Chapter 1:

Bayesian Analysis of Zero-Inflated Generalized Power Series Distributions Under Different Loss Functions

Peer Bilal Ahmad

DOI: https://doi.org/10.21467/books.44.1

Additional information is available at the end of the chapter

Introduction

As we know some of the family members of generalized power series distributions (GPSD) like binomial, negative binomial, Poisson and logarithmic series distributions are widely used for modelling count data. The properties of modality and divisibility of these distributions are known in the literature. Misra et.al (2003), Alamatsaz and Abbasi (2008), Aghababaei Jazi and Alamatsaz (2010), Abbasi et.al (2010) and Aghababaei Jazi et.al (2010) studied the stochastic ordering comparison between these distributions and their mixtures.

For modelling count data like accumulated claims in insurance and correlated count data which exhibit over-dispersion has resulted in introduction of zero-inflated and non-zero inflated parameter counterparts of the GPS distributions. Neyman (1939) and Feller (1943) studied that in some discrete data, the observed frequency for $X = 0$ is much higher than the expected frequency predicted by the assumed model. To be more specific, let us suppose that there are two machines. One of which is perfect and does not produce any defective item. The other machine produces defective items according to a Poisson distribution. We record the joint output of the two machines without knowing whether a specific item is produced by one or the other. In this case, the zero count seems to be inflated. Pandey (1964-65) studied a situation dealing with the number of flowers of plants of Primula veris. He has found that most of the plants were with eight flowers and inflated Poisson distribution (inflated at the point 8 not zero) proved to be the best model for fitting of such a data set. A similar data set on premature ventricular contractions where the distribution turns out to be inflated binomial has been analyzed by Farewell and Sprott (1988). Yip (1988) while dealing with the number of insects per leaf came to the conclusion that inflated Poisson distribution is the best fitted model for such a data set.