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On Mixture Modeling Using the Multivariate Skew Normal Distribution

Abstract: Finite mixture of distributions, especially for the use of normal components, are known as very powerful for modeling an extremely wide range of theoretic and applied problems. However, normal mixture models still have their drawbacks. When a set of data contains many classes of asymmetric observations, the use of normal components tends to be overfitting since it needs to include additional components to capture excess skewness.

In this paper, we provide a flexible modeling framework using a mixture of (multivariate) skew normal distributions. Efficient EM-type algorithms are employed for computing maximum likelihood estimates. Applications such as density estimation and classification of a new data vector are also addressed. Our proposed methodologies are demonstrated through simulation studies and real examples in the presence of asymmetric components. Numerical results are compared with standard normal mixtures.