



Tutorial Session

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Sequentially Adaptive Bayesian Learning Workshop, October 31, 2015

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Sequentially Adaptive Bayesian Learning (SABL) is an algorithm that provides a unified approach to problems in Bayesian inference, maximum likelihood and method of moments estimation, and optimization. In the context of the literature it may accurately be viewed as a combination of sequential Monte Carlo methods and particle filtering applied to parametric inference, evolutionary algorithms and simulated annealing, entailing some new extensions of all three methods. The algorithm is highly (almost embarrassingly) parallel and this characteristic facilitates its implementation in massively parallel desktop computing with GPU's, in environments with dozens of CPU cores, and in traditional supercomputing settings. The workshop begins with an introduction to these methods suitable for participants with background in contemporary numerical methods (e.g., MCMC and importance sampling) for Bayesian inference.

In work undertaken at the Australian Research Council Centre of Excellence for Mathematical and Statistical Frontiers (ACEMS), SABL has been implemented as a Matlab toolbox. Matlab is often the software of choice in economics, finance and engineering, and the Matlab environment is especially well suited to both CPU and GPU parallel computing. SABL provides an environment that has minimal requirements for bringing new models or optimization to production, requiring little beyond the coding of the likelihood or objective function. The workshop will provide a tutorial in the use of SABL. It then moves to a "hands on" introduction to SABL, requiring only a laptop for access to cloud computing. It is not necessary to have a Matlab license, but participants who have licensed Matlab with the statistics toolbox will be able to use (and keep) SABL on their laptops; the parallel toolbox will provide even more flexibility.

SABL is designed to encourage third-party contributions (similar to R, in this respect). A primary goal of the workshop is to advance participants on a path to enhancing their research using SABL and to become contributors themselves. Beyond the workshop, participants will have access to consulting support from the ACEMS SABL team in these endeavors.

