The Pyrenees International Workshop on Statistics, Probability and Operations Research
SPO 2007 Jaca, September 12–15, 2007

Some results for generalized mixtures of Weibull distributions with common shape parameter

Manuel Franco[1], **Juana-María Vivo**[2]

SUMMARY

Weibull models have been used in solving real-world problems from many different situations (among others, see Murthy, Xie and Jiang (2004)). Specially, Weibull distributions and their mixtures play a great role in the reliability and life testing experiments and survival analysis, as they exhibit a wide range of shapes for the density and failure rate functions.

Nevertheless, generalized mixtures of Weibull distributions with common shape parameter arise under formation of some structures of systems, and moreover, where observations are taken from possibly heterogeneous population with the same distribution type in each sub-population, Weibull and Weibull mixture models may not always be appropriate. So, it is natural to consider generalized mixtures of Weibulls as underlying distributions in these situations, i.e. to use relaxed mixing weights. However, the generalized mixtures of Weibull components with the same shape parameter have not been characterized.

In this paper, we discuss conditions for that an arbitrary finite mixture of Weibulls with common shape parameter to be a valid probability model, and we characterize these generalized mixtures with two or three Weibull components.

Keywords: Weibull, Weibull mixture, generalized mixture

AMS Classification: 60E05, 62E10, 62N01

References

[1] Murthy, D.N.P.; Xie, M. and Jiang, R. *Weibull models*. Wiley, New York, 2004.

[1]Department of Statistics and Operations Research
University of Murcia, mfranco@um.es

[2]Department of Quantitative Methods for Economy
University of Murcia, jmvivomo@um.es