STATISTICAL INFERENCE FOR EXPONENTIAL PROBABILITY MODEL WITH KNOWN COEFFICIENT OF VARIATION

BY

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Dedicated to my beloved parents

Prof. C. Dwarakanath
and
Ranganayaki
and
my excellent wife, Jayanti
and
sons, Ajay and Abhishek

CERTIFICATE

This is to certify that the thesis entitled "Statistical Inference for Exponential Probability Model with Known Coefficient of Variation" which is being submitted by **C.D. RAVINDRAN** for the award of **DOCTOR OF PHILOSOPHY (Mathematics)** to the Indian Institute of Technology, Delhi, is a record of bonafide research work carried out by him under our guidance and supervision. The thesis has reached the standards fulfilling the requirements of the regulations relating to the degree. The results obtained in the thesis have not been submitted to any other University or Institute for the award of any degree or diploma.

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ABSTRACT

Estimation and hypothesis testing problems concerning the parameter of the exponential distribution with known coefficient of variation have been studied when the available samples are complete or type II censored, drawn from single or two or more populations. Estimation problem of the smaller and larger of parameters of the exponential distribution have been studied. The maximum likelihood estimator and some new estimators which are functions of sufficient statistics are studied and compared in terms of bias and MSE criteria. The problem of estimation of the common parameter of several exponential populations are studied next. The minimal sufficient statistics are not complete. A structural equivalence of the estimation problem under two different probability models is exhibited which is exploited to simplify the problem of estimation of the common parameter of several exponentials. Several estimators for the problem have been proposed. For the hypothesis testing problems, the problem of testing the parameter of the exponential distribution is considered. Although, an ancillary statistic which is a component of the minimal sufficient statistics exists, this had been ignored in the existing studies. Following well known suggestions in such situations, to condition on the ancillary, the conditionality principle is used to develop a UMP conditional test. This conditional test possesses some desirable properties which have been studied. Ancillary statistics not being unique, the choice of ancillary statistics has been studied. Large sample approximations to the upper percentile points of the conditional distribution involved in the testing problem have been studied. The problem of testing the equality of parameters of two exponential distributions has been studied with two-sided and

one-sided alternatives respectively using both the unconditional and conditional approaches. A one-sided conditional test has been developed and is compared with the available unconditional tests. Lastly, the problem of testing the parameter of the exponential distribution when the sample is type II censored has been studied. A UMP conditional test for the problem has been developed and compared with the existing unconditional approximate test.

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