

The Working Group on Risk - CREAR, with the support of the IDS dpt, Institut des Actuaire, LabEx MME-DII and the group BFA (SFdS), has the pleasure to invite you to the Seminar by:

Prof. David BOLIN

Univ. of Gothenburg & Chalmers Univ. of Technology, Sweden

Thursday, January 30, 2019, 12:30pm – 1:30pm (CET)
at ESSEC La Défense (CNIT) – Amphi 202
and ESSEC Asia Pacific – Level 3, classroom 7

« A Bayesian General Linear Modeling Approach to Cortical Surface fMRI Data Analysis »

Cortical surface fMRI (cs-fMRI) has recently grown in popularity versus traditional volumetric fMRI, as it allows for more meaningful spatial smoothing and is more compatible with the common assumptions of isotropy and stationarity in Bayesian spatial models. However, as no Bayesian spatial model has been proposed for cs-fMRI data, most analyses continue to employ the classical, voxel-wise general linear model (GLM). Here, we propose a Bayesian GLM for cs-fMRI, which employs a class of spatial processes based on stochastic partial differential equations to model latent activation fields. Bayesian inference is performed using integrated nested Laplacian approximations (INLA), which is a computationally efficient alternative to Markov Chain Monte Carlo. To identify regions of activation, we propose an excursions set method based on the joint posterior distribution of the latent fields, which eliminates the need for multiple comparisons correction. Finally, we address a gap in the existing literature by proposing a Bayesian approach for multi-subject analysis. The methods are validated and compared to the classical GLM through simulation studies and a motor task fMRI study from the Human Connectome Project. The proposed Bayesian approach results in smoother activation estimates, more accurate false positive control, and increased power to detect truly active regions.

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David Bolin (PhD in Mathematical Statistics, Lund Univ., Sweden) is Associate Professor of Mathematical Statistics at University of Gothenburg and Chalmers University of Technology. David is also Associate Editor for the Scandinavian Journal of Statistics. His main area of research is spatial statistics and topics of interest include Gaussian Markov random fields, stochastic partial differential equations, spatio-temporal modeling, analysis of large data sets, and image analysis.



Labex MME-DII
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