

Equivalent Nonparametric Regression Tests Based on Spline and Local Polynomial Smoothers

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It is well known that a smoothing spline estimate is asymptotically equivalent to a kernel-type estimate of nonparametric regression functions. However, little information has been available about whether the nonparametric diagnostic tests of the regression functions based on smoothing spline and kernel-type smoothing are equivalent in terms of their asymptotic distributions and powers. In this paper, we consider the "generalized likelihood ratio" test statistics constructed from using both smoothing spline and kernel-type estimators, and derive explicitly the equivalent forms of the asymptotic distributions. Furthermore, we derive the optimal rate of smoothing parameter in the resulting spline-based test and suggest choice of kernel function for kernel-based test. Power comparisons of the two tests are also examined. Application of our results will be addressed in a mixed-effects model.