Department of Decision Sciences

Statistics Seminar

On choosing mixture components via non-local priors

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Thursday, 20th October 2016
12:30pm Room 3-E4-SR03 Via Rontgen 1 Milano

Abstract

Choosing the number of components remains a central but elusive challenge in mixture models. Traditional model selection criteria can fail to enforce parsimony or result in poorly separated components of limited practical use. Non-local priors (NLPs) are a family of distributions that encourage parsimony by enforcing a separation between the models under consideration. We formalize NLPs in the context of mixtures and show how they lead to extra parsimony and well-separated components that have non-negligible weight, hence interpretable as distinct subpopulations. We derive tractable expressions and suggest default prior settings aimed at detecting multi-modal densities. We also give a theoretical characterization of the sparsity induced by NLPs and propose easily implementable algorithms to obtain the integrated likelihood and parameter estimates. Although the framework is generic we fully develop the multivariate Normal mixture case based on a novel family of exchangeable moment priors. The proposal is illustrated using simulated and real data sets. Our results show a serious lack of sensitivity of the Bayesian information criterion (BIC) and insufficient parsimony of local prior and shrinkage counterparts to our formulation, which strikes a reasonable balance between power and parsimony.

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