Accepted Manuscript

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PII: S1572-3127(16)30033-8
DOI: http://dx.doi.org/10.1016/j.stamet.2016.10.001
Reference: STAMET 551

To appear in: *Statistical Methodology*

Received date: 13 April 2015
Revised date: 13 October 2016
Accepted date: 19 October 2016

Please cite this article as: S.Z. Sim, S.H. Ong, A generalized inverse trinomial distribution with application, *Statistical Methodology* (2016), http://dx.doi.org/10.1016/j.stamet.2016.10.001

A Generalized Inverse Trinomial Distribution with Application

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ABSTRACT

This paper considers a particular generalized inverse trinomial distribution which may be regarded as the convolution of binomial and negative distributions for the statistical analysis of count data. This distribution has the flexibility to cater for under- , equi- and over- dispersion in the data. Some basic and probabilistic properties and tail approximation of the distribution have been derived. Conditions for the numerical stability of the two-term probability recurrence formula have also been examined to facilitate computation. For the purpose of statistical analysis, test of hypothesis for equi-dispersion by the score and likelihood ratio tests and simulation study of their power, parameter estimation by maximum likelihood and a probability generating function based methods have been considered. The versatility of the distribution is illustrated by its application to real biological data sets which exhibit under and over dispersion. It is shown that the distribution fits better than the well-known generalized Poisson and COM-Poisson distributions.

Keywords: Convolution, dispersion, goodness-of-fit, log-concavity, numerical stability of probability recurrence, parameter estimation, reliability, score and likelihood ratio tests

1. Introduction

Modelling of count data is of considerable interest and importance in applications in diverse areas, for example, in modelling of contract strikes, patent registration, failed

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