Scalable computation for Bayesian hierarchical models

A seminar by Giacomo Zanella

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Friday 18 Mar 2022 | 12:30 p.m.
Room Benvenuti and live Zoom
Department of Statistical Sciences

We study coordinate-wise inference algorithms for Bayesian hierarchical models, seeking schemes whose total computational cost scales linearly with the number of observations and of parameters in the model. We focus on crossed random effects and nested multilevel models, which are ubiquitous in applied statistics, and consider methodologies built around Gibbs sampling, coordinate-ascent variational inference, and backfitting for maximum-a-posteriori estimation. For certain combinations of algorithm and model we establish theoretical guarantees for scalability and for others the lack thereof, leveraging connections to random graphs theory and statistical asymptotics. Various numerical simulations suggest that our results lead to methodological guidance that is useful beyond the specific assumptions used to derive the theory.

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