Concentration function for skew-symmetric models with application to Bayesian robustness

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Data from many applied fields exhibit both heavy tail and skewness behavior. For this reason, in the last few decades, there has been a growing interest in exploring parametric classes of skew-symmetrical distributions. A popular approach to model departure from normality consists of modifying a symmetric probability density function in a multiplicative fashion, introducing skewness. An important issue, addressed in this paper, is the introduction of some measures of distance between skewed versions of probability densities and their symmetric baseline. Different measures provide different insights on the departure from symmetric density functions: we analyze and discuss L_1 distance, J distance and the concentration function in the normal and Student-t cases. Multiplicative contaminations of distributions can be also considered in a Bayesian framework as a class of priors and the notion of distance is here strongly connected with Bayesian robustness analysis: we use the concentration function to analyze departure from a symmetric baseline prior through multiplicative contamination prior distributions for the location parameter in a Gaussian model.

Keywords: Bayesian robustness; skew-symmetric models; L_1 distance; concentration function.