Darika Yamrubboon 2009: Probability Properties of Beta Exponential Random Variable. Master of Science (Statistics), Major Field: Statistics, Department of Statistics. Thesis Advisor: Assistant Professor Winai Bodhisuwan, Ph.D. 216 pages.

This research is to study the probability properties of the beta exponential random variable; i.e., probability density function, cumulative distribution function, closed-form solution and exact value of mean, variance, skewness coefficient, kurtosis coefficient, characteristic function, moment generating function, reliability function, hazard function. In additions, sum of beta exponential variable using convolution technique, generating of random variate using inverse transform technique and goodness-of-fit test are investigated. Comparison of 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 and λ = 0.5, 1.0, 2.0 with sample sizes of 20, 40, 80, 100 and 250 each case was run 500 replications and evaluated through mean square error (MSE) which using R and WinBUGS program. Furthermore, this research presented the application of reliability analysis based on beta exponential distribution.

The results of this research found that, the beta exponential random variables can be classified into two shapes of distribution. It is monotonically decreasing function if $0 < a \leq 1$ and it skewed to the right if $a > 1$ when parameter $b > 0$ and $\lambda > 0$. The mean and variance will be decreased when parameter λ is increased. However, the value of skewness coefficient and kurtosis coefficient do not depend on the parameter λ. There are three shapes of the hazard rate function which are monotonically decreasing function, monotonically increasing function and constant function if $0 < a \leq 1$, $a > 1$ and $a = 1$ respectively where parameter $b > 0$ and $\lambda > 0$. 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.

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