Testing goodness-of-fit for exponential distribution based on cumulative residual entropy

S. Baratpour* and A. Habibi Rad

Department of Statistics, School of Mathematical Sciences
Ferdowsi University of Mashhad, P. O. Box 91775-1159
Mashhad, Iran

Abstract

Testing exponentiality has long been an interesting issue in statistical inferences. In this paper, we introduce a new measure of distance between two distributions that is similar Kullback-Leibler divergence, but using the distribution function rather than the density function. This new measure is based on the cumulative residual entropy. Based on this new measure, a consistent test statistic for testing the hypothesis of exponentiality against some alternatives is developed. Critical values for various sample sizes determined by means of Monte Carlo simulations are presented for the test statistics. Also, by means of Monte Carlo simulations, the power of the proposed test under various alternative is compared with that of other tests. Finally, we found that the power differences between the proposed test and other tests are not remarkable. The use of the proposed test is shown in an illustrative example.

Keywords: Cumulative residual entropy; Maximum entropy; Kullback-Leibler divergence; Test for exponentiality; Power study

1 Introduction

The notion of entropy is of fundamental importance in different areas such as physics, probability and statistics, communication theory, and economics. In information theory, entropy is a measure of the uncertainty associated with a random variable. This

*Corresponding author. *E-mail address:* baratpour@um.ac.ir {S. Baratpour}.