Towards Robust and Scalable Bayesian Learning

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Abstract
My talk consists of two parts. The first focuses on Generalised Bayesian Inference (GBI), where the loss hyperparameters are critical under model misspecification yet difficult to determine in a principled way. We introduce a Bayesian framework for hyperparameter inference using held-out data, enabling coherent estimation and uncertainty quantification, together with amortized generalized-posterior approximations that avoid repeated costly sampling across datasets and hyperparameter values. The second addresses scalability in simulation-based inference through data reduction, developing methods that learn informative low-dimensional summaries to enable efficient inference in complex settings, with applications to gravitational wave analysis.

Keywords: GBI, SBI, amortized learning