Extended sine-skewed circular distributions and their application to statistical models on cylinders

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Abstract

In this talk, after explaining symmetric circular statistical models and the basic statistics for observations on the unit circle, we will introduce the sine-skewed circular distributions, which are well-known asymmetric distributions on the unit circle. After that, we propose a new family of skew circular distributions as an extension of the sine-skewed circular distributions. This family includes some distributions that can give stronger asymmetry than the sine-skewed circular distribution around the mode. We also show that a subfamily of the proposed distributions is identifiable with respect to parameters, and all distributions in the subfamily have explicit trigonometric moments. In addition, we present new cylindrical distributions combining the extended sine-skewed von Mises distribution in a circular part with the Weibull distribution in a linear part.

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