

Journal of Statistics Applications & Probability An International Journal

http://dx.doi.org/10.18576/jsap/060318

Discrete Burr Type XII Minimax Distribution: A New Discrete Model

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Received: 29 Jun. 2017, Revised: 17 Aug. 2017, Accepted: 20 Aug. 2017. Published online: 1 Nov. 2017.

Abstract: In this article, we attempt to introduce a new count data model which is obtained by compounding discrete Burr type XII distribution with Minimax distribution. Several distributional properties of the model have been discussed. Finally, real data set is analyzed to investigate the suitability of the proposed distribution in modeling count.

Keywords: Discrete Burr type XII Distribution, Minimax distribution, compound distribution, count data, reliability.

1 Introduction

Researchers employ different techniques like discretization [18,19,20], transmutation [21], compounding [17] etc. to generate new probability distributions to handle complex data. Compound distribution arises when all or some parameters of a distribution known as parent distribution vary according to some probability distribution called the compounding distribution, for instance negative binomial distribution can be obtained from Poisson distribution when its parameter λ follows gamma distribution. If the parent distribution is discrete then resultant compound distribution will also be discrete and if the parent distribution is continuous then resultant compound distribution will also be continuous i,e. the support of the original (parent) distribution determines the support of compound distributions. In several research papers it has been found that compound distributions are very flexible and can be used efficiently to model different types of data sets. With this in mind many compound probability distributions have been constructed. In the early 1970s, Dubey [10] derived a compound gamma, Minimax and F distribution by compounding a gamma distribution with another gamma distribution and reduced it to the beta Ist and 2nd kind and to the F distribution by suitable transformations. Sankaran [1] introduced a compound of Poisson distribution with that of Lindley distribution for modeling count data. Gerstenkorn [11,12] proposed several compound distributions, he obtained compound of gamma distribution with exponential distribution by treating the parameter of gamma distribution as an exponential variate and also obtained compound of polya with beta distribution. Ghitany, Al-Mutairi and Nadarajah [2,3] introduced zero-truncated Poisson-Lindley distribution, who used the distribution for modeling count data in the case where the distribution has to be adjusted for the count of missing zeros. Zamani and Ismail [4] constructed a new compound distribution by compounding negative binomial with one parameter Lindley distribution that provides good fit for count data where the probability at zero has a large value.

In this paper we propose a new count data model by compounding two parameter discrete Burr type XII distribution with Minimax distribution, as there is a need to find more plausible discrete probability models or survival models in medical science and other fields, to fit to various discrete data sets. It is well known in general that a compound model is more flexible than the ordinary model and it is preferred by many data analysts in analyzing statistical data. Moreover, it presents beautiful mathematical exercises and broadened the scope of the concerned model being compounded.

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