

## The Modality of Multivariate Skew Normal Mixture

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**Abstract :** Finite mixtures are a flexible and powerful tool that can be used for univariate and multivariate distributions, and a wide range of research analysis has been conducted based on the multivariate normal mixture and multivariate of a t-mixture. Determining the number of modes is an important activity that, in turn, allows one to determine the number of homogeneous groups in a population. Our work currently being carried out relates to the study of the modality of the skew normal distribution in the univariate and multivariate cases. For the skew normal distribution, the aims are associated with studying the modality of the skew normal distribution and providing the ridgeline, the ridgeline elevation function, the  $\pi$  function, and the curvature function, and this will be conducive to an exploration of the number and location of mode when mixing the two components of skew normal distribution. The subsequent objective is to apply these results to the application of real world data sets, such as flow cytometry data.

**Keywords :** mode, modality, multivariate skew normal, finite mixture, number of mode

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