

Areeya Sudsukh 2012: Beta Generalized Exponential Random Variable and Its Application in Reliability. Master of Science (Statistics), Major Field: Statistics, Department of Statistics. Thesis Advisor: Assistant Professor Winai Bodhisuwan, Ph.D. 149 pages.

This aim is to study some probability properties of the beta generalized exponential random variable; *i.e.*, probability density function, cumulative distribution function, reliability function, hazard function, moment generating function, characteristic function, exact value of mean, variance, skewness coefficient, kurtosis coefficient and generating of random variate using inverse transform technique. Studying and comparing parameter estimation technique by the method of maximum likelihood and method of Bayes with gamma prior distribution is included. In this study we consider parameters $a = 0.5, 1.0, 2.0$, $b = 0.5, 1.0, 2.0$, $\alpha = 0.5, 1.0, 2.0$ and $\lambda = 0.5, 1.0, 2.0$ with sample sizes of 20, 50, 100 and 250. Each case was evaluated through mean square error which using R and WinBUGS with running 500 replications. Moreover, studying goodness-of-fit test by Komogoluv-Smirnov test and Anderson-Darling test. Furthermore, this research presented the application of reliability analysis based on beta generalized exponential distribution.

The results found that, the beta generalized exponential random variable can be classified into two shapes of distribution. It is monotonically decreasing function in the choice $0 < a \leq 1$ and $0 < \alpha \leq 1$. It skewed to the right in the choice $a > 1$ and $\alpha > 1$ when $b > 0$ and $\lambda > 0$. The hazard rate functions are classified as monotonically decreasing function, constant function and monotonically non-decreasing function in the case $0 < a < 1$, $0 < \alpha < 1$, $a = 1$, $\alpha = 1$ and $a > 1$, $\alpha > 1$ respectively where parameters $b > 0$ and $\lambda > 0$. The mean and variance will be increased when parameter a and α are increased and decreased when parameter b and λ are increased. The value of skewness coefficient and kurtosis coefficient do not depend on the parameter λ . Under comparison of parameter estimation technique, method of Bayes gives a smaller mean square error than the method of maximum likelihood in almost of tested cases.

Student's signature

Thesis Advisor's signature