Parameter Estimation for the Mixture of Generalized Gamma Model

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Abstract : Mixture generalized gamma distribution is a combination of two distributions: generalized gamma distribution and length biased generalized gamma distribution. These two distributions were presented by Suksaengrakcharoen and Bodhisuwan in 2014. The findings showed that probability density function (pdf) had fairly complexities, so it made problems in estimating parameters. The problem occurred in parameter estimation was that we were unable to calculate estimators in the form of critical expression. Thus, we will use numerical estimation to find the estimators. In this study, we presented a new method of the parameter estimation by using the expectation – maximization algorithm (EM), the conjugate gradient method, and the quasi-Newton method. The data was generated by acceptance-rejection method which is used for estimating α, β, λ and p. λ is the scale parameter, p is the weight parameter, α and β are the shape parameters. We will use Monte Carlo technique to find the estimator's performance. Determining the size of sample equals 10, 30, 100; the simulations were repeated 20 times in each case. We evaluated the effectiveness of the estimators which was introduced by considering values of the mean squared errors and the bias. The findings revealed that the EM-algorithm had proximity to the actual values determined. Also, the maximum likelihood estimators via the conjugate gradient and the quasi-Newton method are less precision than the maximum likelihood estimators via the EM-algorithm.

Keywords : conjugate gradient method, quasi-Newton method, EM-algorithm, generalized gamma distribution, length biased generalized gamma distribution, maximum likelihood method

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