IMPROVED METHODS IN ESTIMATION IN K-PARAMETER EXPONENTIAL FAMILY

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An important class of distributions in Statistics is known as the Exponential family of distributions, which possesses very nice properties for estimation, testing and other inference problems. Many researchers devoted their time to analyze the properties of the Exponential family, since a large number of probability distributions belongs to it.

In a probability distribution, one can identify fixed parameters as well as probability parameters. For example, in a Binomial distribution with parameters n and p , n is called the fixed parameter and p is the probability parameter. A probability distribution is said to belong to a one parameter exponential family if only one *unknown* probability parameter is available in the distribution. Otherwise it is said to belong to a k-parameter exponential family. Estimation of these unknown parameters can be done using the standard techniques, and unbiased estimators were derived for the unknown parameters. However it is well known that a biased estimator with a small mean squared error is preferable to an unbiased estimator with a large variance. Further it is preferable if the *Minimum Mean Squared Error estimator* can be derived.

A general method for finding *Minimum Mean Squared Error estimators* was given by Bibby and Toutenburg (1977). Wijekoon (2003) applied this method to one parameter exponential family and obtained the best improved estimator for the natural Statistic $T(x)$ in one parameter exponential family.

In this study the results are extended to k-parameter exponential families, and the *Minimum Mean Squared Error estimator* for the vector of natural statistics was obtained. This method has been applied to several probability distributions; such as Normal, Trinomial and lognormal. In each case the minimum mean squared error matrix was also derived.

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