Ann Inst Stat Math (2019) 71:213–246
https://doi.org/10.1007/s10463-017-0634-9

Bootstrapping the Kaplan–Meier estimator on the whole line

Dennis Dobler[1]

Received: 27 June 2016 / Revised: 18 October 2017 / Published online: 13 January 2018

Abstract This article is concerned with proving the consistency of Efron's bootstrap for the Kaplan–Meier estimator on the whole support of a survival function. While previous works address the asymptotic Gaussianity of the Kaplan–Meier estimator without restricting time, we enable the construction of bootstrap-based time-simultaneous confidence bands for the whole survival function. Other practical applications include bootstrap-based confidence bands for the mean residual lifetime function or the Lorenz curve as well as confidence intervals for the Gini index. Theoretical results are complemented with a simulation study and a real data example which result in statistical recommendations.

Keywords Counting process · Right censoring · Resampling · Efron's bootstrap · Mean residual lifetime · Lorenz curve · Gini index

✉ Dennis Dobler
dennis.dobler@uni-ulm.de

[1] Institute of Statistics, Ulm University, Helmholtzstr. 20, 89081 Ulm, Germany