University of Hyderabad, India)

"Statistical Inference for Fractional Diffusion Processes"

Wednesday, 27 October 2010, 16:00-17:00
Room 37

Abstract:

Fractional diffusion process is a process satisfying a stochastic differential equation driven by a fractional Brownian motion. We present a brief review of properties of self-similar processes and fractional Brownian motion and discuss asymptotic properties of parameters involved in the trend coefficient in the parametric case and estimation of the trend function in the nonparametric case.

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Professor Alexander Goldenshluger

(Department of Statistics, University of Haifa, Israel)

"Adaptive Nonparametric Estimation by Selection of Estimators"

Friday, 29th October 2010, 16:00-18:00
Room 037

Abstract:

The talks are about adaptive nonparametric estimation of regression function. The first part will focus on the problem of adaptive estimation of univariate regression function. I will survey some techniques based on selection from collections of linear estimators. Related minimax and minimax adaptive results will be presented. In the second part I will discuss a general selection procedure that leads to adaptive minimax estimators of multivariate regression functions in a wide variety of estimation settings. In particular, the resulting estimators adapt both to unknown smoothness and structure of the function to be estimated. (The talk is based on joint work with Professor Oleg Lepski.)

UNIVERSITY OF CYPRUS
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Professor Rainer Dahlhaus

(Institute of Applied Mathematics, University of Heidelberg, Germany)

"Statistical inference for locally stationary processes"

Friday, 12th November 2010, 16:00-18:00
Room 037

Abstract:

Locally stationary processes are models for non-stationary time series whose behaviour can locally be approximated by a stationary process. In this situation the classical characteristics of the process such as the covariance function at some lag k, the spectral density at some frequency lambda, or e.g., the parameter of an AR(p)-process are curves which change slowly over time. The theory of locally stationary processes allows for a rigorous asymptotic treatment of various inference problems for such processes. Although technically more difficult many problems are related to classical curve estimation problems.

In the first part of the talk we give an overview over different methods of nonparametric curve estimation for locally stationary processes. We discuss stationary methods on segments, wavelet expansions, local likelihood methods and nonparametric maximum likelihood estimates.

In the second part of the talk we introduce the empirical spectral process as a powerful tool to investigate such processes. Many statistics of interest can be related to this empirical spectral process. We present a functional central limit theorem for such processes indexed by function spaces, a Bernstein type exponential inequality and a maximal-inequality. As an application we derive uniform rates of convergence for local parameter estimates and for estimates of the time varying spectral density.

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Professor Laurent Cavalier

(Centre de Mathematiques et Informatique, University Aix-Marseille, France)

"Oracle inequalities and the risk hull method in inverse problems"

Friday, 19th November 2010, 16:00-18:00
Room 037

Abstracts:

Talk 1:

There exist many fields where inverse problems appear. Some examples are: astronomy (blurred images of the Hubble satellite), econometrics (instrumental variables), financial mathematics (model calibration of the volatility), medical image processing (X-ray tomography), and quantum physics (quantum homodyne tomography). These are problems where we have indirect observations of an object (a function) that we want to reconstruct. We consider a statistical model of linear inverse problems $Y=Af+e$, where A a linear operator and e is a Gaussian white noise. This white noise model may be discretized in the spectral domain using the singular value decomposition (SVD), when the operator A is known and compact. We then obtain a sequence space model of statistical linear inverse problems where we need to estimate the unknown function f from indirect noisy observations. Let a finite set Λ of linear estimators be given. Our aim is to mimic the estimator in Λ that has the smallest risk on the true f. When the problem is mildly ill-posed, under general conditions, we show that this can be achieved by simple minimization of the unbiased risk estimator (URE). The main result is a non-asymptotic oracle inequality that is shown to be asymptotically exact. This inequality can be also used to obtain sharp minimax adaptive results. In particular, we apply it to show that minimax adaptation on ellipsoids in the multivariate anisotropic case is realized by the same method.

Talk 2:

We consider the Gaussian white noise model in inverse problems where A is a known compact operator with singular values converging to zero with polynomial decay. The unknown function f is recovered by a projection method using the SVD of A, a method that is also called the truncated SVD or spectral cut-off. The bandwidth choice N of this projection regularization is governed by a data-driven procedure which is based on the principle of the risk hull minimization (RHM). This new method may be presented as a penalized empirical risk minimization with a penalty slightly stronger than the usual URE (or Akaike) penalty. We provide non-asymptotic upper bounds for the mean square risk of this method and we show, in particular, that in numerical simulations, this approach may substantially improve the classical method of URE.

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Professor Yiannis Yatrakos

(Department of Hotel and Tourism Management, TEPAK, Cyprus)

"Statistical Decision Theory in Finance"

Friday, 26th November 2010, 16:00-17:00
Room 037

Abstract:

A decision theoretic approach is used in financial problems. Under mild conditions, the distribution of the logarithmic stock price return is obtained using theory from Le Cam's statistical experiments. It is shown that the fair price of European option can be obtained via a game with loss and profit and the minimum Bayes risk for 0-1 loss of a 2-parameter estimation problem obtained using the equivalent martingale probability. More results will be presented if time permits.