New Extension of Exponentiated Gamma Distribution: A New Regression Model with Applications

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Abstract

In this paper, we introduce a two parameter extension of exponentiated gamma distribution. We explicitly derive the closed form expressions of the moments, mode and quantiles of the proposed distribution. L-moments and coefficients of skewness and kurtosis are obtained using the quantile function. Other important properties including identifiability, entropy, stochastic orderings, stress-strength reliability and differential equations associated with the distribution are also discussed. We briefly describe different estimation procedures namely, the method of maximum likelihood estimation, moment estimation, maximum product of spacings estimation, ordinary and weighted least squares estimation, and Cram´er–von-Mises estimation along with an extensive simulation study for comparing their performance. An application of modeling trees growth data is presented to show the adequacy of the proposed distribution over the distributions existing in the literature. A parametric regression model based on the proposed distribution is introduced and used to establish a regression model for the volume, diameter and height of the trees.