

Spring '07 Seminar Series

When is a bootstrap distribution trustworthy ?

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Date : May 2 (Wednesday)

Time : 4:10 - 5:30 pm

Abstract

In classical models, convergence of the bootstrap distributions of an estimator sequence to the correct limit distribution is equivalent to a local asymptotic equivariance property of the estimator sequence or to an asymptotic independence property in the bootstrap world. The first equivalence implies, in particular, that bootstrap convergence fails at superefficiency points in the parameter space. This dooms ordinary bootstrapping of modern model-selection or shrinkage estimators. The second equivalence suggests graphical diagnostics for detecting whether or not the intuitive bootstrap is trustworthy in a given data analysis. Both criteria for correct bootstrap convergence are related to Hajek's (1970) convolution theorem and to Basu's (1955) theorem on the independence of an ancillary statistic and a complete sufficient statistic. These points are early adventures in an open-ended research story.

Background References:

1. Beran, R. (1997): Diagnosing bootstrap success. *Annals of the Institute of Statistical Mathematics* **49**, 1-25.
2. Canty, A.J., Davison, A.C., Hinkley, D.V. and Ventura, V. (2006): Bootstrap diagnostics and remedies. *Canadian Journal of Statistics* **34**, 5-28.
3. Leeb, H. and Poetscher, B. (2005): Model selection and inference: facts and fiction. *Econometric Theory* **21**, 21-59.
4. van Zwet, E.W. and van Zwet, W.R. (1999): A remark on consistent estimation. *Mathematical Methods of Statistics* **8**, 277-284.