Comparison of the Bayesian and maximum likelilhood estimation for Weibull distribution

ABSTRACT

Problem statement: The Weibull distribution has been widely used especially in the modeling of lifetime event data. It provides a statistical model which has a wide variety of applications in many areas, and the main advantage is its ability in the context of lifetime event, to provide reasonably accurate failure analysis and failure for ecasts especially with extremely small samples. The conventional maximum likelihood method is the usual way to estimate the parameters of a distribution. Bayesian approach has received much attention and in contention with other estimation methods. In this study we explore and compare the performance of the maximum likelihood estimate with the Bayesian estimate for the Weibull distribution. Approach: The maximum likelihood estimation, Bayesian using Jeffrey prior and the extension of Jeffrey prior information for estimating the parameters of Weibull distribution of life time are presented. We explore the performance of these estimators numerically under varyin g conditions. Through the simulation study comparison are made on the performance of these estimators with respect to the Mean Square Error (MSE) and Mean Percentage Error(MPE). Results: For all the varying sample size, several specific values of the scale parameter of the Weibull distribution and for the values specify for the extension of Jeffrey prior, the estimators of the maximum likelihood method result in smaller MSE and MPE compared to Bayesian in majority of the cases. Nevertheless in all cases for both methods the MSE and MPE decrease as sample size increases. Conclusion: Based on the results of this simulation study the Bayesian approach used in the estimating of Weibull parameters is found to be not superior compared to the conventional maximum likelihood method with respect to MSE and MPE values.