

Optimal Estimates of Integrated Squared Density Partial Derivatives

吳鐵肩

國立成功大學統計系

ABSTRACT

Based on a random sample of size n from an unknown d -dimensional density f , the nonparametric estimation of the integrated squared density partial derivative of order \mathbf{m} (for any \mathbf{m}) is investigated. These functionals are important in a number of contexts. The proposed estimate is constructed in the frequency domain by using the sample characteristic function. For all d and \mathbf{m} , the information bounds of estimating the integrated squared density partial derivatives are established. Furthermore, for every d , \mathbf{m} and sufficiently smooth f and kernel, it is shown that the proposed estimate is asymptotically normal, attains the optimal root n convergence rate and achieves the information bound. This extends the work of Wu (Ann. Statist. 1995) who dealt with the case $d=1$. In simulation studies the superior performance of the proposed estimate is clearly demonstrated.