STAT3210 Resampling methods with applications

[30h] 6 credits

This course is taught in the 1st semester

Teacher(s): Léopold Simar
Language: English
Level: Third cycle

Aims

The objective is to present the basic resampling methods (bootstrap, jacknife,...) useful for doing inference in statistical models. These methods provide approximations of the sampling distribution of the quantities of interest (estimator, pivotal quantities, test statistics,...). In many situations, the quality of the approximation is better than the usual asymptotic ones based on central-limit arguments. In others situation (more complex
problems), there are no real alternatives than the bootstrap to obtain these approximations. Using these approaches (which are computer intensive), we are often able to provide confidence intervals, critical values, p-values in testing problems, etc. The statistical properties of the bootstrap are investigated and applied in many fields of statistics and/or econometrics.

Main themes

- Basic ideas of the bootstrap
- Monte-Carlo methods
- Bias of an estimator
- Confidence intervals
- Theoretical properties of the bootstrap
- Hypothesis testing
- Bootstrap in regression models
- Iterated bootstrap
- The Jacknife
- The smmothed bootstrap
- Bootstrap in time series

Content and teaching methods

- Basic ideas of the bootstrap
- Monte-Carlo methods
- Bias of an estimator
- Confidence intervals
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- Bootstrap in time series

Other information (prerequisite, evaluation (assessment methods), course materials recommended readings, ...)

References
Efron B. and R.J. Tibshirani (1993) : An introduction to the Bootstrap, Chapman and Hall, London.Hall P. (1992) : The Bootstrap and the Edgeworth Expansion, Springer Verlag, New-York.Beran, R . and G. Ducharme (1991) : Asymptotic theory for bootstrap methods in statistics, Centre de Recherches Mathématiques, Univ. de Montréral.
For more information:
http://www.stat.ucl.ac.be/cours/stat3210/index.html http://www.stat.ucl.ac.be/cours/stat3210/index.html

Programmes in which this activity is taught

ACTU2MS	Master en sciences actuarielles, à finalité spécialisée
ACTU3DS	Diplôme d'études spécialisées en sciences actuarielles
ECGE3DS/SC	Diplôme d'études spécialisées en économie et gestion (Master in business administration) (Supply Chain Management)
MAPA3DA	Diplôme d'études approfondies en mathématique
STAT3DA	Diplôme d'études approfondies en statistique

Other credits in programs

ACTU22MS	Deuxième année du master en sciences actuarielles, à finalité spécialisée	(5 credits)	Mandatory
ACTU3DS	Diplôme d'études spécialisées en sciences actuarielles	(5 credits)	Mandatory
ECGE3DS/SC	Diplôme d'études spécialisées en économie et gestion (Master in business administration) (Supply Chain Management)	(6 credits)	Mandatory
STAT3DA	Diplôme d'études approfondies en statistique		
STAT3DA/B	diplôme d'études approfondies en statistique (biostatistique et épidémiologie)	(6 credits)	
STAT3DA/E	diplôme d'études approfondies en statistique (statistique et économétrie)	(6 credits)	Mandatory
STAT3DA/M	Diplôme d'études approfondies en statistique (méthodologie de la statistique)	(6 credits)	Mandatory
STAT3DA/P	diplôme d'études approfondies en statistique (pratique de la statistique)	(6 credits)	Mandatory