

13. Optimum Estimates for Location and Scale Parameters. RAYMOND P. PETERSON, University of California and National Bureau of Standards, Los Angeles.

Let $h_i(W | E, \theta) = W(\theta_i^*, \theta)p(E | \theta)$, where $p(E | \theta)$ is the joint probability density function of the n (not necessarily independent) sample values x_1, \dots, x_n which may be represented as a point $E = (x_1, \dots, x_n)$ in the n -dimensional Euclidean sample space M . The unknown parameters, $\theta_1, \dots, \theta_s$, may be represented as a point $\theta = (\theta_1, \dots, \theta_s)$ in the s -dimensional Euclidean parameter space Ω . $W(\theta_i^*, \theta)$ is a real-valued, nonnegative, measurable weight function, defined for all E in M and θ in Ω , which represents the relative seriousness of taking the estimate $\theta_i^*(E)$ as the value of θ_i for any particular sample point E . Let $G(\theta)$ be the unknown cumulative distribution function of θ . Then $\theta_i^*(E)$ is defined to be a best estimate of θ_i , provided that, if $\hat{\theta}_i(E)$ is any other estimate of θ_i in the class under consideration, $I - I^* \geq 0$, where

$$I = \int_{\Omega} \int_M h_i(W | E, \theta) dE dG(\theta).$$

Let

$$r_i(\theta) = \int_M h_i(W | E, \theta) dE, \quad \varphi_i(E) = \int_{\Omega} h_i(W | E, \theta) d\theta.$$

A general theorem is proved to the effect that if $h_i(W | E, \theta)$ is measurable over the product space $M \times \Omega$ and if $r_i(\theta)$ and $\varphi_i(E)$ are uniformly convergent integrals, then a best estimate $\theta_i^*(E)$ of θ_i exists provided that $r_i(\theta)$ is constant and that $\theta_i^*(E)$ minimizes $\varphi_i(E)$ for all points E in M . General methods are obtained for constructing best estimates for location and scale parameters, separately or jointly, and for functions of location and scale parameters from several populations. As special cases, results are derived which are analogous to converses of Theorems 1 and 2 in Kallianpur's, "Minimax Estimates of Location and Scale Parameters", Abstract, (*Annals of Math. Stat.*, Vol. 21 (1950), pp. 310-311).

NEWS AND NOTICES

Readers are invited to submit to the Secretary of the Institute news items of interest.

Personal Items

Professor William Feller of Cornell University has been appointed Eugene Higgins Professor of Mathematics at Princeton University.

Dr. Leonard Kent, formerly on the staff at the University of Chicago in the School of Business, is now with the firm of Alderson and Sessions, 1905 Walnut Street, Philadelphia 3, Pennsylvania.

Dr. G. B. Oakland has resigned an associate professorship of statistics at the University of Manitoba to accept the position as Head of Biometrics Unit, Division of Administration, Department of Agriculture, Ottawa.

Dr. Norman Rudy has accepted an appointment as Assistant Professor at Sacramento State College, Sacramento, California.

Professor G. R. Seth has returned to India to accept the position of Professor of Statistics and Deputy Statistical Advisor to the Indian Council of Agricultural Research, New Delhi.