On the scale mixture of multivariate skew slash distribution

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Abstract

The multivariate skew slash distribution, was introduced by Tian et al. (2017), which defined as the follows, the random vector $\mathbf{X} \in \Re^n$ has a multivariate skew slash distribution, with location parameter $\boldsymbol{\mu} \in \Re^n$, positive definite matrix $\Sigma \in M_{n\times n}$, and skewness vector $\boldsymbol{\alpha} \in \Re^n$, denoted by $\mathbf{X} \sim MSS_n(\boldsymbol{\mu}, \Sigma, \boldsymbol{\alpha})$, if its pdf is given by

$$f(\mathbf{x}) = 2\phi_n(\mathbf{x}; \boldsymbol{\mu}, \Sigma) \left[\Phi\left(\boldsymbol{\alpha}' \Sigma^{-\frac{1}{2}} (\mathbf{x} - \boldsymbol{\mu}) \right) - \frac{\phi(0) - \phi\left(\boldsymbol{\alpha}' \Sigma^{-\frac{1}{2}} (\mathbf{x} - \boldsymbol{\mu}) \right)}{\boldsymbol{\alpha}' \Sigma^{-\frac{1}{2}} (\mathbf{x} - \boldsymbol{\mu})} \right], \quad for \quad \mathbf{x} \neq \boldsymbol{\mu}.$$

In this paper, the scale mixture of multivariate skew slash distribution is introduced. According to the definition, the probability density function with some additional properties were discussed. The first four moments and measures of skewness and kurtosis of the scale mixture of multivariate skew slash distribution allowing for scale parameters are calculated. In addition, the first two moments of their quadratic forms are obtained. In particular, the linear transformation, stochastic representation and hierarchical representation were studied. In the end, the maximum likelihood estimation through EM algorithm was proposed.

Keywords: Scale mixture of skew slash distribution, skew slash distribution, Quadratic form, Moment generating function.

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