Una giornata dedicata alla statistica per i processi stocastici

A day devoted to statistics for stochastic processes

Giovedì 4 Maggio 2006, ore 11.00
Aula 4
Dipartimento di Ingegneria Gestionale e dell'Informazione
Università di Bergamo
Viale Marconi 5, Dalmine (BG)

Program

11.00-11.45 **Yury Kutoyants**
Laboratoire de Statistique et Processus
Faculté des Sciences - Université du Maine
Title: Invariant density estimation for ergodic diffusion processes.

11.45-12.30 **Alessandra Micheletti**
ADAMSS Centre and Department of Mathematics
University of Milan
Title: Birth and Growth Processes applied to crystallization processes.

12.30-13.00 **Ilia Negri**
Department of Management and Information Technology
University of Bergamo
Title: On optimality of the empirical distribution function for ergodic diffusion processes.

For more information and the abstract of the talks please refer to the web page:

http://www.unibg.it/pers/?ilia.negri

Abstract

Yury Kutoyants

TITLE: Invariant density estimation for ergodic diffusion processes.

ABSTRACT: We consider the problem of invariant density estimation by observations of ergodic diffusion process in the asymptotics of large samples. The trend coefficient is supposed to be unknown and the diffusion coefficient is a known positive function. First we consider the problem of estimation the density at one given point. We propose a lower minimax bound on the risks of all
estimators. Then we show that the local-time estimator, a wide class of unbiased estimators of the density and the wide class of kernel-type estimators are asymptotically efficient in the sense of this bound. Then we present similar results for the integral-type lower bound with quadratic loss function. Particularly all mentioned above estimators are asymptotically efficient in the sense of this bound too. The last problem is the second order bound in the same problem, i.e., we establish the lower bound on the risks of all estimators and then we construct second-order efficient estimator of the density.

Alessandra Micheletti
(Joint work with Dr. Stefano Patti, ADAMSS Centre and Department of Mathematics, UNIVERSITA' DEGLI STUDI DI MILANO)

TITLE: Birth and Growth Processes applied to crystallization processes.

ABSTRACT: Many physical, biological and chemical processes may be modelled as a birth-and-growth process (germ-grain model), which is composed of two processes, birth (nucleation), which is in general stochastic both in time and space, and subsequent growth of spatial cells (crystals). If we assume that at points of contact between two growing cells they stop growing, a random division of the relevant region in a d-dimensional space is obtained, known as a random Johnson-Mehl tessellation. In applications a quantitative description of the final spatial structure of the tessellation is of interest, in terms of the mean densities of interfaces (n-facets). Actually the coupling of the kinetic parameters of the birth-and-growth process with an underlying field (such as temperature or concentration of matter in a fluid) may induce time and space heterogeneities, thus motivating a more general analysis of the stochastic geometry of the germ-grain process. In this respect a crucial role is often played by the so called hazard function of the geometric process of space invasion by the germ-grain (crystallization) process. In this talk some models for birth and growth processes will be presented, leading to stochastic geometric differential equations; particular attention will be also payed to the related statistical problems.

Ilia Negri

TITLE: On optimality of the empirical distribution function for ergodic diffusion processes.

ABSTRACT: We consider the problem of nonparametric estimation of the stationary distribution function of an ergodic diffusion process. We suppose that the drift coefficient of the observed diffusion process is completely unknow whereas the diffusion coefficient is supposed to be known. The asymptotic efficiency of the empirical distribution function is studied under two different metrics: the sup norm and the L^2 norm. At first we establish a local asymptotic minimax lower bound for the risk of all the estimators using two different techniques for the two cases considered. The first is based on an abstract version of the Hajek--Le Cam theorem and on the convergence of the experiments of a suitable abstract Wiener space built on our model. The second technique consists on the reduction of our problem to a parametric one with parameter of increasing dimension and then applying the van Trees inequality to the obtained model. We prove that the empirical distribution function is efficient in the two cases, in the sense that its asymptotic risk attains the lower bounds established.