POINT AND INTERVAL ESTIMATION OF $P(X < Y)$: THE NORMAL CASE WITH COMMON COEFFICIENT OF VARIATION

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(Received September 25, 1996; revised February 9, 1998)

Abstract. The problem of estimating $R = P(X < Y)$ originated in the context of reliability where Y represents the strength subjected to a stress X. In this paper we consider the problem of estimating R when X and Y have independent normal distributions with equal coefficient of variation. The maximum likelihood estimation of R when the coefficient of variation is known and when it is unknown is studied. The asymptotic variance of the estimators are obtained and asymptotic confidence intervals are provided. An example is presented to illustrate the procedure. Finally some simulation studies are carried out to study the coverage probability and the lengths of the confidence interval. In particular, lengths of the confidence intervals are compared with and without the assumption of common coefficient of variation. It is observed that the assumption of common coefficient of variation results in considerably tighter intervals.

Key words and phrases: Normal distributions, coefficients of variations, delta method, confidence intervals, coverage probability.