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MISCLASSIFIED SIZE-BIASED MODIFIED POWER SERIES DISTRIBUTION AND ITS APPLICATIONS

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Abstract. A misclassified size-biased modified power series distribution (MSBMPSD) where some of the observations corresponding to $x = 2$ are misclassified as $x = 1$ with probability α, is defined. We obtain its recurrence relations among ordinary, central and factorial moments and also for some of its particular cases like the size-biased generalized negative binomial (SBGNB) and the size-biased generalized Poisson (SBGP) distributions. We also discuss the effect of the misclassification on the variance for MSBMPSD and illustrate an example for size-biased generalized negative binomial distribution. Finally, an example is presented for the size-biased generalized Poisson distribution to illustrate the results, and a goodness of fit test is also done using the method of moments.

Keywords: misclassification, size-biased modified power series distribution, raw moments, central moments, factorial moments, variance ratio, inverted parabola, generalized Poisson, generalized negative binomial

MSC 2010: 62E15, 62E10, 60E05

1. Introduction

In certain experimental investigations involving discrete distributions external factors may induce a measurement error in the form of misclassification. For instance, a situation may arise where certain values are erroneously reported; such a situation termed as modified or misclassified has been studied by Cohen ([4], [5], [6]) for the Poisson and the binomial random variables, Jani and Shah [16] for modified power series distribution (MPSD) where some of the values of one are sometimes reported as zero, and recently by Patel and Patel ([18], [19]) in the case of generalized power series distribution (GPSD) and MPSD for a more general situation where sometimes the value $(c + 1)$ is reported erroneously as c.