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Le Cam optimal tests for symmetry against Ferreira and Steel's general skewed distributions

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❝ Cite this article   ↗ https://doi.org/10.1080/10485250902971765

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Abstract

When testing symmetry of a univariate density, (parametric classes of) densities skewed by means of the general probability transform introduced in Ferreira and Steel [*A constructive representation of univariate skewed distributions*, J. Amer. Statist. Assoc. 101 (2006), pp. 823–829] are appealing alternatives. This paper first proposes parametric tests of symmetry (about a specified centre) that are locally and asymptotically optimal (in the Le Cam sense) against such alternatives. To improve on these parametric tests, which are valid under well-specified density types only, we turn them into semiparametric tests, either by using a standard studentisation approach or by resorting to the invariance principle. The second approach leads to robust yet efficient signed-rank tests, which include the celebrated sign and Wilcoxon tests as special cases, and turn out to be Le Cam optimal irrespective of the underlying original symmetric density. Optimality, however, is only achieved under well-specified 'skewing mechanisms', and we therefore evaluate the overall performances of our tests by deriving their asymptotic

relative efficiencies with respect to the classical test of skewness. A Monte-Carlo study confirms the asymptotic results.

Acknowledgements

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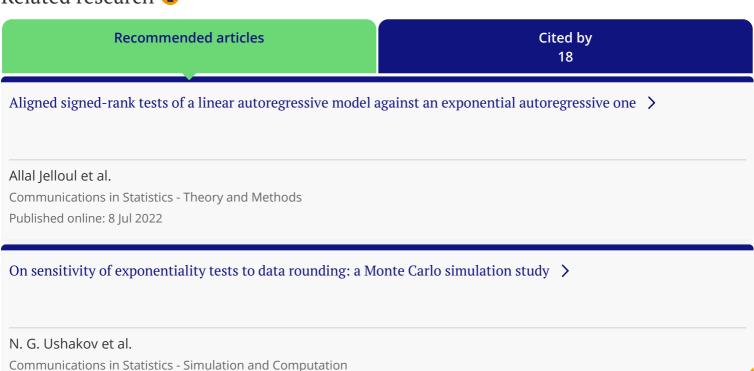Published online: 11 Dec 2021

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