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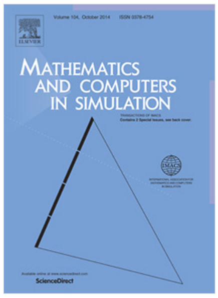

Estimation of parameters for the Marshall–Olkin generalized exponential distribution based on complete data

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Estimation of parameters for the Marshall-Olkin generalized exponential distribution based on complete data

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Abstract

This paper derives some properties of the Marshall-Olkin generalized exponential distribution and shows that this distribution is more flexible than the previous generalized exponential. Then we discuss estimation of the distribution parameters by the methods of moments, maximum likelihood and new method of minimum spacing distance. Furthermore, asymptotic confidence intervals of the estimators are presented. Finally, we give a method to simulate the proposed distribution.

Keywords: Exponentiated exponential distribution, Marshall-Olkin generalized exponential distribution, Maximum likelihood estimation, Minimum spacing distance estimator.
2010 MSC: 60E05, 62F10.

1. Introduction

The generalized exponential distribution (GE) or exponentiated exponential distribution was introduced by Mudholkar and Srivastava [12] as an alternative to the commonly used gamma and Weibull distributions. Since then, the GE distribution has been studied by many authors, for example, Gupta and Kundu [3], [6], Raqab and Ahsanullah [13], Jaheen [10], Raqab and Madi [14], Sarhan and Zheng [15]. Gupta and Kundu [4], [8] mentioned that the GE distribution could be used quite effectively in analyzing many lifetime data, particularly, in place of the two-parameter gamma or two-parameter Weibull distribution and in many situations the GE distribution could provide a better fit than the two-parameter Weibull distribution. Gupta and Kundu [5] also studied many different methods of parameter estimations which included maximum likelihood estimates, estimates of moment method and estimates by the method of probability plot based on a complete random sample. An extensive survey of some recent developments for the GE distribution based on a complete random sample can be derived from Gupta and Kundu [9].

The GE distribution has the following cumulative distribution function (CDF):

$$F(x;\alpha,\lambda) = (1-e^{-\lambda x})^{\alpha}, \qquad x>0,\ \alpha,\lambda>0. \tag{1}$$

Corresponding its probability density function (PDF) is

$$f(x;\alpha,\lambda) = \alpha\lambda(1-e^{-\lambda x})^{\alpha-1}e^{-\lambda x}, \qquad x>0. \tag{2}$$

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