Department of Decision Sciences

Statistics Seminar

Bayesian multiscale mixture models

Antonio Canale
Università degli Studi di Torino

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Abstract

The Bayes density estimation literature is dominated by single scale methods, with the exception of Polya trees, which produce overly-spiky densities even when the truth is smooth. We propose a multiscale family of priors, which produce smooth realizations that do not rely on hard partitioning of the support. At each level in an infinitely-deep binary tree, we place a dictionary density. Using a stick-breaking characterization, stochastically decreasing weights are allocated to the finer scale dictionary elements. A slice sampler is used for posterior computation, and properties are described. The method characterizes densities with locally-varying smoothness, and can produce a sequence of coarse to fine density estimates. An extension for Bayesian testing of group differences is introduced and applied to DNA methylation array data. The method is also implemented in the msBP R package, which is briefly introduced.

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Via Röntgen 1 - 20136Milano

Tel. 02 5836.5632
Fax 02 5836.5630