

Concomitants of Order Statistics

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ABSTRACT

If the random sample (X_i, Y_i) , $i = 1, \dots, n$, from a bivariate distribution is ordered by the X_i , then the Y -variate associated with the r th order statistic $X_{r:n}$ is denoted by $Y_{[r:n]}$ and termed the concomitant of the r th order statistic. A unified account of the basic finite-sample and asymptotic theory of concomitants is presented, together with multivariate generalizations. It is shown how concomitants enter into (a) the estimation of regression and correlation coefficients in a variety of situations, (b) the analysis of censored bivariate data, (c) ranked-set sampling, and (d) double sampling. Several selection procedures using concomitants are reviewed. The asymptotic theory of various functions of concomitants is examined, with applications to (a) inference on the regression function $E(Y|x)$, (b) the induced selection differential, (c) bootstrapping, and (d) file-matching procedures.