

Skewed Sub-Gaussian Multivariate Distribution

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Abstract

Normal variance mixture models are used as an extension of the Gaussian framework to allow heavier tails and add flexibility to the Wiener processes time concept. The Sub-Gaussian model is a typical representative of this class. It is a parametric sub-class of the multivariate α -stable distribution which is an elliptical, infinitely divisible and has a tractable representation of its characteristic function. It possesses heavy tails but it is also a symmetric distribution.

To overcome the latter drawback a ρ -weighted, univariate, α -stable skewness component is introduced. The domain of ρ and its connection to the skewness and the dependence structure are explored as well as some of the border cases. By varying ρ from 0 to 1 the distribution transforms from a regular Sub-Gaussian to multivariate α -stable with independent and not necessary symmetric components.

Application to a real-world financial assets data is provided together with fitting techniques and comparison of the Sub-Gaussian and the Skewed Sub-Gaussian distribution.

Keywords: Variance mixture, Multivariate stable models, Sub-Gaussian model, Asymmetric distributions

AMS subject classifications: 60E07, 62P05, 62E17

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