

On the use of some unconventional projection pursuit indexes in cluster identification problems

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Abstract

Despite kurtosis is often regarded as a univariate characteristic, its relevance in the analysis of multivariate data has been recognized as an important tool in the field of projection pursuit. The need to project a set of multivariate points onto a lower dimensional space (often the real line) struggles against the computational effort to work with infinitely many directions for such projections, but some “interesting” directions are possibly found by minimizing or maximizing the kurtosis of the projected data. The existing literature concentrated on the use of the standardized fourth moment as a pursuit index and on the possible simplification of the related computations. In this work we evaluate the use of different unconventional kurtosis measures. We underline that their strength rests in their decomposability, as long as in their balanced sensitivity for both the tails and the center of the distribution. In a simulation study involving bivariate data, the effectiveness of the unsupervised projection pursuit procedures built upon these unconventional kurtosis indexes, to reveal hidden clustering structures, is assessed. The results obtained are promising and will be further validated on higher-dimensional data in future works.

Keywords

Kurtosis, Dimension reduction, Clustering.