

Hierarchical Item Response Theory

A seminar by Omiros Papaspiliopoulos

Università Bocconi

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Room BENVENUTI

Department of Statistical Sciences

The talk relates to a book I am currently writing with a political scientist, Max Goplerud (Austin), and deals with variational inference and its applications to large scale inference for mixed models. In this talk I will discuss an important special case of the models we consider and involves random effects with multiplicative interactions. This model structure is pervasive throughout applied sciences: within political science is known as item response theory, within other parts of social sciences as factor models, within machine learning as matrix factorization. The type (and “density”) of data differ across application areas and this has implications on current practices, existing theory and practical priorities. Nevertheless, there are important synergies. In this talk I will provide a synthesis of different results in this broad field, and I will present our work, motivated primarily by understanding political ideology using roll call data, on developing variational inference methods for such models, and some surprising challenges they arise. Among other things, our models learn an ANOVA-type decomposition of latent ideology. To put things in perspective and see why variational inference is a useful tool in this context, we train models of hundreds of thousands of parameters on millions of observations.



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