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ABSTRACTS OF PAPERS

(*Abstracts of papers to be presented at the Eastern Regional meeting, University Park, Pennsylvania, April* 21–23, 1971. *Additional abstracts will appear in future issues.*)

129-3. Asymptotic properties of a certain estimator related to the maximum likelihood estimator (preliminary report). JAMES C. FU, The Johns Hopkins University.

Let the sequence $\{X_n\}$ be a sequence of i.i.d. random variables with common density $f(x \mid \theta)$, where θ is in an open interval Θ of R^1. An estimator $\{\hat{T}_n\}$ is called a maximum probability estimator of θ with respect to the (prior) density $g(\theta)$ of a positive measure on Θ if

$$\prod_{i=1}^n f(x_i \mid T_n(x_1, \cdots, x_n))g(T_n(x_1, \cdots, x_n)) = \max_{\theta \varepsilon \Theta} \prod_{i=1}^n f(x_i \mid \theta)g(\theta)$$

for all $n = 1, 2, \cdots$. In this report, we prove, under certain regularity conditions, that the estimator $\hat{T}_n$ is asymptotically efficient in the sense that $\lim_{\varepsilon \to 0} \lim_{n \to \infty} (1/\varepsilon^2 n) \log P_\theta\{|\hat{T}_n - \theta| > \varepsilon\} = -I(\theta)/2$, where $I(\theta)$ is Fisher's information. This proof also gives a direct method of verifying Bahadur's result [*Ann. Math. Statist.* **38** (1967) 303–324] that the maximum likelihood estimator $\hat{\theta}_n$ is asymptotically efficient in the above sense. The existence, consistency and asymptotic distribution of the estimator $\hat{T}_n$ are also discussed. (Received 20 October 1970.)

(*Abstracts of papers to be presented at the Central Regional meeting, Columbia, Missouri, May* 5–7, 1971. *Additional abstracts will appear in future issues.*)

130-1. Asymptotic theory for two estimators of the generalized failure rate function. B. L. S. PRAKASA RAO and J. VAN RYZIN, University of Wisconsin.

Let $Y_1 \leqq Y_2 \leqq \cdots \leqq Y_n$ be an ordered sample of n observations from an unknown distribution function F with density f. Let G be a known distribution function with density g. The, $r(x) = f(x)/g(G^{-1}(F(x)))$, defined for all x for which $gG^{-1}(F(x)) \neq 0$, is called the generalized failure rate function (GFR). Two estimators of $r(x)$ based on the sample of size n are proposed and studied. These are: (i) $r_n^*(x) = [G^{-1}(B_n/n) - G^{-1}(A_n/n)][Y_{B_n} - Y_{A_n}]^{-1}$ and (ii) $r_n^{**}(x) = [B_n - A_n][n\{Y_{B_n} - Y_{A_n}\}g(G^{-1}(T_n))]^{-1}$, where $\{A_n\}$, $\{B_n\}$ are such that $A_n = A_n(x)$, $B_n = B_n(x)$, $0 < B_n - A_n \leqq k_n$, $A_n \leqq n$, $B_n \leqq n$ are suitably chosen and specified integer valued random variables measurable with respect to the σ-field generated by the n observations, $T_n = (A_n + B_n)/(2n)$, and $\{h_n\}$ is a sequence of specified positive integers. Theorems giving sufficient conditions under which $r_n^*(x)$ and $r_n^{**}(x)$ are both weakly and strongly consistent estimators of $r(x)$ are presented. Furthermore, for each estimator three separate statements concerning the asymptotic distribution are developed. These results give conditions under which $k_n^{\frac{1}{2}}(r_n^*(x) - r(x))$ (or $k_n^{\frac{1}{2}}(r_n^{**}(x) - r(x))$), for different rate choices of the $\{k_n\}$ sequence, converge in distribution to a random variable which has a certain specified normal distribution. (Received 15 October 1970.)

130-2. Some recent results in the theory of symmetrical factorial designs and error correcting codes. BODH RAJ GULATI, Southern Connecticut State College.

It is well known that the problem of determining the alphabet of the code or the fundamental subgroup of the design can be reduced to the "packing problem." This problem deals with the investigation of the maximum possible number of points in $(t+r-1)$-dimensional projective space PG $(t+r-1, s)$ over a Galois field of order $s = p^h$ (where p and h are positive integers and p is the prime characteristic of the field), so that no t of the chosen points lie on a $(t-2)$-flat. In the