



Characterization, properties and applications of *gpot*-normal distributions

Lila Ricci*

Universidad Nacional de Mar del Plata, Mar del Plata, Argentina - lricci@mdp.edu.ar

Diana Kelmansky

Universidad de Buenos Aires, Buenos Aires, Argentina - dkedkelman@ic.fcen.uba.ar

A new family of probability distributions is introduced, the *gpot*-normal. It was motivated as an alternative approach to transformations for microarray intensity, characterized by the presence of zero and negative values, however this family has shown to be useful also for modeling a wider type of data. It is proved that random variables that belong to the *gpot*-normal distribution family, when they are transformed with a suitable transformation become normal or truncated normal distributed. It is also shown that the proposed family of density functions constitute a pseudo-dispersion model, defined by Jørgensen in 1997 and its deviance and unit variance are obtained. An expression is given for the moments and for the quantiles, in terms of the truncated normal density. A combined maximum likelihood method is proposed to estimate the model parameters, and it is applied to microarray and chemical concentration data.

Keywords: *Gpot*-normal; Pseudo-dispersion models; Microarrays; Truncated normal.