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Second-order correctness of the Poisson bootstrap. (English. English summary)

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Let $S = (X_1, \cdots, X_n)$ be a random sample of iid observations on the real line. The ordinary bootstrap scheme uses $\widehat{X}_1, \cdots, \widehat{X}_n$ drawn from S with replacement. C. R. Rao, P. K. Pathak and V. I. Koltchinskii [J. Statist. Plann. Inference 64 (1997), no. 2, 257–281; MR 99j:62059] introduced a sequential resampling method, in which resampling is carried out one-by-one with replacement until $m+1$ distinct original observations appear, where m denotes the largest integer not exceeding $(1-e^{-1})n$.

The authors modify in the present paper this resampling scheme by sampling according to n independent Poisson distributed random variables $Y_1, \cdots, Y_n$, each having mean 1. If there are exactly m nonzero values in this sample, it is accepted and the bootstrap sample is taken by repeating the observation X_i Y_i times. By this Poisson approach, existing techniques of Edgeworth expansions can be employed for the proof that the error of the bootstrap estimate of $P((Y_1 + \cdots + Y_n)^{-1/2} \sum_{i=1}^{n} (X_i - E(X_1)) \le x\sigma)$ is of order $O_P(n^{-1})$, uniformly for x.

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