L^2 ISFA Lyon and DSA-HEC Lausanne

Wednesday, January 23rd 2019

AT I.S.F.A.
Amphi G2

9 h 30	OPENING ADDRESS
10 h 00	**Claude LEFÈVRE** (Université Libre de Bruxelles) *Insurance and Epidemic Risk Modeling*
10 h 45	Discussion by Patrick LAUB (ISFA)
11 h 00	Phd talk #1: **Iegor RUDNYTSKYI** (UNIL) *On the Socio-demographic and Medical Drivers of Long-Term Care Needs in Europe*
11 h 20	Q&A's by ISFA PhD students: Steve BRIAND and Morgane PLANTIER
11 h 30	Networking Time
12 h 00	LUNCH BREAK – **Room 3203**
13 h 30	**Christophe DUTANG** (Université Paris Dauphine) *Closed-form Maximum Likelihood Estimator for Generalized Linear Models in the case of categorical explanatory variables: Application to insurance loss modelling*
14 h 15	Discussion by José ARAUJO-ACUNA (UNIL)
14 h 30	Phd talk #2: **Sarah BENSALEM** (ISFA) *Prevention efforts, insurance demand and price incentives under coherent risk measures*
14 h 50	Q&A's by UNIL PhD students: Dina FINGER and Charbel MIRZA
15 h 00	Phd talk #3: **Martin BLADT** (UNIL) *Combined tail estimation using censored data and expert information*
15 h 20	Q&A's by ISFA PhD students: Romain GAUCHON and Pierre MONTESINOS
15 h 30	Phd talk #4: **Maximilien BAUDRY** (ISFA) *Autoregressive Quantile Networks for Time Series Generation*
15 h 50	Q&A's by UNIL PhD students: Leonard VINCENT and Yves STAUDT
16H00	SHORT DRINK
16H30	DEPARTURE

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ABSTRACTS

Claude LEFÈVRE: Insurance and Epidemic Risk Modeling

Abstract: Two links between epidemics and insurance are highlighted. First, we briefly mention the polynomial structure that underlies the distribution of the epidemic final size and the finite-time ruin probability in insurance. Then, we apply simple actuarial methods to build an insurance plan protecting against an epidemic risk in a closed population. The studied model is an extended SIR epidemic in which the removal and infection rates may depend on the number of registered removals.

Iegor RUDNYTSKYI: On the Socio-demographic and Medical Drivers of Long-Term Care Needs in Europe

Abstract: The increase in the proportion of elderly people in most industrialized countries triggers higher demand for long-term care (LTC) associated with limitations of activities of daily living (ADL). The aim of this research is to derive the drivers affecting the probability of having limitations with ADL. By using the most recent wave of a cross-national European survey on individuals aged over 50 years (SHARE, wave 6), we develop econometric logistic models for identifying the effect of selected factors on limitations with ADL. We find that the demographic factors age, gender, and BMI significantly influence the probability of functional limitations. The same holds for social and medical characteristics, namely, wealth status, education level, the presence of the partner in the household, the children, and diseases. In particular, we show that the dependence highly increases with mental and physical diseases in comparison to cancer. Further, we observe the significant influence of the type of LTC scheme among European countries. We proceed by considering refined acuity levels of dependency and linking limitations in specific ADL to pathologies. We validate our model by cross-validation technique and by observing the same findings for data from previous waves, and thus, ensure robustness. The ongoing work investigates the impact of the above factors on the demand for formal LTC (nursing homes, professional services at home, meals-on-wheels, etc.).
Joint work with Michel FUINO and Joël WAGNER

Christophe DUTANG: Closed-form Maximum Likelihood Estimator for Generalized Linear Models in the case of categorical explanatory variables: Application to insurance loss modelling

Abstract: Generalized Linear Models with categorical explanatory variables are considered and parameters of the model are estimated by an exact maximum likelihood method. The existence of a sequence of maximum likelihood estimators is discussed and considerations on possible link functions are proposed. A focus is then given on two particular positive distributions: The Pareto 1 distribution and the shifted log-normal distributions. Finally, the approach is illustrated on an actuarial dataset to model insurance losses.

Sarah BENSALEM: Prevention efforts, insurance demand and price incentives under coherent risk measures

Abstract: This paper studies an equilibrium model between an insurance buyer and an insurance seller, where both parties' risk preferences are given by convex risk measures. The interaction is modeled through a Stackelberg type game, where the insurance seller plays first by offering prices, in the form of safety loadings. Then the insurance buyer chooses his optimal proportional insurance share and his optimal prevention effort in order to minimize his risk measure. The loss distribution is given by a family of stochastically ordered probability measures, indexed by the prevention effort. We give special attention to the problems of self-insurance and self-protection. We prove that the formulated game admits a unique equilibrium, that we can explicitly solve by further specifying the agents criteria and the loss distribution. In self-insurance, we consider also an adverse selection setting, where the type of the insurance buyers is given by his loss probability, and study the screening and shutdown contracts. Finally, we provide case studies in which we explicitly apply our theoretical results.
Joint work with Nabil KAZI TANI and Nicolás HERNÁNDEZ SANTIBÁÑEZ.

Martin BLADT: Combined tail estimation using censored data and expert information

Abstract: We study tail estimation in Pareto-like settings for datasets with a high percentage of right-censored data, and where some expert information on the tail index is available for the censored observations. This setting arises for instance naturally for liability insurance claims, where actuarial experts build reserves based on the specificity of each open claim, which can be used to improve the estimation based on the already available data points from closed claims. Through an entropy-perturbed likelihood we derive an explicit estimator, establish a close analogy with Bayesian methods, and propose a procedure of tuning the perturbation parameter through cross-validation.
Embedded in an extreme value approach, asymptotic normality of the estimator is shown and consequently the perturbation parameter which minimizes the mean squared error can be used. The latter can be found explicitly whenever the expert information is centered, which leads to a very simple formula for combining the classical statistical approach with the expert information. We study the performance of the new estimator through simulations and perform a case study on a liability insurance claim dataset. It is illustrated how this method facilitates the choice of the threshold in extreme value analysis.
Joint work with Hansjörg ALBRECHER and Jan BEIRLANT.

Maximilien BAUDRY: Autoregressive Quantile Networks for Time Series Generation

Abstract: Generating a time series from a small amount of realizations without fixing any prior model structure is challenging since it needs to estimate the distribution of all its subvectors. Deep learning work on time series analysis recently shown strong results on forecasting, but very few has been done on generation. Autoregressive implicit quantile networks (AIQN) have been proposed as a new approach for generative modelling, which motivates the use of such architectures to generate conditional time series. We design an AIQN network for time series, and show that such a network is able to efficiently learn the fundamental time dependencies of the underlying stochastic process. We also illustrate our approach by simulating conditional time series on two real-world datasets: US Stock markets and GPS trajectories.