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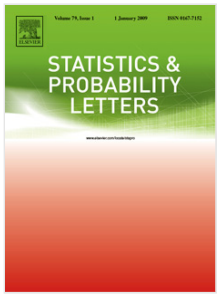

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On the asymptotic properties of the Bernstein estimator of the multivariate distribution function

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Abstract

The purpose of this paper is to study the asymptotic properties of Bernstein estimator of the multivariate distribution function, such as asymptotic bias, variance and asymptotic normality. Besides, we give the optimal choice of the polynomial order in terms of MSEs.

Keywords: Distribution function, Bernstein polynomials, Asymptotic properties, Mean squared error.

1. Introduction

For many problems, it is not evident how to select a parametric family of distribution functions to describe the data at hand, nonparametric estimation of distribution functions is an option. More recent works have shed light on these methods in particular, based on Bernstein polynomials, which seem to have optimal properties in the sense of the mean squared error (MSE), namely, such estimation procedures behave interestingly at the boundaries of the support of the distribution function or its density, including the absence of the boundary bias.

The Bernstein polynomial estimator was introduced for the first time by Vitale (1975) in order to estimate a density function defined on $[0, 1]$, who has shown it to be consistent in terms of MSE. Tenbusch (1994) extended this idea to multidimensional densities. Recently, Bernstein polynomial estimator of density functions got fashionable and attracted a lot of attention. See, for instance, the works of Babu et al. (2002), Kakizawa (2004), Babu &

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