

Asymptotic Bayesian Analysis for Infinite Dimensional Parameter Spaces

Werner Ploberger

University of Rochester
and

Peter C. B. Phillips

Yale University & University of Auckland

Abstract

We perform an asymptotic analysis of Bayesian procedures for locally asymptotically quadratic (LAQ) models where the parameter space is infinite dimensional. The likelihood is assumed to be locally approximated by a quadratic function of an infinite-dimensional parameter (such as a regression function, a transfer function of a linear system, a long run variance or an infinite sequence of matrices). We then define a general class of priors which – in the case our parameter of interest is a function – can be viewed as imposing certain smoothness conditions (differentiability) on the parameter.

The importance of smoothness in certain theoretical asymptotic results is well known. But, in practical work, the determination of the smoothness parameter (i.e. the degree of differentiability) is often a problem. Here we provide a procedure that is analogous to the usual approach of “order estimation” and show that the procedure is consistent. In particular, we demonstrate that maximizing the Bayesian data-density (i.e. the Bayesian mixture of classical likelihoods) yields a consistent estimator for this smoothness parameter.