Bocconi
Università Commerciale Luigi Bocconi

Department of Decision Sciences

Statistics Seminar

A new approach to proving rates of contraction of posterior distributions in bayesian nonparametrics

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Abstract

We develop a new approach to deriving rates of contraction for nonparametric bayes procedures. While similar in spirit to the approach taken in ghoshal, gosh, van der vaart (2000, AOS) and shen and wasserman (2001, AOS), we propose a new approach to the nonparametric testing problems employed in these proofs. We replace the Birge-Le Cam theory of nonparametric hypothesis testing in Hellinger distance by a general empirical process approach, that combines powerful concentration of measure phenomena of product measures -- in particular Talagrand's (1996, Invent.
Math.) inequality -- with approximation theoretic properties of the support of the prior. This approach applies to many of the commonly used priors, such as Gaussian, Dirichlet etc, and can in particular be generalised to cover contraction results in general L^p-norms, 1 \le p \le \infty, rather than only Hellinger or total variation distance. We discuss some apparent limitations of nonparametric bayes procedures that arise in L^p-loss for p>2, and some open conjectures related to it. [This is joint work with Evarist Gine.]

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