Tisdag 6 november 2018, Ingemar Kaj, Uppsala universitet

Titel: Fractional limit processes in shot noise models

Sammanfattning: A wide variety of random processes and spatial random fields arise naturally as Poisson shot noise models, with shots of random location and size. Such models with power-law size intensities, display a range of limit processes under aggregation and suitable scaling of parameters. We discuss the various scaling regimes and their limits, which include fractional Brownian motion, fractional Poisson type motions, and stable processes, Allowing for a type of dependence between shots, yet another hybrid Gaussian-Poisson model appears in the limit.

Tisdag 9 oktober 2018, Johan Tykesson, Chalmers Tekniska Högskola

Titel: Generalized Divide and Color models

Sammanfattning: In this talk, we consider the following model: one starts with a finite or countable set V, a random partition of V and a parameter p in [0,1]. The corresponding Generalized Divide and Color Model is the {0,1}-valued process indexed by V obtained by independently, for each partition element in the random partition chosen, with probability p, assigning all the elements of the partition element the value 1, and with probability 1-p, assigning all the elements of the partition element the value 0.

A very special interesting case of this is the "Divide and Color Model" (which motivates the name we use) introduced and studied by Olle Häggström. A number of quite varied well-studied processes actually fit into this context such as the Ising model, the stationary distributions for the Voter Model and random walk in random scenery.

Some of the questions which we study here are the following. Under what situations can different random partitions give rise to the same color process? What can one say concerning exchangeable random partitions? What is the set of product measures that a color process stochastically dominates? For random partitions which are translation invariant, what ergodic properties do the resulting color processes have? In the talk, we will focus most attention to the case when V is a finite set.

The talk is based on joint work with Jeff Steif.

Tisdag 28 augusti 2018, Chencheng Hao, Shanghai University of International Business and Economics

Titel: Estimation of Kronecker structured covariance based on modified Cholesky decomposition

Sammanfattning: This paper is to study covariance estimation problems for high dimensional matrix-valued data. We propose a covariance estimator for the matrix-valued data from penalized matrix normal likelihood. Modified Cholesky decomposition of covariance matrix is utilized to construct positive definite estimators. The method is applied for identify parsimony

and for producing a statistically efficient estimator of a large covariance matrix of matrix-valued data. Simulation results are illustrated.

Tisdag 12 juni 2018, Jean-Claude Zambrini, Department of Mathematics, University of Lisbon, Portugal

Titel: Stochastic Deformation of Classical Integrability

Sammanfattning: Is it possible to deform, along quantum-like trajectories, one of the deepest notions of ODE's theory, the one of integrable systems?

We shall start from a classical example, then summarize the method of Stochastic Deformation. It will provide a way to deform Jacobi's strategy to reach this goal in the classical, deterministic, case. This talk is founded on a joint work with C. Léonard (Paris-Ouest Nanterre).

Tisdag 5 juni 2018, Vlad Bally, Université Paris-Est Marne-la-Vallée, Frankrike

Titel: Asymptotic integration by parts formula and regularity of probability laws

Sammanfattning: We consider a sequence of random variables $F_n \sim p_n(x)dx$ which converge to a random variable F. If we know that $p_n \to p$ in some sweated sense, then we obtain $F \sim p(x)dx$. But in many interesting situations p_n blows up as $n \to \infty$. Our aim is to give a criterion which says that, if there is a "good equilibrium" between $\|F - F_n\|_1 \to 0$ and $\|p_n\| \uparrow \infty$ then we are still able to obtain the absolute continuity of the law of F and to study the regularity of the density p. Moreover we get some upper bounds for p. The blow up of p_n is characterized in terms of integration by parts formulae.

We give two examples. The first one is about diffusion processes with Hölder coefficients. The second one concerns the solution $f_t(dv)$ of the two dimensional homogeneous Boltzmann equation. We prove that, under some conditions on the parameters of the equation, we have $f_t(dv) = f_t(v)dv$. The initial distribution $f_0(dv)$ is a general measure (except a Dirac mass) so our result says that a regularization effect is at work; moreover, if the initial distribution has exponential moments $\int e^{|v|^\lambda} f_0(dv) < \infty$, then we prove that $f_t(v) \leq Ct^{-\eta} e^{-|v|^{\lambda'}}$ for every $\lambda' < \lambda$. So we have exponential upper bounds in space and at most polynomial blow up in time.

Onsdag 2 maj 2018, Katarzyna Filipiak, Poznań University of Technology, Polen

Titel: Testing hypotheses about covariance structures under multi-level multivariate models using Rao score

Sammanfattning: Modern experimental techniques allow to collect and store multi- level multivariate data in almost all fields such as agriculture, biology, biomedical, medical, environmental and engineering areas, where the observations are collected on more than one response variable at different locations, repeatedly over time, and at different ”depths”, etc. Before any statistical analysis it is vital to test the appropriate mean and variance-covariance structures on the multi-level multivariate observations.

In this talk the Rao's score test (RS) statistic for testing the hypotheses about variance-covariance structures, such as e.g. separable structures with one component structured or exchangeable structures, is presented. It is shown that the distribution of the RST statistic under the null hypothesis of any separability does not depend on the true values of the mean or the unstructured components of the separable structure. A significant advantage of the RST is that it can be performed for small samples, even smaller than the dimension of the data. Monte Carlo simulations are then used to study the behavior of the empirical type I error as well as the empirical null distribution of the RST statistic with respect to the sample size. It is shown that RST outperforms the commonly used likelihood ratio test in all considered areas.

References:

[1] Roy, A., K. Filipiak, and D. Klein (2018). Testing a block exchangeable covariance matrix. Statistics 52(2), 393–408.

[2] Filipiak, K., D. Klein, and A. Roy (2017). A comparison of likelihood ratio tests and Rao's score test for three separable covariance matrix structures. Biometrical Journal 59, 192–215.

[3] Filipiak, K., D. Klein, and A. Roy (2016). Score test for a separable covariance structure with the first component as compound symmetric correlation matrix. Journal of Multivariate Analysis 150, 105–124.

Tisdag 20 mars 2018, Béatrice Byukusenge, Matematiska institutionen, Linköpings universitet

Titel: Estimation and residual analysis in the GMANOVA-MANOVA model

Sammanfattning: In this talk we will consider the GMANOVA-MANOVA model, which is a special case of an extended growth curve model, with no assumption of the nested subspace condition. We derive two residuals, establish their properties and give interpretation. Finally, a numerical example on a data set from a study that was conducted to investigate two treatments for patients suffering from multiple sclerosis is performed to validate the theoretical results.

Tisdag 13 mars 2018, Silvelyn Zwanzig, Uppsala universitet

Titel: On high dimensional data analysis under errors in variables

Sammanfattning: Errors in variables induce additional complications already in models with $p<n$. The total least squares estimator is theoretically the best estimator in this case. In literature methods are presented for high dimensional sparse models with errors in variables. In the talk I will study the behavior of total least squares estimator for non sparse models with $n << p$ and propose a generalized version of it.

Tisdag 13 februari 2018, Kevin Schnelli, KTH

Titel: Local law of addition of random matrices on optimal scale

Sammanfattning: Describing the eigenvalue distribution of the sum of two general Hermitian matrices is basic question going back to Weyl. If the matrices have high dimensionality and

are in general position in the sense that one of them is conjugated by a random Haar unitary matrix, the eigenvalue distribution of the sum is given by the free additive convolution of the respective spectral distributions. This result was obtained by Voiculescu on the macroscopic scale. In this talk, I show that it holds on the microscopic scale all the way down to the eigenvalue spacing. This shows a remarkable rigidity phenomenon for the eigenvalues.

Seminarier i Matematisk statistik

2017

Tisdag 21 februari 2017, Alex Teterukovsky, If Skadeförsäkring
Titel: Non-life (re)insurance pricing: an introduction

Sammanfattning: Insurance is about transferring risks between parties. A party who assumes a risk or a portfolio of risks is normally compensated by the other so-called ceding party. We will look into principles for how this compensation is calculated from both sides. The seminar will cover risk-based pricing of single risks, as well as portfolios of risks, both from the perspective of the insured and from that of the insurer.

Special attention will be given to reinsurance pricing, i.e. the transfer of risks from the insurer to other insurers. The seminar will focus on practical issues insurance companies face in their daily work.

Take your pens with you, as we'll try to have a hands-on pricing exercise, if time permits.

Måndag 20 mars 2017, Serik Sagitov, Matematisk statistik, Chalmers
Titel: Galton-Watson processes with the expectation kernel having an atom

Sammanfattning: Branching processes with infinitely many types are usually studied under the assumptions of the Perron-Frobenius theorem for the expectation kernels. The Perron-Frobenius eigenvalue then gives the growth rate of the process allowing to distinguish between subcritical, critical, and supercritical reproduction regimes.

We consider Galton-Watson processes with a general type space whose expectation kernels have a particular structure, ensuring the existence of an embedded single-type branching process. The mean offspring number of the embedded process can be used as a criticality gauge for the multi-type Galton-Watson process even outside the Perron-Frobenius zone.

The talk will be given on a level suitable for Ph.D. students.

Tisdag 18 april 2017, Mathias Lindholm, Matematisk statistik, Stockholms Universitet
Titel: On connections between some classical mortality laws and proportional frailty

Sammanfattning: We provide a simple frailty argument that produces the Gompertz-Makeham mortality law as the population hazard rate under the assumption of proportional frailty given a common exponential hazard rate. Further, based on a slight generalisation of the result for the Gompertz-Makeham law the connection to Perks and Beard's mortality laws are discussed.

Moreover, we give conditions for which functional forms of the baseline hazard that will yield proper frailty distributions given that we want to retrieve a certain overall population hazard within the proportional frailty framework.

Tisdag 16 maj 2017, Thomas Holgersson, Nationalekonomi och statistik, Linnéuniversitetet
Titel: Weak convergence of individual Mahalanobis distances

Sammanfattning: Mahalanobis distance (MD) is used in a wide range of applications, such as graphical analysis, outlier detection, discriminant analysis, multivariate calibration, non-normality testing, construction of process control charts and many others. Although the distributional properties of sample MD´s are well developed in the case of finite dimension, little is known about the behavior in high-dimensional settings. We present some types of weak convergence of sample Mahalanobis distances, along with some other limiting properties.

Onsdag 20 september 2017, Erik Broman, Chalmers tekniska högskola
Titel: Covering a subset of R^d by Poissonian random sets

Sammanfattning: The problem of covering a set A by a collection of random sets dates back to Dvoretzky in 1954. Since then, a host of papers have been written on the subject. In this talk we shall review some of this history and discuss two directions in which progress have recently been made.

In the first case we consider a statistically scale invariant collection of subsets of R^d, which are chosen at random according to a Poisson process of intensity lambda. The complement of the union of these sets is then a random fractal that we denote by C. Such random fractals have been studied in many contexts, but here we are interested in the critical value of lambda for which the set C is almost surely empty (so that R^d is completely covered). Such problems were earlier studied and solved in one dimension, while here we shall present recent progress which solves it in all dimensions. This part is based on joint work with J. Jonasson and J. Tykesson.

In the second direction we consider a dynamic version of coverings. For instance, the set A could be a box of side lengths n, and then balls are raining from the sky at unit rate. One then asks for the time at which A is covered. Together with F. Mussini I have recently studied a variant in which the balls are replaced by bi-infinite cylinders. This makes the problem fundamentally different as one no longer have independence between well separated regions. Thus, new methods and techniques must be used. Our main result is that we find the correct asymptotics for the cover time as the set A grows.

Tisdag 17 oktober 2017, Joanna Tyrcha, Stockholms universitet
Titel: Stochastic Gene Switches

Sammanfattning: The timing of key events in the eukaryotic cell cycle is remarkably stochastic. Special attention had been paid to the START transition, when the cell starts to synthesize DNA. Experiments have shown that START in budding yeast proceeds in two distinct steps, both of which are stochastic. We look at the cellular reactions responsible for the stochasticity in these and similar transitions. Their dynamics can be described by stochastic differential equations, allowing us to write a path-integral representation for the transition rate. We study also the bursting limit in which we can eliminate the mRNA of our model if we study an appropriate time scale.

Tisdag 14 november 2017, Daniel Ahlberg, Stockholms universitet
Titel: Random coalescing geodesics in first-passage percolation

Sammanfattning: Since the work of Kardar-Parisi-Zhang in the mid 1980s, it has been widely believed that a large class of two-dimensional growth models should obey the same asymptotic behaviour. This behaviour stands in contrast to one-dimensional behaviour where fluctuations are dictated by the central limit theorem. To rigorously understand the predictions of KPZ-theory has become one of the most central themes in mathematical physics. One prominent model believed to belong to this class is known as first-passage percolation. It can be interpreted as the random metric on Z^2 obtained by assigning non-negative i.i.d. weights to the edges of the nearest neighbour lattice. We shall discuss properties of geodesics in this metric and their connection to KPZ-theory. As a first step in this direction, we answer a question posed by Benjamini, Kalai and Schramm in 2003, that has come to be known as the 'midpoint problem'. This is joint work with Chris Hoffman.

Tisdag 12 december 2017, Astrid Hilbert, Linnéuniversitetet
Titel: Asymptotic Behaviour in Time of a Singular Stochastic Newton Equation

Sammanfattning:

Asumptotic Behaviour in Time for a Singular Stochastic Newton Equation

Astrid Hilbert

Christiansen et al. [1], Phys. Rev. E **54**, introduced a focusing formal 2D non-linear Schrödinger equation, perturbed by a damping term, and driven by multiplicative noise. The question in focus is whether collapse of the wave function occurs, i.e. whether the width of the wave function vanishes in finite time, while its L^2 value is conserved, which means explosion of solutions. Being a formal equation only, its rigorous meaning would need further discussion in the first place. This difficulty was by-passed in [1] by introducing the following family of trial wave functions:

$$\Psi(u,t) := C\|\Psi(\cdot,0)\|_{L_2}\tfrac{1}{x(t)} f\left(\tfrac{|u|}{x(t)}\right)\exp\left[i\tfrac{\dot{x}(t)|u|^2}{4x(t)}\right],$$

where $f:\mathbf{R}\to(0,\infty)$ is a rapidly decreasing function and x is an unknown stochastic process describing the width of the corresponding non-linear wave function. In order to answer the question in focus a function f and a process x need to be specified to i) match the trial functions to the non-linear wave function and ii) study whether an appropriate x reached the origin a.s. in finite time. This work answers part ii), with a process x satisfying the singular degenerate system of SDE's:

$$dx(t) = y\,dt, \qquad dy(t) = \frac{1}{x^\alpha}dt - \frac{\gamma}{x^{2\beta}}dt + \frac{\sqrt{2T\gamma}}{x^\beta}dW_t,$$

where the physical relevance of the constants may be found in *arXiv:1405.0151*. Beyond existence an uniqueness of solutions we focus on the large time asymptotics of the solutions. For the existence proof methods of Cerny and Engelbert are extended to the 2D system.
Based on joint work with S. Assing, Warwick University.

2016

Tisdag 19 januari 2016, Tõnu Kollo, Institute of Mathematics and Statistics, University of Tartu
Titel: On Skewed Multivariate Distributions

Sammanfattning: Skew-symmetric elliptical distributions will be of interest and estimation of their parameters discussed. Explicit expressions of the estimators by the method of moments are presented for some distributions with help of multivariate skewness and kurtosis measures.

Construction of copulas from skew-elliptical distributions is considered and some properties of these copulas is discussed.

Tisdag 26 januari 2016, Xiangfeng Yang, MAI, Linköpings universitet
Titel: Large deviations for longest runs

Sammanfattning: In the first n tosses of a coin, the longest head/success run L(n) is the longest stretch of consecutive heads/successes. The same definition can be also given in the first n steps of a two-state Markov chain. The longest run is the basic object in a consecutive-k-out-of-n system, and it finds other applications such as in statistics. In this talk we will firstly review some well known properties of L(n), and then present several new results on large deviations of L(n). An application in statistical inference will be mentioned as well, together with several possible extensions such as comparing two DNA sequences.

Tisdag 23 februari 2016, David Bolin, Mathematical statistics, Chalmers University
Titel: Quantifying the uncertainty of contour maps

Sammanfattning: Contour maps are widely used to display estimates of spatial fields. Instead of showing the estimated field, a contour map only shows a fixed number of contour lines for different levels. However, despite the ubiquitous use of these maps, the uncertainty associated with them has been given a surprisingly small amount of attention. We derive measures of the statistical uncertainty, or quality, of contour maps, and use these to decide an appropriate number of contour lines, that relates to the uncertainty in the estimated spatial field. For practical use in geostatistics and medical imaging, computational methods are constructed, that can be applied to Gaussian Markov random fields, and in particular be used in combination with integrated nested Laplace approximations for latent Gaussian models. The methods are demonstrated on simulated data and an application to temperature estimation is presented.

Tisdag 22 mars 2016, Göran Bergqvist, MAI, Linköpings universitet
Titel: Generalised eigenvalues of random matrices and rank of random tensors

Sammanfattning: A rank-1 order-d tensor or multi-array is the tensor product of d vectors, and the rank of a tensor T is the minimum number of rank-1 tensors needed in a sum that equals T. Assuming elements of some continuous probability distribution, a random matrix or order-2 tensor has full rank with probability 1. For higher-order real random tensors several ranks can occur with positive probability. We show how knowledge about the distribution of real generalised eigenvalues of random matrices can be used to find rank probabilities for order-3 random tensors of size n x n x 2, and find exact values of rank probabilities for such tensors with independent standard Gaussian entries. These are the only known exact results for tensor rank probabilities. This is partly joint work with Peter Forrester.

Tisdag 19 april 2016, Thomas Önskog, Mathematical Statistics, KTH
Titel: Stochastic differential equations on non-smooth time-dependent domains

Sammanfattning: The Skorohod problem is an important tool for constructing solutions to stochastic differential equations with reflection. In this talk, I give an introduction to the Skorohod problem and show how it can be used to prove existence and uniqueness of strong solutions to stochastic differential equations with oblique reflection on non-smooth time-dependent domains whose boundary is Hölder continuous in time. Crucial to the proof is the construction of certain test functions that can also be used to prove existence and uniqueness of viscosity solutions to fully nonlinear second-order parabolic partial differential equations with oblique derivative boundary conditions. The presented results generalize earlier results by Dupuis and Ishii to the setting of time-dependent domains. The talk is based on joint work with Niklas Lundström at Umeå University.

Onsdag 4 maj 2016, Miguel Fonseca, Center of Mathematics and Applications, NOVA University of Lisbon
Titel: Hypothesis testing in variance components with constraints

Sammanfattning: In this paper we will introduce an hypothesis test for variance components for balanced one-way and two-way nested models.

Unlike the classical F-test, it takes into account the natural constraint of positivity for variance components. It is also applicable when the assumption of normality does not hold and in the presence of outliers. Simulations are performed in order to ascertain the performance of the proposed hypothesis tests.

Tisdag 17 maj 2016, Taras Bodnar, Mathematical Statistics, Stockholm University
Titel: Exact and Asymptotic Tests on a Factor Model in Low and Large Dimensions with Applications

Sammanfattning: We suggest three tests on the validity of a factor model which can be applied for both small dimensional and large dimensional data.

Both the exact and asymptotic distributions of the resulting test statistics are derived under classical and high-dimensional asymptotic regimes. It is shown that the critical values of the proposed tests can be calibrated empirically by generating a sample from the inverse Wishart distribution with identity parameter matrix. The powers of the suggested tests are investigated by means of simulations. The results of the simulation study are consistent with the theoretical findings and provide general recommendations about the application of each of the three tests. Finally, the theoretical results are applied to two real data sets, which consist of returns on stocks from the DAX index and on stocks from the S&P 500 index. Our empirical results do not support the hypothesis that all linear dependencies between the returns can be entirely captured by the factors considered in the paper.

Tisdag 24 maj 2016, Daniel Klein, P.J. Safarik University, Slovakien
Titel: Testing mean under compound symmetry covariance setup

Sammanfattning: Geisser 1963 discussed the problem of testing the mean in the normal model under compound symmetry covariance structure. Szatrowski 1982 discussed estimation

and testing block compound symmetry problem. Very recently we arrived to the solution of this problem as a natural extension of the Hotelling's T^2 test statistic, which seemed to be very easy; the solution was obtained via orthogonal transformation which diagonalize (or block-diagonalize) the variance matrix of the transformed vector. Natural question arrised afterwards: Is the solution independent to this transformation? We will discuss this question.

Tisdag 4 oktober 2016, Timo Koski, Matematisk statistik, KTH
Titel: The Minimal Hoppe-Beta Prior Distribution for Directed Acyclic Graphs and Structure Learning

Sammanfattning: This talk gives a new prior distribution over directed acyclic graphs intended for structured Bayesian networks, where the structure is given by an ordered block model. That is, the nodes of the graph are objects which fall into categories or blocks; the blocks have a natural ordering or ranking. The presence of a relationship between two objects is denoted by a directed edge, from the object of category of lower rank to the object of higher rank. Hoppe's urn scheme is invoked to generate a random block scheme.

The prior in its simplest form has three parameters that control the sparsity of the graph in two ways; implicitly in terms of the maximal directed path and explicitly by controlling the edge probabilities.

We consider the situation where the nodes of the graph represent random variables, whose joint probability distribution factorizes along the DAG.

We use a minimal layering of the DAG to express the prior. We describe Monte Carlo schemes, with a similar generative that was used for prior, for finding the optimal a posteriori structure given a data matrix.

This is joint work with J. Noble (Univ. of Warsaw) and Felix Rios (KTH).

Tisdag 8 november 2016, Mikhail Lifshits, MAI, Linköpings universitet och St. Petersburg State University
Titel: Some extensions of linear prediction/approximation problems for stationary processes

Sammanfattning: In this talk, we consider a problem of linear approximation for stationary random processes and for processes with stationary increments with discrete or continuous time. This setting extends the classical problem of linear prediction: along with prediction quality, optimization has to take into account some other properties of approximating process, such as, for example, the amount of kinetic energy spent in its approximation efforts.

In this generalized setting, we also obtain the extentions of the classical Kolmogorov-Krein results on error-free prediction and that of Kolmogorov on error-free interpolation.

This is a joint work with I. Ibragimov (Russian Academy of Science) and Z. Kabluchko (Muenster University, Germany).

Tisdag 6 december 2016, Igor Rychlik, Mathematical Sciences, Chalmers
Titel: Spatio-temporal model for wind speed variability

Sammanfattning: Investments in wind energy harvesting facilities are often high. At the same time uncertainties for the corresponding energy gains are large. Therefore a reliable model to describe the variability of wind speed is needed to estimate the expected available wind power and other statistics of interest, e.g. coefficient of variation, expected length of the wind conditions favorable for the wind-energy harvesting etc.

Wind speeds are modeled by means of a spatio-temporal transformed Gaussian field. Its dependence structure is localized by introduction of time and space dependent parameters in the field.

The model has the advantage of having a relatively small number of parameters. These parameters have natural physical interpretation and are statistically fitted to represent variability of observed wind speed in ERA Interim reanalysis data set. Some validations and applications of the model will be presented.

2015

Tisdag 27 januari 2015, Takis Konstantopoulos, mathematical statistics, Uppsala University
Titel: Runs in coin tossing: a general approach for deriving distributions for functionals

Sammanfattning: We take a fresh look at the classical problem of runs in a sequence of i.i.d. coin tosses and derive a general identity/recursion which can beused to compute (joint) distributions of functionals of run types. This generalizes and unifies already existing approaches. We give several examples, derive asymptotics, and pose some further questions.

Joint work with Lars Holst.

Tisdag 10 februari 2015, Joseph Nzabanita, Mathematical Statistics, MAI, Linköpings universitet
Titel: Extended GMANOVA model with a linearly structured covariance matrix

Sammanfattning: We consider the problem of estimating a linearly structured covariance matrix in the extended GMANOVA (Generalized Multivariate Analysis of Variance) model. In the talk we will show how a decomposition of the residual space, the orthogonal complement to the design space, into m + 1 orthogonal subspaces and a study of residuals obtained from projections of observations on these subspaces yields explicit consistent estimators of the covariance matrix. An explicit consistent estimator of the mean will be also given.

Tisdag 24 mars 2015, Erik Ekström, Mathematical Statistics, Uppsala University
Titel: The inverse first-passage problem and optimal stopping

Sammanfattning: Given a survival distribution on the positive half-axis and a Brownian motion, a solution of the inverse first-passage problem consists of a boundary so that the first passage time over the boundary has the given distribution. We show that the solution of the inverse first-passage problem coincides with the solution of a related optimal stopping problem. Classical methods in optimal stopping theory thus may be applied in the study of the inverse first-passage problem.

Tisdag 21 april 2015, Yuli Liang, Statistics, Stockholm University
Titel: Hypothesis Testing of Patterned Covariance Matrices: Two Situations

Sammanfattning: Testing in multivariate normal models with two types of patterned covariance matrices are considered. In the models with a covariance structure based on the Kronecker product of compound symmetry matrices, we explore possible methods to combine testing procedures based on a certain number of independent F-tests. To compare the performance of the new combined test procedures with the so-called higher-order accurate testing procedures, we compute the attained significance level and the empirical power. In the models with a block circular covariance structure, we consider various hypotheses concerning testing mean and covariance matrices. The corresponding likelihood ratio test statistics are derived and their distributions are studied.

Torsdag 4 juni 2015, Alexandre Lyambaje, University of Rwanda
Titel: An Economic Evaluation of SPREAD on Rwanda's Rural Population

Sammanfattning: Sustainable Partnerships to Enhance Rural Enterprises and Agricultural Development (SPREAD) was a program to enhance the value chain for commodities in Rwanda including coffee. The implicit concept was that improving the value chain would increase the incomes for smallholders and, hence, reduce the poverty rate. The results indicate that Rwanda coffee prices increased relative to an index price for traded coffee with the implementation of SPREAD. In addition, the results indicate that participation in the coffee market at this time was associated with higher household income and lower rates of poverty.

Onsdag 10 juni 2015, Miguel Fonseca, Center of Mathematics and Applications, NOVA University of Lisbon
Titel: Optimal Estimation for Doubly Multivariate Data in Blocked Compound Symmetric Covariance Structure

Sammanfattning: The paper deals with the best unbiased estimators of the blocked compound symmetric covariance structure for $m-$variate observations over u sites under the assumption of multivariate normality. The free-coordinate approach is used prove thay the quadratic estimation of covariance parameters is equivalent to linear estimation with a properly defined inner product in the space of symmetric matrices. Complete statistics are then derived to prove that the estimators are best unbiased. Finally, strong consistency is proven.

Tisdag 8 september 2015, Måns Thulin, Statistik, Uppsala universitet
Titel: Multivariate tests with censored data

Sammanfattning: The one-way MANOVA problem of testing whether the mean vectors of several populations differ is common in many fields of research. In medicine, the rapid advance of high-throughput technologies has led to an increased interest in multivariate sets of biomarkers in e.g. blood samples. Such biomarkers can be used to understand different diseases and how they are affected by treatments and covariates. Biomarker data is often left-censored because some measurements fall below the laboratory's detection limit. I will discuss some problems caused by censoring; in particular how censoring affects multivariate two-sample and one-way MANOVA tests, in terms of size and power. Classical parametric tests are found to perform better than nonparametric alternatives, which means that the current recommendations for analysis of censored multivariate data have to be revised. The good performance of the classical parametric tests can at least partially be explained by some asymptotic results related to multivariate skewness and kurtosis. If time permits, I will also discuss MANOVA for multivariate survival data.

Tisdag 6 oktober 2015, Michael Höhle, Matematisk statistik, Stockholms universitet

Titel: Outbreak detection in the presence of reporting delays

Sammanfattning: Outbreak detection algorithms are statistical process control based procedures for the on-line identification of change-points in count time series, e.g., representing weekly reported cases of a particular disease. Inherent reporting delays in the underlying surveillance system collecting these data are here an impediment towards timely detection of outbreaks.

In this talk, I'll present a novel statistical algorithm, which considers the obtained time series as an incomplete two-way contingency table to be analyses by a negative binomial regression model. Bayesian inference based on the predictive posterior is performed both by asymptotic Bayes and integrated nested Laplace approximations. Simulation studies as well as the time series of reported Salmonella Newport cases in Germany in 2011 are then used to evaluate and illustrate the method.

Literature: Bayesian outbreak detection in the presence of reporting delays (2015), Salmon M, Schumacher D, Stark K, Höhle M. Biometrical Journal, Epub ahead of print -- http://dx.doi.org/10.1002/bimj.201400159.

Tisdag 3 november 2015, Sergey Zuev, Mathematical Statistics, Chalmers University
Titel: Thinning and branching-stable point processes as a model for bursty spatial data

Sammanfattning: Thinning-stable point processes are important class of generally infinite intensity point processes since they are exactly the processes arising as a limit in superposition-thinning schemes. It can shown that these processes are exactly Cox (doubly stochastic Poisson) processes with strictly stable random intensity measures and, in a regular case, they are cluster processes with a specific heavy tailed distribution of cluster size. The cluster representation uses the so-called Sibuya point processes that constitute a new family of purely random point processes. Based on this facts, we develop statistical inference for stable processes and also discuss their generalisation when the thinning operation is replaced by a stochastic operation based on branching.

Tisdag 1 december 2015, Jakob Björnberg, Mathematical Statistics, University of Copenhagen
Titel: Random permutations related to quantum Heisenberg models

Sammanfattning: The interchange process (or random-transposition random walk) is a model for random permutations which is closely related to a model from quantum statistical physics (the ferromagnetic Heisenberg model). In fact, certain 'cycle-weighted' interchange processes are equivalent to the latter, and in this talk we present results on such processes. Magnetic ordering in the physical model translates to the occurrence of large cycles in the random permutation.

We focus on the case when the underlying graph is the complete graph (i.e. the 'mean-field' case in physical jargon). By a combination of probabilistic techniques and some group character theory we can obtain nice formulas for expectation values in the model, and then use these to identify the critical point.

Onsdag 9 december 2015, Hans Jürgen Engelbert, Friedrich Schiller-University, Jena, Tyskland
Seminariet är ett gemensamt seminarium med Matematiska kollokviet.

Titel: Stochastic Differential Equations for Sticky Reflecting Brownian Motion

Sammanfattning: We study the 'ordinary' stochastic differential equation (SDE) with irregular drift and diffusion coefficients

$$X_t = x_0 + \mu \int_0^t 1_{\{0\}}(X_u)\, du + \int_0^t 1_{(0,+\infty)}(X_u)\, dB_u, \quad t \geq 0\,,$$

where $x_0 \in \mathbb{R}_+$ is the initial state and $(B, \mathbb{F})$ is a standard Brownian motion. It turns out that the equation above is equivalent to a system of equations involving local time at state 0 and the occupation time of the solution at state 0, and a solution $(X, \mathbb{F})$ will be called \textit{sticky reflecting Brownian motion} with stickiness parameter $\mu \in (0, \infty)$. The limiting cases $\mu = 0$ and $\mu = \infty$ correspond to an absorbing Brownian motion and an immediately reflecting Brownian motion, respectively. We prove that the SDE has a jointly unique weak solution but no strong solution. The latter fact verifies Skorokhod's conjecture on sticky reflecting Brownian motion and provides alternative arguments to those given in the literature.

2014

Tisdagen 11 februari 2014, Xiangfeng Yang, MAI, Linköpings universitet
Titel: Large deviations for Markov bridges

Tisdag 11 mars 2014, Holger Rootzén, Mathematical Statistics, Chalmers University of Technology
Titel: Efficient estimation of the number of false positives in high-throughput screening

Sammanfattning: This talk is about tail estimation methods to handle false positives in very highly multiple testing problems where testing is done at extreme significance levels and with low degrees of freedom, and where the true null distribution may differ from the theoretical one. We show that the number of false positives, conditional on the total number of positives, approximately has a binomial distribution, and find estimators of its parameter. We also develop methods for estimation of the true null distribution, and techniques to compare it with the theoretical one. Analysis is based on a simple polynomial model for the tail of the distribution of p-values. Asymptotics which motivate the model, properties of the parameter estimators, and model checking tools are provided. The methods are applied to two large genomic studies and an fMRI brain scan experiment.

Tisdag 8 april 2014, Jimmy Olsson, Mathematical Statistics, KTH
Titel: Comparison of asymptotic variances of inhomogeneous Markov chains with applications to Markov Chain Monte Carlo methods

Sammanfattning: In this talk we will discuss the asymptotic variance of sample path averages for inhomogeneous Markov chains evolving alternatingly according to two different π-reversible Markov transition kernels. More specifically, we define a partial ordering over the pairs of π-reversible Markov kernels that allows us to compare directly the asymptotic variances for the inhomogeneous Markov chains associated with each pair. As an important application we use our result for comparing different data-augmentation-type Metropolis Hastings algorithms. In particular, we compare some pseudo-marginal algorithms and propose a novel exact algorithm, referred to as the random refreshment algorithm, which is more efficient, in terms of asymptotic variance, than the Grouped Independence Metropolis Hastings algorithm and has a computational complexity that does not exceed that of the Monte Carlo Within Metropolis algorithm.

Tisdag 6 maj 2014, Cecilia Holmgren, Mathematical Statistics, SU
Titel: Using Stein Couplings for the Study of Fringe Trees

Sammanfattning: The binary search tree (in computational science known as Quicksort, the most used of all sorting algorithms) and the random recursive tree are important examples of random trees. We have examined fringe trees ("small" subtrees) in these two types of random trees.

The use of certain couplings based on Stein's method allow provision of simple proofs showing that in both of these trees, the number of fringe trees of size k, where k tends to infinity, converges to a Poisson distribution. Furthermore, combining these results and another version of Stein's method, we can also show that for k=o(sqrt{n}) (where n is the size of the whole tree) the number of fringe trees in both types of random trees converges to a normal distribution.

We can then use these general results on fringe trees to obtain simple solutions to a broad range of problems relating to random trees; as an example, we obtain a simple proof showing that the number of protected nodes in the binary search tree has a normal distribution. (Joint work with Svante Janson, Uppsala University.)

Tisdag 27 maj 2014, Daniel Klein, P.J. Safarik University, Slovakien
Titel: Testing of multivariate data with block compound symmetry covariance structure

Sammanfattning: It is well-known that Hotelling's T^2 test is the conventional method to test the equality of mean vectors in two populations. However, Hotelling's T^2 statistic is based on the unbiased estimate of the unstructured variance-covariance matrix. Nevertheless, the variance-covariance matrix may have some structure, and one should use an unbiased estimate of that structure to test the equality of mean vectors. A natural extension of the Hotelling's T^2 statistic, called the Block T^2 statistic, is obtained for doubly multivariate data for q response variables at p time points in block compound symmetric covariance matrix setting. The minimum sample size needed for this test is only $q + 1$, unlike $pq + 1$ in Hotelling's T^2 test.

Tisdag 2 september 2014, Muni S. Srivastava, University of Toronto, Kanada
Titel: Tests For Covariance Matrices in High Dimension with Less Sample Size

Samanfattning: In this article, we propose tests for covariance matrices of high dimension with fewer observations than the dimension for a general class of distributions with positive definite covariance matrices. In one-sample case, tests are proposed for sphericity and for testing the hypothesis that the covariance matrix $\bSi$ is an identity matrix, by providing an unbiased estimator of $\tr[\bSi^2]$ under the general model which requires no more computing time than the one available in the literature for normal model. In the two-sample case, tests for the equality of two covariance matrices are given. The asymptotic distributions of proposed tests in one-sample case are derived under the assumption that the sample size N = $O(p^\delta)$, $1/2 < \delta < 1$, where p is the dimension of the random vector.

Keywords & Phrases: Asymptotic distributions, covariance matrix, high dimension, non-normal model, sample size smaller than dimension, test statistics.

Tisdag 23 september 2014, Stanislav Volkov, Mathematical Statistics, Lund University
Titel: On random geometric subdivisions

Sammanfattning: I will present several models of random geometric subdivisions, similar to that of Persi Diaconis and Laurent Miclo (Combinatorics, Probability and Computing, 2011), where a triangle is split into 6 smaller triangles by its medians, and one of these parts is randomly selected as a new triangle, and the process continues ad infinitum. I will show that in a similar model the limiting shape of an indefinite subdivision of a quadrilateral is a parallelogram. I will also show that the geometric subdivisions of a triangle by angle bisectors converge (but only weakly) to a non-atomic distribution, and that the geometric subdivisions of a triangle by choosing a uniform random points on its sides converges to a flat triangle, similarly to the result of the paper mentioned above.

Tisdag 7 oktober 2014, Rolf Larsson, Mathematical Statistics, Uppsala University
Titel: Confidence distributions and nuisance parameters

Sammanfattning: We study hypothesis testing using confidence distributions for two parameters, where one of them is of interest and the other one is a nuisance parameter. Under asymptotic normality of parameter estimates, we introduce a framework where the ideas of integrating out or maximizing w.r.t the nuisance parameter (profiling) appear as extreme cases. In particular, three examples are considered: testing that the higher order parameter in an autoregressive process of order two is zero, testing that the moving average parameter is zero in the simplest autoregressive moving average model, ARMA(1,1), and testing equality of two binomial proportions. Overall, integrating is to be preferred over profiling, although problems can occur in the ARMA case due to identification issues. Moreover, in the binomial example, we illustrate how we may find a useful compromise between the two methods in terms of robustness of size when varying the nuisance parameter.

Tisdag 4 november 2014, Patrik Albin, Mathematical Statistics, Chalmers
Titel: On the Existence of Fake Brownian Motions

Sammanfattning: We construct a continuous martingale $M(t); t \geq 0$ with the same univariate marginal distributions N(0,t) as Brownian motion, but that is not Brownian motion. We learned about this problem some years ago from a seminar given by Fima C Klebaner at Chalmers and solved it some time thereafter.

2013

29 januari 2013
Ergodic properties for the conditional distribution of partially observed Markov chains

Thomas Kaijser, Mathematical Statistics, Linköping University

Abstract: Suppose we want to investigate the properties of a stochastic process using some kind of observation system. As a model for the stochastic process we use a Markov kernel, and similarly for the observation process. (A model of this type is nowadays often called a Hidden Markov Model(HMM) or State Space Model; as a special case we have the so-called Kalman filter.) The interest in such models has been very great the last two (three) decades, and HMMs have e.g. been applied to speech recognition and gene-finding in DNA. The problem, that I have been interested in, is to find conditions which imply ergodic properties for the conditional distribution of the Markov chain, given the observations. (This problem is mainly of theoretical interest, with no immediate practical applications.) My plan is to give a historical overview of this problem and to present some recent results.

14 februari 2013
Bridging between the block-circularity and the compound symmetry tests

Carlos A. Coelho, Mathematics Department, Faculdade de Ciencias e Tecnologia, Universidade Nova de Lisboa, Portugal

Abstract: Using a suitable diagonalization, of the block-circulant structure and by adequately splitting the null hypothesis of block-circularity, it is possible to easily define the likelihood ratio test statistic to test for compound symmetry, once the block-circulant structure of the covariance matrix is assumed. This approach also enables us to easily build a similar test for complex multivariate normal random variables. Near-exact distributions, which lie very close to the exact distribution, are developed for the likelihood ratio test statistic.

Keywords: characteristic function, composition of hypotheses, decomposition of the null hypothesis, distribution of likelihood ratio statistics, near- exact distributions, product of independent Beta random variables, sum of independent Gamma random variables.

26 februari 2013
Large deviations for weighted empirical measures arising in importance sampling

Henrik Hult, Mathematical Statistics, KTH

Abstract: Importance sampling is a popular method for efficient computation of various properties of a distribution such as probabilities, expectations, quantiles, etc. The output of an importance sampling algorithm can be represented as a weighted empirical measure, where the weights are given by the likelihood ratio between the original distribution and the sampling distribution. In this talk the efficiency of an importance sampling algorithm is studied by means of large deviations for the weighted empirical measure. The main result, which is stated as a Laplace principle for the weighted empirical measure arising in importance sampling, can be viewed as a weighted version of Sanov's theorem. The main result is applied to quantify the efficiency of an importance sampling algorithm over a collection of subsets as well as quantiles.

26 mars 2013
Statistical aspects of adaptive designs in clinical studies

Frank Miller, Mathematical Statistics, Stockholm University

Abstract: Adaptive designs became popular in recent years in the context of clinical studies. Mid-term during an ongoing study, changes to the design can be conducted based on the data collected until then. This design adaptation offers the opportunity to handle uncertainties in the planning phase of the study. However, if data dependent changes are done during a study, statistical inference is more complicated. Unexpected effects on the properties of estimators and tests can be introduced. We consider a sample size re-estimation design which is an example of a specific adaptive design. We explain for this design why a bias for an estimator and a test occurs and how one can correct for it.

23 april 2013
Bootstrap percolation on random graphs and its application in neuromodelling

Tatyana Turova, Mathematical Statistics, Lund University

Abstract: We consider random processes on random graphs relevant for modelling of propagation of activation in neural networks. A bootstrap percolation is a process in a discrete time. The state of the process at each time is a vector with entries indexed by the vertices of the underlying graph. The value at each entry is binary, zero or one. The value zero becomes one at time t+1 if it has at least r neighbours with value 1 at time t, and the value one does not change with time. We study the dynamics of the set of vertices with value one. If the underlying structure is a classical random graph, it is known (joint work with Janson, Luczak and Vallier) that typically either the initial set of ones increases only a few times, or it percolates through almost entire graph. To model a spread of activation in a neural network we consider a percolation on a random graph with both local and random connections on a lattice. We also introduce a function of inhibition to model an effect of "self-organization". We derive sufficient conditions which allow to stabilize the percolation process at an intermediate level (which order is strictly higher than the initial one, but does not yield a complete percolation).

4 juni 2013
Addition and multiplication laws for free non-hermitian ensembles

Maciej A. Nowak, Jagiellonian University, Poland

Abstract: We remind the generalization of additive Voiculescu R-transform for non-hermitian ensembles, using the planar diagrammatic techniques. Next, using similar techniques, we derive a multiplication law for free non-Hermitian random matrices allowing for an easy reconstruction of the two-dimensional eigenvalue distribution of the product ensemble from the characteristics of the individual ensembles. We provide examples which illustrate our construction.

11 september 2013
Simulation of conditional diffusions via forward-reverse stochastic representations

Christian Bayer, Weierstrass Institute, Berlin, Germany

Abstract: In this paper we derive stochastic representations for the finite dimensional distributions of a multidimensional diffusion on a fixed time interval, conditioned on the terminal state. The conditioning can be with respect to a fixed point or more generally with respect to some subset. The representations rely on a reverse process connected with the given (forward) diffusion as introduced in Milstein et al. [Bernoulli 10(2):281-312, 2004] in the context of a forward-reverse transition density estimator. The corresponding Monte Carlo estimators have essentially root-N accuracy, hence they do not suffer from the curse of dimensionality. We provide a detailed convergence analysis and give a numerical example involving the realized variance in a stochastic volatility asset model conditioned on a fixed terminal value of the asset.

8 oktober, 2013
Iterated random functions

Örjan Stenflo, Mathematical Statistics, Uppsala University

Abstract: This talk will be a brief introduction to the theory of iterated random functions and its applications in the theory of fractals, Markov chains and simulations.

5 november 2013
Hierarchical modeling of spatial structure of epidermal nerve fibers

Aila Särkkä, Mathematical Statistics, Chalmers University

Abstract: Epidermal nerve fiber (ENF) density and morphology are used to diagnose small fiber involvement in diabetic and other small fiber neuropathies. ENF density and summed length of ENFs per epidermal surface area are reduced, and based on mainly visual inspection, ENFs seem to appear more clustered within the epidermis (the outmost living layer of the skin) in subjects with small fiber neuropathy compared to healthy subjects. We have investigated the spatial structure of ENF entry points, which are the locations where the nerves enter the epidermis, and ENF end points, which are the terminal nodes of ENFs. The study is based on suction skin blister specimens from two body locations of 32 healthy subjects and 15 subjects with diabetic neuropathy. The ENF entry (end) points are regarded as a realization of a spatial point process and Ripley's K function is used to summarize the spatial structure. A hierarchical Bayesian approach is then used to model the relationship between this summary characteristic and the disease status and some other covariates (gender, age, body mass index).

19 november 2013
Stochastic Approximation Methods for American Type Options

Dmitrii Silvestrov, Mathematical Statistics, Stockholm University

Abstract: This lecture presents a survey of results from my new book, which is devoted to stochastic approximation methods for rewards of American type options for multivariate modulated Markov log-price processes. The classes of discrete and continuous time log-price processes (LPP) under consideration include multivariate modulated Markov chains, modulated random walks, and various autoregressive models, multivariate modulated Markov log-price processes, diffusion and Levy processes. General convergence results are presented, as well as their applications to space skeleton approximations, tree approximations, and Monte Carlo based approximation algorithms for option rewards. Also, results related to studies of structure for optimal stopping domains are presented as well as results related to option reselling problem. Theoretical results are illustrated by results of experimental studies. The book contains two parts and the lecture will be mainly concentrated on the results related to discrete time processes. These results included in the first part of the book, which is expected to appear in 2013.

2012

31 januari 2012
Small deviation probabilities and their interplay with operator theory and Bayesian statistics

Mikhail Lifshits, Linköping University and S:t Petersburg State University

13 mars 2012
On optimality of neighbor designs under interference models

Augustyn Markiewicz, Department of Mathematical and Statistical Methods, Poznań University of Life Sciences

Abstract: The concept of neighbor designs was introduced and defined by Rees (1967) who gave also some methods of their construction. Henceforth many methods of construction of neighbor designs as well as of their generalizations are available in the literature. However there are only few results on their optimality. Therefore the aim of the talk is to give an overview of study on this problem. It will include some recent results on optimality of specified neighbor designs under various linear models.

27 mars 2011
On sequential change-point detection

Allan Gut, Department of Mathematics, Uppsala University

Abstract A typical situation in a series of observations is that if everything is in order, then the observations follow some kind of common pattern, whereas if something goes astray at some time point, then, from there on, the observations follow a different pattern. One obviously wishes to find out as soon as possible if something goes wrong---that is, if there is a change-point---in order to take appropriate action, and, at the same time, minimize the probability of taking action if nothing is wrong. The typical analysis in change-point theory is based on samples of fixed size. In a series of paper, together with Josef Steinebach at the University of Cologne, we have taken an alternative view point. Namely, instead one observes the random phenomenon in question sequentially in order to take action as soon as one observes some statistically significant deviation from normal'' behaviour. Based on this idea we have analyzed the counting process related to the original processes. In this talk I will review some results of our joint efforts. The main ingredients in the proofs are strong invariance principles for renewal processes and extreme value asymptotics for Gaussian processes.

10 april 2011
Bi-stability in an age structured Hepatitis B model

Nelson Owuor Onyango, University of Nairobi, Kenya and SLU Uppsala

Abstract The Basic Reproduction Number, R0, associated with epidemic models is a threshold condition for determining disease extinction (R0<1) or endemicity (R0>1). Under normal circumstances, there is a forward bifurcation at R0=1, and the emerging endemic solution is unique. We however seek to establish within the context of an age structured model, conditions for which bi-stability (also called backward bifurcation) may occur. Previous simulation studies indicate that in hyper-endemic populations, with high carrier prevalence, bi-stable dynamics are highly likely (Medley G.F. et al, 2001).

Key words: Backward bifurcation, Stability of PDE models in epidemiology, Hepatitis B, Basic Reproduction Number.

24 april 2012
Quasi equilibrium methods in population genetics

Ola Hössjer, Mathematical Statistics, Stockholm University

Abstract: We consider time evolvement of a population with some kind (geographical, social, ethnic, ...) of substructure. It is assumed that a limited amount of migration takes place between the subpopulations. Two classical questions in population genetics are to quantify the degree of spatial heterogeneity between the subpopulations (fixation index) and the degree of inbreeding (effective population size). In this talk we introduce a general framework for answering these (and other) questions. The idea is to model the spatio-temporal variation at a number of genetic markers as vector valued autoregressive processes and consider their quasistationary behaviour, conditional on that no variant (allele) at each marker of interest has taken over the whole population.

8 juni 2012
Licentiate Seminar: *Estimation in Multivariate Linear Models with Linearly Structured Covariance Matrices*

Joseph Nzabanita, Mathematical Statistics, Linköping University

Discussant: Dr. Daniel Klein, Faculty of Sciences, P.J. Safarik University in Kosice, Slovakia.

18 september 2012
Efficient calculation of financial Greeks

Patrik Andersson, Mathematical Statistics, Stockholm University

Abstract: In finance a Greek is the sensitivity of the price of a derivative, e.g. a European call option, with respect to some parameter in the model, e.g. the current price of the underlying asset. The Greeks are important both for hedging purposes and from a risk-management perspective. In realistic models of asset prices, e.g. with stochastic volatility, there are no known formulas for these and one solution is to resort to simulation; however, calculating a Greek involves differentiating an expectation and this can be computationally difficult. A number of methods have been proposed, one of which is the so-called Malliavin calculus integration by parts. This method allows one to write the expectation of a differentiated function as the expectation of the function itself times a stochastic weight. These stochastic weights are however not unique and so there is a freedom to choose them in an efficient way, i.e. in a way that gives a low variance.

25 september 2012

Long-range percolation on the hierarchical lattice

Pieter Trapman, Mathematical Statistics, Stockholm University

Abstract: The hierarchical lattice of order N, may be seen as the leaves of an infinite regular N-tree, in which the distance between two vertices is the distance to their most recent common ancestor in the tree. We create a random graph by independent long-range percolation on the hierarchical lattice of order N: The probability that a pair of vertices/nodes at (hierarchical) distance R share an edge/bond depends only on R and is exponentially decaying in R, furthermore the presence or absence of different edges are independent. We give criteria for percolation (the presence of an infinite cluster) and we show that in the supercritical parameter domain, the infinite component is unique. Furthermore, we show that the percolation probability (the density of the infinite cluster) is continuous in the model parameters. In particular, there is no percolation at criticality.

20 november 2012
On the BK inequality

Johan Jonasson, Mathematical Sciences, Chalmers

Abstract: A family of binary random variables is said to have the BK property if, loosely speaking, for any two events that are increasing in the random variables, the probability that they occur disjointly is at most the product of the probabilities of the two events. The classical BK inequality states that this holds if the random variables are independent. Since the BK property is stronger than negative association, it is a form of negative dependence property and one would expect other negatively dependent families to have the BK property. This has turned out to be quite a challenge and until very recently, no substantial example beside the independent case were known. In this talk I will give two of these examples, the k-out-of-n measure and pivotal sampling, and sketch how to prove the BK inequality for these. I will also mention a few seemingly "simple questions" and how solutions to these would be profoundly important.

4 december 2012
Conditioned branching processes and the evolution of species

Krzysztof Bartoszek, Mathematical Sciences, Chalmers

Abstract: Conditioned branching processes have recently received a lot of attention in the biomathematical literature. They are useful for modelling and developing software in the field of phylogenetic tree inference. However on top of this they can also be combined with continuous stochastic processes to describe the evolution of character traits without the need to use a fixed phylogeny. This makes them an appealing tool for the field of phylogenetic comparative methods where often there can be great uncertainty attached to the underlying evolutionary relationships. By using them we can predict how much we expect species to diverge (in the trait of interest) and include uncertainty due to phylogeny in our conclusions. Morphological characteristics are an important factor in the field of systematics, for example for the delimitation of species, and therefore the framework of phylogenetic comparative models on top of branching processes offers an attractive application of stochastics in biology.

2011

29 september 2011
Market Implied Valuation of Equity Derivatives

Magnus Ekdahl, Carnegie Investment Bank AB

Abstract: An important characteristic of any financial pricing model is the ability to replicate traded market prices. One way of doing this is to choose a process model with relatively small amount of parameters, and try to verify that one's guess is correct. Another is to choose a large enough parameter set so that traded market instruments can be priced very accurately by the model. This seminar is about the practicalities of the latter approach.

25 october 2011
Generalized Smooth Finite Mixtures

Mattias Villani, Statistics, Linköping University

Abstract: We propose a general class of models and a unified Bayesian inference methodology for flexibly estimating the density of a response variable conditional on a possibly high-dimensional set of covariates. Our model is a finite mixture of component models with covariate-dependent mixing weights. The component densities can belong to any parametric family, with each model parameter being a deterministic function of covariates though a link function. Our MCMC methodology allows for Bayesian variable selection among the covariates in the mixture components and in the mixing weights. The model's parameterization and variable selection prior are chosen to prevent overfitting. We use simulated and real data sets to illustrate the methodology. Keywords: Bayesian inference, Conditional distribution, GLM, Markov Chain Monte Carlo, Mixture of Experts, Variable selection.

8 november 2011
Tractability of some high dimensional problems

Mikhail Lifshits, Linköping University and S:t Petersburg State University

Abstract: We study finite rank L_2-approximation of tensor product random fields with covariance $K^{(d)}(s,t) = \prod_{j=1}^{d} K_j(s_j,t_j)$ depending on many parameters (d is very large). We first give some general criteria for various bounds on approximation errors (tractability of approximation problem). Then, as an example, we consider tensor products of r_j-times integrated Wiener process and investigate the interplay between tractability and smoothness of the field. Surprisingly, the type of integration (Euler or classical) influences the results significantly.

6 december 2011
On the Inference of Ranked Set Sampling Using the Bootstrap Method

Saeid Amiri, Department of Mathematics, Uppsala University

Abstract: We consider the bootstrap approach to infer the ranked set sampling (RSS) method. Here a sequential bootstrap approach is used to shift the analysis from an unbalanced RSS sample to the analysis of a balanced RSS sample. The balanced RSS is also discussed. Consequences of using different algorithms for carrying out resampling are discussed. The proposed methods are studied using Monte Carlo investigations. Furthermore, the theoretical side of the approach is considered.