A new generalization of Aradhana distribution: Properties and applications

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Abstract

In this paper, we introduce a new generalization of Aradhana distribution called as Weighted Aradhana Distribution (WID). The statistical properties of this distribution are derived and the model parameters are estimated by maximum likelihood estimation. Simulation study of ML estimates of the parameters is carried out in R software. Finally, an application to real data set is presented to examine the significance of newly introduced model.

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1. INTRODUCTION

Aradhana distribution is a newly proposed lifetime model formulated by Rama Shanker (2016) for several engineering applications and calculated its various characteristics including stochastic ordering, moments, order statistics, Renyi entropy, Stress-Strength reliability and ML estimation.

Probability density function (pdf) of Aradhana Distribution (AD) is given by

$$f(x;\theta) = \frac{\theta^3}{\theta^2 + 2\theta + 2}(1+x)^2 e^{-\theta x} \ x > 0, \theta > 0 \tag{1.1}$$

The corresponding cdf of (1.1) is given by

$$F(x;\theta) = 1 - \left[1 + \frac{\theta x(\theta x + 2\theta + 2)}{\theta^2 + 2\theta + 2}\right]e^{-\theta x} \ , \ x > 0, \theta > 0 \tag{1.2}$$

2. WEIGHTED ARADHANA DISTRIBUTION (WAD)

Often scientists cannot select sampling units in observational studies with equal probability. Well defined sampling frames often do not exist for human, wildlife, insect, plant, or fish populations. Recorded observations on individuals in these

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