Università Commerciale Luigi Bocconi

Department of Decision Sciences

Statistics Seminar

Bayesian modeling approaches for inferring activation and connectivity from brain signals

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12:30pm Room 3-E4-SR03 Via Rontgen 1 Milano

Abstract

We consider Bayesian state-space models for the analysis of large-dimensional brain signals including functional magnetic resonance imaging (fMRI) signals and multi-channel electroencephalogram (EEG) data. In the case of fMRI signals, we develop a modeling approach that allows us to jointly infer local hemodynamic response functions and activation parameters, as well as global effective and functional connectivity parameters across multiple regions of interest (ROIs) in the brain. Sparsity priors are placed on the parameters that describe coupling relationships between ROIs. We also consider dynamic factor models with structured latent factors for the analysis of multi-channel EEG and fMRI data. We discuss several aspects of the proposed models, as well as posterior inference through Markov chain Monte Carlo and sequential Monte Carlo methods. We apply the statistical models and methods to the analysis of two real fMRI datasets and one EEG dataset.

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