Jasiulewicz, Helena

A comparison of methods of approximations for probabilities of death for fractions of a year. (English) Zbl 0979.91043

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This paper deals with the comparison of methods of approximations for probabilities of death for fractions of a year. Let human lifetime X be a continuous random variable with distribution function $F(x)$. Let $\overline{F}(x)$ denote the empirical lifetime distribution and $\widehat{F}(x)$ denote the interpolating function of $\overline{F}(x)$ such that $\widehat{F}(x) = \overline{F}(x)$ at integer points $x = 1, \ldots, \omega - 1$, where ω is the maximum age for human being. The author considers four methods of approximation:

(1) $\widehat{F}(x+u) = \overline{F}(x) + u(\overline{F}(x+1) - \overline{F}(x))$;

(2) $\widehat{F}(x+u) = 1 - (1 - \overline{F}(x+1))^u (1 - \overline{F}(x))^{1-u}$;

(3) $\widehat{F}(x+u) = 1 - \frac{(1-\overline{F}(x))(1-\overline{F}(x+1))}{u(1-\overline{F}(x)) + (1-u)(1-\overline{F}(x+1))}$;

(4) $\widehat{F}(x+u) = (\overline{F}(x+2) - \overline{F}(x+1))(u^3 - u^2) + (\overline{F}(x+1) - \overline{F}(x))(u + u^2 - u^3) + \overline{F}(x))$,

$u \in [0,1]$, $x = 0, 1, \ldots, \omega - 1$.

Two criteria based on the Kolmogorov statistic and the measure of distance $L^2(x)$ are used. The author shows that none of the four methods are better than the other three.

Reviewer: A.D.Borisenko (Kyïv)

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