

Aspects of Residual Information Measures for Weighted Distributions

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Abstract

The concepts of weighted distributions have been introduced by Rao (1965,1985). A weighted function will be denoted by $w(x)$ and $g(x, \theta) = \frac{w(x)f(x, \theta)}{E(w(X))}$ where $E_{\theta}(w(X)) = \int_D w(x)dF(x)$, and $f(., \theta)$ is the distribution of random variable X and g is the pdf of the weighted distribution.

Characterization results for the residual information measures are given here in view of the weighted distributions. We also derive relationship among residual information measures and reliability measures such as hazard rate. The residual divergence between two positive random variables are studied and finding link results relevant to information theory and reliability theory. Some examples that lead us to results related to information measures are derived for order statistics, record value, proportional hazard, proportional reversed hazard, Lorenz curve and hazard rate as special cases of weighted families.

Ebrahimi and Kirmani(1996) defined the uncertainty of residual lifetime distributions, then Asadi et. al. (2005, 2004) obtained some results related to minimum dynamic discrimination information and maximum dynamic entropy models. We obtain results concerning their relations with life distributions and information measures and give some examples for weighted families.

Some inequalities, relations and partial ordering for weighted reliability measures are also presented. A new measure of information called cumulative residual entropy in view of M Rao et. al. (2004) is defined, examples and some of its properties are obtained at the end of this paper.

References

- [1] Ebrahimi, N & Kirmani S. N. U. A. (1996). A measure of discrimination between two residual life-time distributions and its applications. *Ann. Inst. Statist. Math.*, **Vol. 48, No. 2**, 257-265.
- [2] Majid Asadi, Nader Ebrahimi, G. G. Hamedani and Ehsan S. Soofi (2005). Minimum dynamic discrimination information models. *J. Appl. Probab*, **42, no. 3** , 643-660
- [3] Majid Asadi, Nader Ebrahimi, G. G. Hamedani and Ehsan S. Soofi (2004). Maximum dynamic entropy models. *J. Appl. Probab*, **41, no. 2** , 379-390.
- [4] M. Rao, Y. Chen , Baba C. Vemuri and F. Wang (2004). Cumulative Residual Entropy: A New Measure of Information. *IEEE Transactions on Information Theory*, **50 (6)**, 1220-1228.
- [5] Rao, C. R. (1965). On discrete distributions arising out of methods of ascertainment, in *Classical and Contagious Discrete Distributions*, G. Patil Ed., Pergamon Press and Statistical Publishing Society, Calcutta, 320-332.
- [6] Rao, C. R. (1985). Weighted distributions arising out of methods of ascertainment, in *A Celebration of Statistics*, A. C. Atkinson & S. E. Fienberg eds. Springer Verlag, New York, Chapter 24 , pp. 543-569.