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Abstract In this paper, we have discussed the Bayesian procedure for the estimation of the parameters of inverse Weibull distribution under Type-II hybrid censoring scheme. The highest posterior density credible intervals for the parameters have also been constructed. The performance of the Bayes estimators of the model parameters have been compared with maximum likelihood estimators through the Monte Carlo Markov chain techniques. Finally, two real data sets have been analysed for illustration purpose.

Keywords Inverse Weibull distribution · Hybrid censored sample · MLEs · Bayes estimates · HPD credible intervals · Goodness-of-fit

1 Introduction

In Engineering, generally, life-testing experiments are performed to know the life expectancy of the manufactured product/equipment/system so that one can take an idea about the reliability characteristics of that product and correspondingly producer can reasonably set the warranty period for the product. But it is often happened that the some units put on test, are lost or removed intentionally from the test before their complete failures due to time and cost constraints or due to some unavoidable circumstances, or for other purposes. In such situation, censoring scheme can take place in a natural way. The conventional Type-I and Type-II censoring schemes are the most widely discussed censoring schemes in the Reliability/Survival theory. Both Type-I and Type-II censoring scheme have their advantages and disadvantages. In Type-I censoring scheme, the test is terminated at a pre-fixed time \( T_0 \) while in Type-II censoring scheme, the test is stopped as soon as pre-fixed number \( (R) \) items have failed. Thus, Type-I censoring scheme controls the duration of the test and efficiency of the test may be low where as Type-II censoring scheme controls the efficiency of the test and the termination time of the test is random since the failure of \( R \)th item is uncertain. Therefore, there is a need of more flexible sampling procedure for life-testing experiments.

For this purpose, (Epstein 1954) have introduced a mixture of Type-I and Type-II censoring schemes, named as hybrid censoring scheme. The hybrid censoring scheme is of two types namely (i) Type-I hybrid censoring scheme, and (ii) Type-II hybrid censoring scheme. In Type-I hybrid censoring, the test is terminated at a time \( T_1 = \min (X_R, T_0) \), where \( X_R \) represents the failure time of the \( R \)th item and \( T_0 \) is the pre-fixed maximum allowable time to the life-test. In Type-II hybrid censoring, the life-test is terminated at a time \( T_2 = \max (X_R, T_0) \). It is clear that the life-test have at least \( R \) failure items in Type-II hybrid censoring scheme where as in Type-I hybrid censoring scheme, the life-test can never be reached beyond the time \( T_0 \). Many authors have discussed the estimation procedure under Type-I hybrid (Gupta and Singh 2012; Chen and Bhattacharyya 1988; Ebrahimini 1986; Gupta and Kundu 1998; Kennedy et al. 1982; Kundu 2007; Park and Balakrishnan 2012; Kundu and Pradhan 2009) and Type-II hybrid (Banerjee and Kundu 2008; Childs et al. 2003; Ganguly et al. 2012; Panahi and Asadi 2011) censoring scheme for various life time models.

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