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Title: Rank-based inference for one-sample and multi-sample principal component analysis.

Abstract: We consider rank-based inference in the context of one-sample and multi-sample principal component analysis. Our methodology combines (i) Le Cam's theory of locally asymptotically normal experiments (in the nonstandard context of a "curved" parametrization) and (ii) invariance arguments. Unlike classical Gaussian procedures, the procedures we are proposing remain valid without any moment assumption, hence address a broader class of problems, where covariance matrices need not exist and principal components are associated with more general scatter matrices. Yet they are locally and asymptotically optimal under correctly specified densities and show asymptotic relative efficiencies, with respect to pseudo-Gaussian procedures, that are uniformly high. Estimators are obtained via a rank-based version of Le Cam's one-step method, combined with an estimation of cross-information quantities. Finite-sample performances are investigated via a Monte-Carlo study.

This is joint work with Marc Hallin (Université Libre de Bruxelles) and Thomas Verdebout (Université Lille III).