PROGRAMME AND ABSTRACTS

12th International Conference on

Computational and Financial Econometrics (CFE 2018)

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and

11th International Conference of the
ERCIM (European Research Consortium for Informatics and Mathematics) Working Group on

Computational and Methodological Statistics (CMStatistics 2018)

http://www.cmstatistics.org/CMStatistics2018

University of Pisa, Italy
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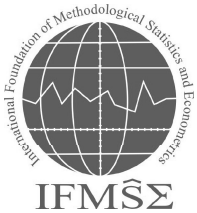

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EO416 Room H1 STATISTICAL MODELS FOR ENVIRONMENTAL PROCESSES AND HUMAN ACTIVITIES Chair: Clara Grazian

E0574: **Quantifying personal exposure to air pollution from smartphone-based location data**
Presenter: **Lucia Paci**, Universita Cattolica SC, Italy
Co-authors: Francesco Finazzi
Personal exposure assessment is a challenging task that requires both measurements of the state of the environment as well as individual's movements and their activity patterns. While ambient exposure is well studied, learning people movements represents an open issue. We show how location data collected by smartphone applications are exploited to quantify the individual exposure of a large group of people to air pollution. A Bayesian approach that blends air quality monitoring data with individual location data is proposed to assess the personal exposure over time, under uncertainty on both pollutant level and individual location. A comparison with personal exposure obtained assuming fixed locations for the individuals is also provided. Location data collected by the Earthquake Network research project are employed to quantify the dynamic exposure to fine particulate matter of around 2500 people living in Santiago (Chile) over a 4-month period. For around 30% of individuals, the personal exposure based on people movements emerges significantly different over the static exposure. The approach is flexible and can be adopted to quantify the personal exposure based on any location-aware smartphone application.

E0589: **A new design test based on a bootstrap method for response-adaptive clinical trials**
Presenter: **Marco Novelli**, Novelli, Italy
Co-authors: Alessandro Baldi Antognini, Maroussa Zagoraiou
The problem of testing hypothesis in sequential clinical trials for treatment comparisons managed via response-adaptive (RA) randomization is addressed. We propose a new bootstrap test which is more efficient and robust with respect to the classical tests proposed in the literature. In particular, through a suitably choice of the target, we introduce a new test statistic based on the treatment allocation proportion and its bootstrap estimate of the variance. We derive the theoretical properties of the suggested procedure in terms of power and ethical gain; moreover, its performance is illustrated through simulations, also compared with those of other tests suggested in the literature, showing a significant improvement from the viewpoint of inferential precision and ethical concerns as well.

E0798: **Constructing priors for varying coefficient models**
Presenter: **Maria Franco Villoria**, University of Torino, Italy
Co-authors: Massimo Ventrucci, Haavard Rue
Varying coefficient models arise naturally as a flexible extension of a simpler model where the effect of the covariate is constant. We present varying coefficient models in a unified way using the recently proposed framework of penalized complexity (PC) priors to build priors that allow proper shrinkage to the simpler model, avoiding overfitting. We illustrate their application in a case study on air pollution and hospital admissions in Turin (Italy).

E0977: **Multivariate Bayesian change-point model with concurrent breaking points**
Presenter: **Gianluca Mastrantonio**, Politecnico of Turin, Italy
Co-authors: Giovanna Jona Lasinio, Alessio Pollice, Giulia Capotorti, Lorenzo Teodonio, Giulio Genova, Carlo Blasi
Extreme temperatures and precipitations have been recorded from 1951 to 2010 in 360 stations across Italy. Motivated by this real data, we present a new multivariate change-point model. The time series are modelled through a spatio-temporal/seasonal Gaussian process, a mean dependent on elevation and with independent trivariate residuals that follow change-point models, one for each station. The change point models take into account possible temporal drifts and parameters and breaking-points can be both shared across stations. Our model is specified using the Dirichlet process in a Bayesian framework. The clusterizations are then compared with the Italian Ecorigion, that are ecologically homogeneous areas of similar potential as regards the climate, physiography, hydrography, vegetation and wildlife, used as geographic framework for interpreting ecological processes, disturbance regimes, and vegetation patterns and dynamics.

EO104 Room I1 FLEXIBLE PARAMETRIC DISTRIBUTIONS: THEORY AND APPLICATIONS Chair: Christophe Ley

E0247: **A new Fourier series based construction for circulas**
Presenter: **Arthur Pewsey**, University of Extremadura, Spain
A new Fourier series based construction is proposed for the analogues of copulas for circular distributions recently coined 'circulas'. Different patterns of real Fourier coefficients are used to generate eight different classes of models, one of which is well-known within the literature. Approaches to model identification, fitting and goodness-of-fit testing are illustrated in the analysis of bird migration data.

E0249: **On a general structure for hazard-based regression models**
Presenter: **Francisco Javier Rubio**, King's College London, United Kingdom
Co-authors: Laurent Remontet, Nicholas Jewell, Aurelien Belot
The proportional hazards model represents the most commonly assumed hazard structure when analysing time to event data using regression models. The context of excess hazard models, which is of great interest in cancer epidemiology, is also dominated by the proportional hazards assumption. We will give a brief introduction to excess hazard regression models, and we will present a general hazard structure which contains, as particular cases, proportional hazards, accelerated hazards, and accelerated failure time structures, as well as combinations of these. We combine these different hazard structures with a flexible parametric distribution (exponentiated Weibull) for modelling the baseline hazard. This distribution allows us to cover the basic hazard shapes of interest in practice: constant, bathtub, increasing, decreasing, and unimodal. An example with real data will be used to illustrate the usefulness of this model. We also illustrate the importance of studying flexible parametric distributions, with interpretable parameters and good inferential properties that control the shape of the hazard.

E0272: **Modulated-symmetry-type skew distributions for directional data**
Presenter: **Christophe Ley**, Ghent University, Belgium
The modulation or perturbation of symmetry is one of the most popular methods to produce skew distributions on the real line and in R^k. The main driving force in this research area was a seminal paper that introduced the skew-normal distribution. The idea of symmetry-modulation is simple: take a symmetric density and modulate it by multiplication with a skewing function. The resulting density is of a simple form and exhibits many nice properties. We will show how, over the past years, the idea of symmetry-modulation has been successfully extended to the world of directional data, be it on the circle, sphere or cylinder.

E0698: **Small area estimation of inequality measures under alternative distribution models**
Presenter: **Silvia Pacei**, University of Bologna, Italy
Co-authors: Maria Rosaria Ferrante
Small area statistics on economic inequality are becoming important for better planning public regional policies. We focus on the estimation of entropy inequality measures in Italian provinces by using data taken from the EU-SILC sample survey for Italy. As EU-SILC survey is planned

