PLENARY LECTURES

JEAN MARC BARDET, Laboratory SAMM, Université Paris1 Panthéon-Sorbonne, Efficient and Consistent Data Driven Model Selection for time series.

MADALINA OLTEANU, CEREMADE, Université Paris-Dauphine, Segregation through the multiscalar length (joint work with J. Randon-Furling, W. Clark, and C. de Bezenac).

CRISTINA TAMMER, Martin Luther Universität Halle-Wittenberg, Optimization problems with variable domination structures and applications

JAMES J. COCHRAN, Alabama University, So you want to design and launch an MS program in analytics

ALAIN CELISSE, Laboratory SAMM, Université Paris1 Panthéon-Sorbonne, Early Stopping rules and Iterative Learning algorithms

TUTORIALS

Tutorial 1: ***A short introduction to wavelet methods in statistics (face to face)***

By FABIEN NAVARRO (SAMM, Paris1 Panthéon-Sorbonne)
A 2h lecture part and a 1h computer practice part.

Starting from classical notions of shrinkage and sparsity, this short course will cover selected topics of regularization and thresholding methods that are crucial to high dimensional statistics. The syllabus includes some aspects of feature selection and model selection, linear and nonlinear techniques for wavelet regression. The course will mainly focus on methodological aspects. A short practical session will provide an opportunity to apply the methods using R.

Tutorial 2: ***Evaluation of Ki-67 index with deep learning*** **(online)**

By JOSEPH RYNKIEWICZ (SAMM, Paris1 Panthéon-Sorbonne)

The value of the Ki-67 index was introduced as a proliferative marker by Gerdes et al. in 1983. Monoclonal antibody Ki-67 is present during reproducing cell cycle phases. Knowing that excessive cellular proliferation correlates with the progression of malignancy, precise estimation of this protein marker can benefit physicians in identifying high-grade tumors. The method for Ki-67 detection is Immunohistochemical analysis in the staining process performed on paraffin-embedded tissue. Marker scoring is based on an expert pathologist's decision, and inter-observer result variations are inevitable. Moreover, at least 500-1000 cells in a representative area are recommended to be counted by the pathologist, which can be very time-consuming. This prompted the need for an exact calculation of the Ki-67 marker using Artificial intelligence. This tutorial will demonstrate a method to get state-of-the-art results with Deep networks.

Tutorial 3 & 4*: Variational Analysis in Optimization and Control (online)*

By BORIS MORDUKHOVICH (Wayne State University, Detroit, Michigan, USA

The tutorial consists of two lectures, which present recent applications of variational analysis to numerical optimization and optimal control.

LECTION 1: GLOBALLY CONVERGENT CODERIVATIVE-BASED NEWTONIAN ALGORITHMS IN NONSMOOTH OPTIMIZATION. This lecture is devoted to applications of second-order variational analysis and generalized differentiation to the design and justification of novel generalized Newtonian algorithms. We present coderivative-based versions of the damped Newton method and of the Levenberg-Marquardt method designed via the generalized Hessian. Efficient conditions for the global convergence of these algorithms are obtained for problems of convex composite optimization with establishing their superlinear convergence rates and applications to Lasso problems.

LECTION 2: OPTIMAL CONTROL OF SWEEPING PROCESSES WITH APPLICATIONS TO ROBOTICS AND TRAFFIC EQUILIBRIA.
This lecture is devoted to applications of variational analysis to a new and challenging class of optimal control problems for sweeping (Moreau) processes, which are governed by discontinuous differential inclusions and have numerous applications to mechanics, economics, etc. We develop the method of finite-difference/discrete approximations to the study of such problems and then derive in this way necessary optimality conditions for discrete-time and continuous-time systems with their applications to some models of robotics and traffic equilibria.