

A CLASS OF MULTIVARIATE SKEW-NORMAL MODELS

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Abstract. The existing model for multivariate skew normal data does not cohere with the joint distribution of a random sample from a univariate skew normal distribution. This incoherence causes awkward interpretation for data analysis in practice, especially in the development of the sampling distribution theory. In this paper, we propose a refined model that is coherent with the joint distribution of the univariate skew normal random sample, for multivariate skew normal data. The proposed model extends and strengthens the multivariate skew model described in Azzalini (1985, *Scandinavian Journal of Statistics*, **12**, 171–178). We present a stochastic representation for the newly proposed model, and discuss a bivariate setting, which confirms that the newly proposed model is more plausible than the one given by Azzalini and Dalla Valle (1996, *Biometrika*, **83**, 715–726).

Key words and phrases: Moment generating function, skewness, stochastic representation, quadratic form, multivariate normal distribution, Helmert matrix.