Titre et Résumé

Pierre Alquier (ESSEC Business School, IDS dept.)

"Robustness of minimum distance estimators"

In this talk, I will discuss statistical estimators obtained by minimizing a suitable metric between the empirical distribution and the statistical model. In a first time, I will show that under fairly general assumptions, these estimators are universally consistent and robust to model misspecification. I will then discuss the practical implementation of these estimators. In particular, the MMD metric leads to estimator that are both computationally feasible and statistically robust. This will be illustrated on toy examples, and I will also mention more challenging applications.

Charles Collot (CYU, AGM)

"Asymptotic dynamics for several wave, fluids, and reaction-diffusion equations"

My research focuses on some nonlinear evolution partial differential equations. They aim at establishing an asymptotic equivalent for their solutions as the time gets closer to their maximal time of existence. In this field, one conjectures that only stationary states, traveling waves, or other coherent structures can appear. I will present some results that illustrate such an asymptotic description, as well as exemples of solutions for which these coherent structures produce remarkable concentration and propagation phenomena.

Paul Doukhan (CYU, AGM)

"Discrete-time trawls"

In a collaborative work with Adam Jakubowski, Silvia Lopes and Surgailis (SPA 2019), we introduce a, possibly integer-valued, stationary time series model which has original properties. On the one hand these models may have moments at all orders and a long range dependence property. In addition these models particularize those introduced by Barndorff-Nielsen, Lunde, Shephard, and Veraart. (Scandinavian Journal of Statistics 2014) to the case of discrete time; they have renormalized partial sums with possibly a stable limit contrary to what was announced by these authors.
With François Roueff and Joseph Rynkiewicz (EJS 2020) we prove the consistency of the

parametric estimation of these models and show a central limit theorem which also seems contradictory for these popular Ambit-type models.

Marie Kratz (ESSEC Business School, IDS dept. & CREAR risk research center) (Marie will need to leave early, so it would be better to assign her talk to an earlier slot)

" New methods for evaluating the distribution of heavy tailed data, based on (asymptotic) mean and extreme behaviors"

Our aim is to propose general distributions for heavy-tailed data that fit well the entire underlying distribution (in both its body and tail). To achieve this, we theoretically and numerically develop methods based on asymptotic theorems for mean and extreme behaviors, to obtain the most accurate approximation. One method targets the sum of heavy-tailed random variables then vectors, and provides rates of convergence. The other is an algorithmic method based on a hybrid general model, enabling the tail-threshold to be selected automatically. Building on this method, we turn to Extreme Value regression (EVR) model, which we extend to non-tail observations using our hybrid model to simultaneously estimate its tail and threshold parameters. This helps address the problem of estimation inefficiencies in EVR, due to the ex ante selection of a tail threshold below which data are discarded. Illustrations on financial or cyber data will be given.

This presentation is based on joint works with: E. Prokopenko (Sobolev Institute of Mathematics, Novosibirsk; postdoc at ESSEC CREAR with the support of ANR-16-IDEX-0008 CY Initiative), N. Debbabi (ESPRIT School of Engineering, Tunis), M. Mboup (Univ. Champagne Ardenne, Reims), M. Dacorogna (PRS), J. Hambuckers (HEC Liège), A. Usseglio-Carleve (Univ. Avignon).

Guillaume Lecue (ESSEC Business School, IDS dept.)

"Making procedures robust to heavy-tailed data and data contamination via the minmax MOM approach"

We present some general concept and applications of new types of estimators and algorithms which aim at performing very well on corrupted databases. In other words, the aim of the talk is to present some procedures and algorithms that are robust to outliers (adversarial and heavy-tailed data). The Median-of-means (MOM) principle is the key tool to our approach.

We introduce a 'minimaximization' procedure based on the MOM principle in several setups. In particular, we revisit some classical procedures such as Ordinary Least Squares, LASSO,

Classification and kernels methods, Cross-validation when performed on corrupted databases.

We prove that these estimators are efficient under weak moments assumptions and on datasets that may have been corrupted by an adversary. Besides these theoretical guarantees, the definition of minmax MOM estimators suggests simple and systematic modifications of standard gradient descent algorithms used to approximate least-squares estimators and their regularized versions.

Armen Shirikyan (CYU, AGM)

“Viscosity estimation in a pipe flow”

The problem of continuous monitoring of viscosity in fluid flows arises in many applications, such as the combustion efficiency, quality control, and cost of transportation. There are various devices for measuring the viscosity, and their choice depends on the data available about the fluid. The aim of our work is develop mathematical foundations for estimation methods that use continuous-time observations of the velocity and its space variations. Namely, we consider the Navier-Stokes system in a two-dimensional strip, supplemented with the no slip boundary condition and periodicity hypothesis along the infinite direction. Assuming that the fluid is subject to a random noise, we construct explicitly a simple estimator for viscosity and prove its consistency and asymptotic normality. We conclude the talk by a number of open questions.