

IMPROVED METHODS IN ESTIMATION OF MEAN IN NATURAL EXPONENTIAL FAMILY

P. WIJEKOON

Department of Statistics & Computer Science, Faculty of Science, University of Peradeniya.

It is well known that a large number of probability densities belongs to a family of distributions known as the exponential family, which enjoys very nice properties for estimation, testing and other inference problems. In 1982, C.N. Morris introduced natural exponential families and natural observations, and showed that using an appropriate natural observation, one parameter natural exponential families can be derived from the distributions which contain more than one probability parameter.

In many applications, sample mean, which is an unbiased estimator, is used to estimate the population mean. But if we can find a biased estimator which has a smaller minimum mean square error when compared to the sample mean, then that estimator is better than the sample mean for estimating the population mean.

The objective of this study is to improve the methods in estimation of mean using natural observations, and the method described by Bibby and Toutenburg (*Prediction and Improved Estimation in Linear Models, Wiley & Sons, 1977*). It is assumed that the coefficient of variation is known, since the application of known coefficient of variation is common in many biological and industrial applications.

A general method for finding the Minimum Mean Square Error Estimator for the population mean is derived by giving an improvement region. This method was applied to several probability distributions; such as Normal, Gamma and Binomial. It can also be shown that this method provides the same estimators derived by Arnholt and Hebert (*American Stat.*, 49, 1995, 367-369) for the above distributions.