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The Skew-Reflected-Gompertz distribution for analyzing symmetric and asymmetric data

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Abstract

In this work, we have defined a new family of skew distribution: the Skew-Reflected-Gompertz. We have also derived some of its probabilistic and inferential properties. The maximum likelihood estimates of the proposed distribution parameters are obtained via an EM-algorithm, and performances of the proposed model and its estimates are shown via simulation studies as well as real applications. Three real data sets are also used to illustrate the model performance which can compete against some well-known skew distributions frequently used in applications.

Keywords: EM-algorithm; Finite mixtures; Maximum likelihood estimates; Skew-Reflected-Gompertz distribution; Two-piece distributions.

1. Introduction

In recent years, various types of skew-symmetric distributions families of probability distributions with their performances and applications have been proposed by several researchers. One of the most important asymmetric distributions, among all the available ones, is the skew-normal (*SN*) model proposed by Azzalini (1985, 1986) and Liseo (1990). This class has a skewness parameter which can provide a more flexible model and represents the asymmetric data in a better form comparing to the celebrated Normal distribution. To see the other commonly studied family based on the skew-normal distribution and their applications; see e.g. Maleki & Arellano-Valle (2017), Maleki et al. (2018a,b) and references therein.