

2003 ABSTRACTS

No. 2003-1

Sliced Inverse Regression with the Single Index Model: Influence Functions and Asymptotic Variances.

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Sliced Inverse Regression (SIR) is a dimension reduction technique that is both efficient and simple to implement with only minimal assumptions about the data. The procedure itself relies heavily on estimates that are known to be highly non-robust and, as such, the issue of robustness is often raised. This paper looks at the robustness of SIR under the single index model assumption by deriving the influence function. These influence functions are plotted for a variety of contamination structures. The asymptotic variance of the estimates is also derived for the single index model when the explanatory variable is known to be standard normally distributed. The asymptotic variance is then compared for varying choices of the number of slices for a simple model example.

No. 2003-2

Power Approximations in Testing for Unequal Means in a One-Way ANOVA Weighted for Unequal Variances.

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The classical F -test for unequal means in a one-way ANOVA is known to be misleading when the populations have different variances. To overcome this Welch (1951) and James (1951) weighted the terms in the numerator sum of squares by the respective inverse of the sample mean variances, and they proposed equivalent tests based on F or χ^2 approximations to the null distribution of the weighted sum of squares for moderate sample sizes. We provide approximations for the non-null distributions of their weighted statistics which are found to be useful in obtaining approximations to the power of the Welch F -test.

No. 2003-3

Prediction m.s.e. comparison of estimators in AR(1)

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Abstract

We consider a first-order autoregressive process with non-zero mean. Our aim is one-step-ahead prediction and so we compare the parameter estimators needed for this prediction according to a prediction mean square error criterion. We compare six estimators using this criterion and we make practical recommendations concerning the relative merits of these estimators.

No. 2003-4

Estimating effect sizes in a one-way ANOVA weighted for unequal variances

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Abstract

Interval estimates are found for the effect size as measured by the non-centrality parameter in an ANOVA weighted for unequal variances. In addition, the effect size is shown to be a monotone function of the weighted coefficient of determination. Extensive simulations demonstrate the accuracy of the nominal 95% coverage percentage of these intervals for a wide range of parameters.