Bocconi
Università Commerciale Luigi Bocconi

Department of Decision Sciences

Statistics Seminar

Integrated Nested Laplace Approximations in practice

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Abstract

Latent Gaussian models are a common construct in statistical applications where some latent field, which is assumed to have a Gaussian structure, is undirectly observed through conditional independent data.
This class of models is interesting as it can be seen as a framework where many commonly used statistical models can be set into.
The latent Gaussian field can, in fact, be used to model, for instance, the time and space dependence among data or the smooth effect of covariates. Hence, smoothing-spline models, space time models, semi-parametric regression, spatial and spatio-temporal models, log-Gaussian Cox models, and geostatistical models, all fall into this category.
Integrated Nested Laplace approximation (INLA) is a new approach to Bayesian inference for latent Gaussian models when the main interest is in estimating posterior marginals.
INLA substitutes MCMC sampling with accurate deterministic approximations of such posterior marginals. Its main advantage is speed: results are obtained in second and minutes where MCMC would require hours and days.
Not less important is that INLA allows for a great deal of automation and parallelization of all computational procedures.
In practice INLA can be used almost as a black-box to analyze latent Gaussian models. The program “inla”, and its R interface make the INLA approach easily available for the end user and practically no programming at all is needed. During this seminar we will illustrate the main ideas behind INLA and illustrate, through a series of examples, the range of models which, at the moment, can be implemented using the INLA program.
This is a joint work with Prof Haavard Rue (NTNU - Trondheim) and Nicholas Chopin (ENSAE - Paris)

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