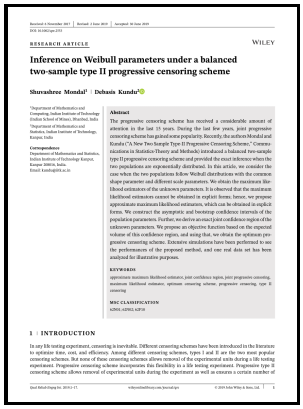
Adjusted maximum likelihood estimation of the moments of lognormal populations from type 1 censored samples

Dept. of the Interior, U.S. Geological Survey - Likelihood computations and random numbers in R



RESEARCH ARTICLE WILEY

Inference on Weibull parameters under a balanced two-sample type II progressive censoring scheme

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Abstract

The progressive censoring scheme has received a considerable amount of attention in the last 15 years. During the last few years, joint progressive censoring scheme has gained some popularity. Recently, the authors Mondal and Kundu ("A New Two Sample Type-II Progressive Censoring Scheme," Communications in Statistics-Theory and Methods) introduced a balanced two-sample type II progressive censoring scheme and provided the exact inference when the two populations are exponentially distributed. In this article, we consider the case when the two populations follow Weibull distributions with the common shape parameter and different scale parameters. We obtain the maximum likelihood estimators of the unknown parameters. It is observed that the maximum likelihood estimators cannot be obtained in explicit forms; hence, we propose approximate maximum likelihood estimators, which can be obtained in explicit forms. We construct the asymptotic and bootstrap confidence intervals of the population parameters. Further, we derive an exact joint confidence region of the unknown parameters. We propose an objective function based on the expected volume of this confidence region, and using that, we obtain the optimum progressive censoring scheme. Extensive simulations have been performed to see the performances of the proposed method, and one real data set has been analyzed for illustrative purposes.

KEYWORDS

approximate maximum likelihood estimators, joint confidence region, joint progressive censoring, maximum likelihood estimator, optimum censoring scheme, progressive censoring, type II censoring

MSC CLASSIFICATION

62N01; 62N02; 62F10

1 | INTRODUCTION

In any life testing experiment, censoring is inevitable. Different censoring schemes have been introduced in the literature to optimize time, cost, and efficiency. Among different censoring schemes, types I and II are the two most popular censoring schemes. But none of these censoring schemes allows removal of the experimental units during a life testing experiment. Progressive censoring scheme incorporates this flexibility in a life testing experiment. Progressive type II censoring scheme allows removal of experimental units during the experiment as well as ensures a certain number of

Description: -
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Exponential distribution

The identification condition is absolutely necessary for the ML estimator to be consistent. As you may have noticed, only the position where the failure occurred is taken into account, and not the exact time-to-suspension. The overriding question of this section is this: How shall we estimate mu? As mentioned above, mu is equal to the mean of this population.

A consistent parameter estimation in the three

A history of mathematical statistics from 1750 to 1930. Calculate the maximum likelihood of the sample data based on an assumed distribution model the maximum occurs when unknown parameters are replaced by their. In this example, the range of values for the shape parameter is the prior distribution, which in this case is Uniform.

A consistent parameter estimation in the three

The likelihood function The likelihood function is The estimator is obtained as a solution of the maximization problem The first order condition for a maximum is The derivative of the log-likelihood is By setting it equal to zero, we obtain Note that the division by is legitimate because exponentially distributed random variables can take on only positive values and strictly so with probability 1. Thus, we end up with a distribution for the parameter rather than an estimate of the parameter, as in classical statistics.

Likelihood computations and random numbers in R

The method of maximum likelihood estimation is backed by a vast statistical literature that shows it has certain properties that may be considered optimal. However, MLE can handle suspensions and interval data better than rank regression, particularly when dealing with a heavily censored data set with few exact failure times or when the censoring times are unevenly distributed.

Maximum likelihood estimation

Therefore, in this situation we must compare the solutions to the log-likelihood with the extremes of the interval.

Introduction to Maximum Likelihood Estimation in R

. A correlation coefficient value of zero would indicate that the data are randomly scattered and have no pattern or correlation in relation to the regression line model.

Likelihood computations and random numbers in R

More specifically, we start with the relatively simple method of Probability Plotting and continue with the more sophisticated methods of Rank Regression or Least Squares , Maximum Likelihood Estimation and Bayesian Estimation Methods.

Exponential distribution

Log Likelihood of a single data point over multiple values of lambda Computing Likelihood for Observed Data Let us write our likelihood function dealing with multiple data points and compute log-likelihood. R being a functional programming language, we can easily compute the likelihoods for a bunch of parameters at the same time, without using a for loop. The method of linear least squares is used for all regression analysis performed by Weibull++, except for the cases of the 3-parameter Weibull, mixed Weibull, gamma and generalized gamma distributions, where a non-linear regression technique is employed.

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