

April 15th, 2019

KAP 414

3:30 P.M. – 4:30 P.M.

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“Approximate Variational Estimation for a Model of Network Formation”

Abstract: We develop approximate estimation methods for exponential random graph models (ERGMs), whose likelihood is proportional to an intractable normalizing constant. The usual approach approximates this constant with Monte Carlo simulations, however convergence may be exponentially slow. We propose a deterministic method, based on a variational mean-field approximation of the ERGM's normalizing constant. We compute lower and upper bounds for the approximation error for any network size, using nonlinear large deviations results. This translates into bounds on the distance between true likelihood and mean-field likelihood, as well as bounds on the distance between approximate parameter estimates from the MLE, assuming the likelihood is not very flat. In small networks, a simple Monte Carlo exercise shows that our deterministic method provides similar estimates as the simulation-based methods with the advantage of converging in quadratic time. This is based on the joint work with Angelo Mele.