ON THE MAXSIMUM PSEVDO-LIKELIHOOD ESTIMATION OF A DISTRIBUTION PARAMETERS BY GROUPED OBSERVATIONS WITH CENSORING

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Let X be a random variable with a distribution function $F(x)=F(X,\theta)$, where $\theta\in\Theta$ is an unknown vector parameter in a finite dimensional spase $\Theta\subset R^n$. Assume that Θ is acompactum.Let the fixed points $-\infty\le t_1\le t_2\le\ldots\le t_n\le+\infty$ be diven on the straight line R.Dhese pointsform intervals which may be of three categories: 1. An interval $(t_i;t_{i+1})$ belongs to the zero-th category if in this interval neither individual values of the sample nor the total quantity of sample values of the random value X are known(m_i); 2. An interval $(t_i;t_{i+1})$ belongs to the first category if in this category r individual values of the sampling are unknown, but the number of sample valuess of the random value X is known(n_i); 3. An interval $(t_i;t_{i+1})$ belongs to the second category if in this interval individual values of the sampling $x_{i1},x_{i2},\ldots x_{in_i}$ are known. If $n=\sum\limits_{(1),(2)} n_i$, $r=n+\sum\limits_{i\in(0)} m_i$ and $\tilde{F}_r(x)=\tilde{F}_r(X,\theta)$ is an empirical distribution function, then

$$m_i=n\frac{[\tilde{F}_r(t_{i+1})-\tilde{F}_r(t_i)]}{1-\sum\limits_{i\in(0)}[\tilde{F}_r(t_{i+1})-\tilde{F}_r(t_i)]}$$

And a slinghtly modified likelihood function has the form

$$\tilde{L}_n(x;\theta)=\prod_{i\in(0)}[F(t_{i+1})-F(t_i)]^{\frac{n[F(t_{i+1})-F(t_i)]}{1-[F(t_{i+1})-F(t_i)]}}\cdot\prod_{i\in(1)}[F(t_{i+1})-F(t_i)]^{n_i}\cdot\prod_{j=1}^{n_i}f(x_{ij}).$$

Theorem. Let the following conditions be fulfilled: (a) the distribution function $F(X,\theta)$ is continuous with respect to both variables and has the continuous derivative $f(X,\theta)=\frac{\partial F(x,\theta)}{\partial x}$; (b)the function $\tilde{L}_n(x;\theta)$ has the absolute maximum $\theta=\bar{\theta}_n$. Then $\bar{\theta}_n$ is an consistent and asymptotically effective estimator of the true value of the parameter θ.

The consideration is concretized for the estimator of a mean normal distribution.