

Efficient Inference based on Signed Ranks in Symmetric IC Models

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Abstract

We consider semiparametric location-scatter models for which the p -variate observation is generated through

$$X = \Lambda Z + \mu,$$

where μ is a real p -vector, Λ is a real invertible $p \times p$ matrix, and the unobserved random p -vector Z has marginals that are centered and mutually independent but are otherwise unspecified. As in blind source separation and independent component analysis (ICA), the parameter of interest is Λ . On the basis of n independent copies of X , we consider, under symmetry assumption on Z , *signed-rank* one-sample testing and estimation procedures for standardized version L of the mixing matrix matrix Λ . We exploit the uniform local and asymptotic normality (ULAN) of the model to define signed-rank procedures that are semiparametrically efficient under correctly specified densities. Yet, as usual in rank-based inference, the proposed procedures remain valid (correct asymptotic size under the null for hypothesis testing, and root- n consistency for point estimation) under a very broad range of densities. We derive the asymptotic properties of the proposed procedures and investigate their finite-sample behavior through simulations.

References

- [1] P. Ilmonen, and D. Paindaveine (2011). Semiparametrically efficient inference based on signed ranks in symmetric independent component models. *The Annals of Statistics*, **39(5)** 2448–2476.
- [2] P. Ilmonen, and D. Paindaveine. Signed rank tests for linear constraints in symmetric IC models. *Manuscript*.