SEMINAR

"Nonparametric Bayes local partition processes with applications to functional data"

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Abstract:

The problem of choosing a prior for a multivariate mixture distribution is considered. Two local alternatives to the Dirichlet process are proposed, which have the advantage of allowing local borrowing of information and clustering, resulting in a much sparser representation of unknown multivariate distributions. The local partition process (LPP) relies on an adaptive mixture of global and local stick-breaking processes to induce an exchangeable dependence structure, while the kernel LPP (kLPP) induces a flexible predictor-dependent dependence structure. Basic properties of the LPP and kLPP are considered, and the approaches are applied to functional data analysis applications. The unknown functions are characterized using a basis function expansion, with LPP or KLPP priors used for the distribution of the basis coefficients. This approach accommodates subject-specific basis function selection and local functional clustering, while resulting in substantial advantages over the functional Dirichlet process in terms of mean square estimation error and predictive performance. Posterior computation relies on a combined slice and retrospective sampler. The methods are illustrated using simulated data and an application to hormone trajectories.