Noon-to-Noon Sauna Seminar of the FDPSS, December 12-13 2013 Helsinki

Schedule: Thursday 12.12

13.00-16.30	talks in Exactum, D122
13.00-13.10	Opening
13.10-13.30	Lasse Holmström (Oulu): *In Memoriam: Petri Koistinen.*
13.30-14.20	Kalle Kytölä (HY): *Boundary zig-zags of random conformally invariant curves.*
14.20-14.30	Coffee break
14.30-15.00	Lauri Viitasaari (Aalto): *Integral Representation of Random Variables with Respect to Gaussian Processes.*
15.00-15.30	Ilkka Launonen (Oulu): *A scale space multiresolution method for extraction of time series features*
15.30-16.00	Alexander Steinicke (JY):*Malliavin differentiation of a Levy driven BDSE with a path dependent generator functional*
16.00-16.30	Mikko Stenlund (HY): *An adiabatic dynamical system as a stochastic process*

Social Program

17.30-19.30	sauna in Kotiharjun sauna, Harjuntorinkatu 1
20.00 ->	carelian dinner in Restaurant Konstan Möljä, Hietalahdenkatu 14.

Schedule Friday 13.12

Social Program:

8.00	winter swimming in Ouritsaari

Scientific Program:

9.15-12.00	talks in Exactum, D122
9.15-10.10	Harri Nyrhinen (HY): *On large deviations of multivariate heavy-tailed random walks.*
10.10-10.30	Coffee break
10.30-11.00	Brita Jung (Åbo): *The time until extinction of the Northern Spotted Owl: Simulations and approximations.*
11.00-11.30	Pekka Matomäki (TY):*Optimal stopping and control near boundaries*
11.30-12.00	Maiju Kujala (TY): *Differential network analysis with multiply imputed LURIC lipidomic data.*
12.00-13.00	lunch
13.00-16.00	talks
13.00-13.30	Jaakko Lehtomaa (HY): *A comparison method for heavy-tailed random variables*
13.30-14.00	Henrik Nyman (ÅA): *Stratified Gaussian Graphical Models*
14.00-14.30	Zitong Li (HY): *A Bayesian longitudinal model for analyzing quantitative genetic data.*
14.30-15.00	Mikko Kuronen (JY):*The giant component in the binomial random intersection digraph*
15.00-15.20	Coffee break
15.20-16.10	Ehsan Azmoodeh (Luxembourg): *Stein's method and the law of the iterated logarithm*

Confirmed partecipants:

Juha Alho
Luis Alvarez
Ehsan Azmoodeh
Zhe Chen
Dario Gasbarra
Göran Högnäs
Lasse Holmström
Brita Jung
Antti Kemppäinen
Maiju Kujala
Mikko Kuronen
Kalle Kytölä
Ilkka Launonen
Jaakko Lehtomaa
Lasse Leskelä
Zitong Li
Antti Luoto
Pekka Matomäki
Peng Mei
Miika Nikula
Ilkka Norros
Henrik Nyman
Harri Nyrhinen
Nicola Rebagliati
Vesa Ronkainen
Eero Saksman,
Paavo Salminen
Mikko Sillanpää
Tommi Sottinen
Alexander Steinicke
Mikko Stenlund
Bao Ta
Lauri Viitasaari
Min Wang

Abstracts

Ehsan Azmoodeh (Luxemburg)
Stein's method and the law of the iterated logarithm

Abstract: *We revisit the law of the iterated logarithm by using tools from Stein's method for normal approximation*

Maiju Kujala (TY)
Differential network analysis with multiply imputed LURIC lipidomic data

Abstract: *The importance of lipids for cell function and health has been recognized, e.g., a disorder in the lipid spectrum of cells has been related to atherosclerosis caused cardiovascular disease. Differential network analysis provides a formal statistical methodology to examine differences in network structures under two biological conditions, and responds to the need for efficient and interpretable analysis tools in the fields of lipidomics. We provide a recipe to conduct permutation based statistical test on association scores resulted from partial least square regression on multiple imputed lipidomic data from the LUdwigshafen RIsk and Cardiovascular Health study, particularly paying attention to the left-censored missing values typical to most life science data sets resulting from mass spectrometry platform. With accordingly customized network analysis, we take full advantage of the data achieving useful information about the underlying biological process, find lipids that interact with each other, and recognize the most important differentially expressed lipids between two subgroups of CVD patients.*

Mikko Kuronen (JY)
The giant component in the binomial random intersection digraph

Abstract: *We show that there exists a giant component in the binomial random intersection digraph precisely when the mean number of neighbors is greater than one and the number of features is not much less than the number of nodes.*

Kalle Kytölä (HY)
Boundary zig-zags of random conformally invariant curves

Abstract: *Schramm-Loewner evolutions (SLE) are conformally invariant random curves that describe scaling limits of interfaces in various models of critical statistical physics in two dimensions. In this talk we consider "boundary zig-zags", i.e. the probabilities for such curves to pass through small neighborhoods of given boundary points in a given order. We find formulas for these probability amplitudes by solving a system of partial differential equations with asymptotics requirements written recursively in terms of solution of the same problem with a smaller number of variables. The solution*

is then based on a general correspondence, which translates such problems to linear systems of equations in finite dimensional representations of the quantum group $U_q(sl_2)$. The talk is based on joint works with Niko Jokela (Santiago de Compostela) and Matti Järvinen (Crete), with Eveliina Peltola (Helsinki), and on some ongoing work with Konstantin Izyurov (Helsinki).

Jaakko Lehtomaa (HY)

A comparison method for heavy-tailed random variables

Abstract: *We present a unifying approach for comparing and classifying tails of heavy-tailed random variables. The main result establishes, for any heavy-tailed random variable, existence of a certain concave function representing the asymptotic decay speed of the tail. Many key properties of the distribution of a random variable are encoded into this function. Our approach extends the idea of classical indices, such as exponential and moment indices, which are widely used measuring heaviness of tails.*

Pekka Matomäki, (TY)

Optimal stopping and control near boundaries

Abstract:*I will investigate the value and continuation region of an optimal stopping problem and a singular control problem by focusing on two fundamental ratios. I shall show that these ratios characterize the solution, although usually only near boundaries. I shall also show how the well-known connection between optimal stopping problem and singular control problem can, in a way, be seen as a local property rather than global.*

Harri Nyrhinen (HY)

On large deviations of multivariate heavy-tailed random walks

On large deviations of multivariate heavy-tailed random walks

Abstract

Let $\{S_n; n = 1, 2, \ldots\}$ be a random walk in $\mathbf{R}^d$ and $\mathbf{E}(S_1) = (\mu_1, \ldots, \mu_d)$. Let $a_j > \mu_j$ for $j = 1, \ldots, d$ and $A = (a_1, \infty) \times \cdots \times (a_d, \infty)$. We are interested in the probability $\mathbf{P}(S_n/n \in A)$ for large n in the case where the components of S_1 are heavy tailed. An objective is to associate an exact power with the aforementioned probability. We also derive sharper asymptotic estimates for the probability.

Key words: Heavy tail, large deviation, random walk

Reference:
Nyrhinen, H. (2009). On large deviations of multivariate heavy-tailed random walks. J. Theoret. Probab. 22, 1-17.

Henrik Nyman (ÅA)

Stratified Gaussian Graphical Models

Abstract: *Gaussian graphical models represent the backbone of the statistical toolbox for analyzing continuous multivariate systems. However, due to the intrinsic properties of the multivariate normal distribution, use of this model family may hide certain forms of context-specific independence that are natural to consider from an applied perspective. Such independencies have been earlier introduced to generalize discrete graphical models and Bayesian networks into more flexible model families. I will present a class of models that incorporates the idea of context-specific independence to Gaussian graphical models by introducing a stratification of the Euclidean space such that a conditional independence may hold in certain segments but be absent elsewhere.*

Malliavin differentiation of Lévy driven BSDEs with a path-dependent generator functional

Alexander Steinicke*

We consider a Lévy process $X = (X_t)_{t\in[0,T]}$ with Lévy measure ν and Lévy-Itô decomposition

$$X_t = \gamma t + \sigma W_t + \int_{(0,t]\times\{1<|x|\}} xN(ds,dx) + \int_{(0,t]\times\{0<|x|\leq 1\}} x\tilde{N}(ds,dx),$$

where $\gamma \in \mathbb{R}, \sigma \geq 0$ are constants, (W_t) denotes the Brownian part, N and $\tilde{N}$ are the Poisson random measure and the compensated Poisson random measure, respectively. Let $\mu(dx) := \sigma^2\delta_0(dx) + x^2\nu(dx)$ and let $\kappa \in L_2(\mathbb{R},\mu)$.

We consider the BSDE (backward stochastic differential equation)

$$Y_t = \xi + \int_t^T f\left(s, (X_r)_{0\leq r\leq s}, Y_s, \int_{\mathbb{R}} Z_{s,x}\kappa(x)\mu(dx)\right) ds - \int_{(t,T]\times\mathbb{R}} Z_{s,x}M(ds,dx),$$

with $0 \leq t \leq T$, where the random measure M is given by

$$M(ds,dx) := \sigma dW_t\delta_0(dx) + x\tilde{N}(dt,dx).$$

Malliavin differentiation of this BSDE is important to access the Z process explicitly from the Y process. Moreover it is an essential tool for investigating smoothness properties of BSDEs.

Our main interest is to find out how regularity assumptions on the functional f influence the Malliavin differentiability of the equation. We discuss certain steps of the differentiation of the BSDE including the aspect how the generator function behaves under the Malliavin differentiation operator.

*Department of Mathematics, University of Jyväskylä
Joint work with Ch. Geiss, University of Innsbruck, Austria

Mikko Stenlund (HY)

An adiabatic dynamical system as a stochastic process

Abstract: *The statistical properties of dynamical systems are traditionally studied in the context of their invariant measures. Motivated by nonequilibrium phenomena in nature, we wish to step out of the above setup. To this end, we introduce a model whose characteristics change slowly with time; hence the word adiabatic in the title. Solving a martingale problem in the spirit of Stroock and Varadhan, we show that repeated observations of the state of the system yield a certain stochastic diffusion process.*

Lauri Viitasaari (Aalto)

Integral Representation of Random Variables with Respect to Gaussian Processes

Abstract:*Integral representations of random variables are interesting subject of study and they are applied in different areas such as mathematical finance. It is known that any random variable can be represented as an Ito integral with respect to standard Brownian motion. Moreover, Mishura et al. (2013) showed that similar result holds true also for fractional Brownian motion with Hurst index $H > 1/2$ if the integral is understood in a pathwise sense. In this talk we extend these result to cover a wide class of Gaussian processes. More precisely, we consider α-Hölder continuous processes of order $\alpha > 1/2$ and, with some mild extra assumptions, we prove that any random variable can be represented as pathwise integral.*

Good to know

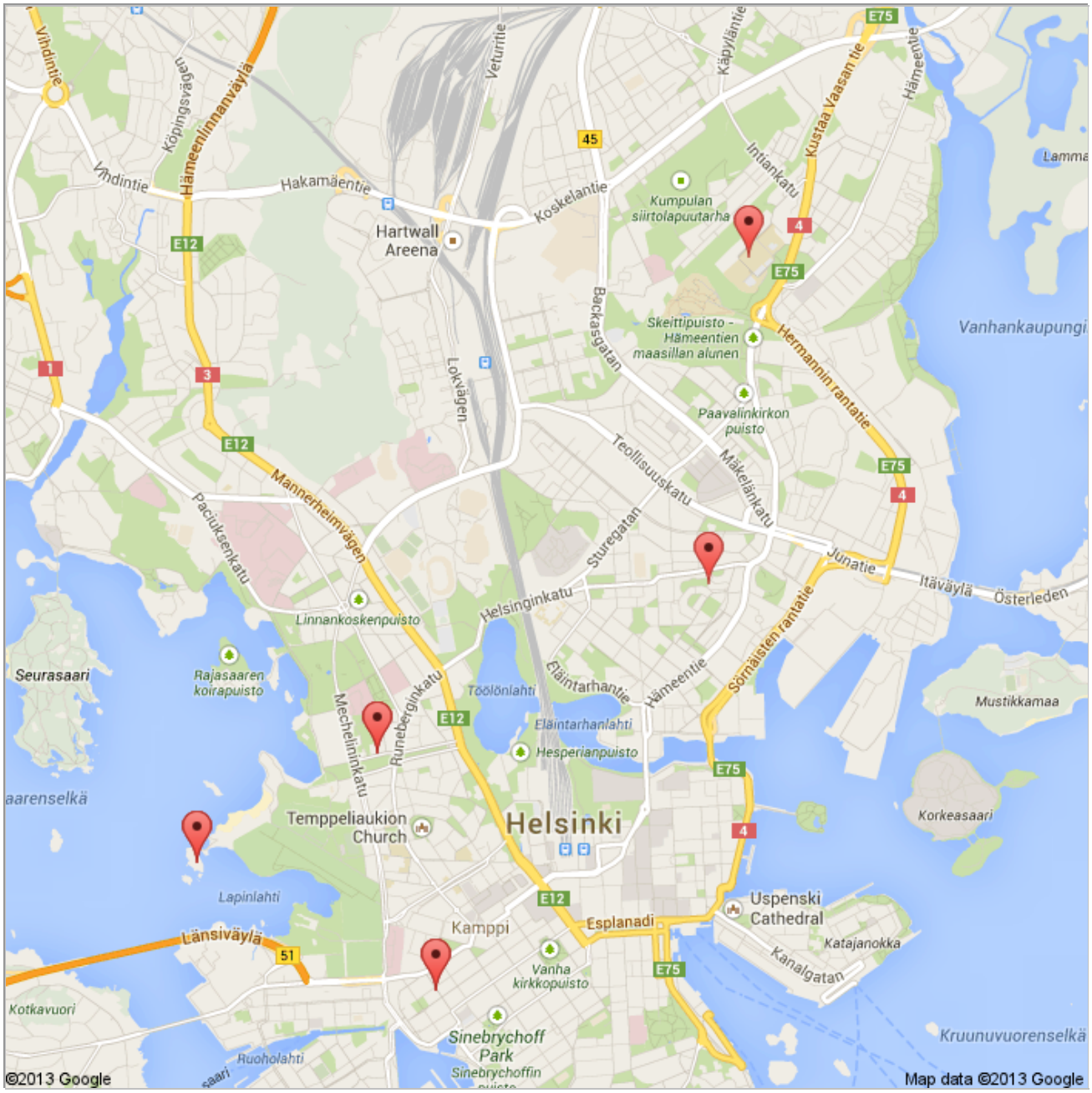
- The Helsinki University WIFI is available (Univ. Helsinki HUPNET)

  `username: hupnet12122 password: petra+9rajamaa`

  the same usename and password will work in the Töölö Towers University residence.

- The plan is to have sauna in Harjuntorin sauna. You can take your own drinks there and it is possible to rent a tovel. You can pay for the sauna in cash only.

Google



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