

Computational Statistics II

Alessia Pini

Outline

1. Jackknife and Bootstrap

- (a) The jackknife: bias estimation and reduction
- (b) Introduction to Bootstrap: empirical distributions, plug-in principle, point estimate of the standard error
- (c) Bootstrap confidence intervals: percentiles method, Bootstrap t, BCa; coverage probability and consistency
- (d) Hypothesis testing with the Bootstrap

2. Introduction to EM

- (a) The algorithm: construction and convergence
- (b) Example: Gaussian mixtures and model-based clustering.

Tentative calendar

- Lesson 1 - 12/02/20 (3 hours). Introduction to Jackknife and Bootstrap
- Lesson 2 - 14/02/20 (3 hours). Bootstrapping more complex data structures
- Lesson 3 - 18/02/20 (3 hours). Bootstrap confidence intervals and tests
- Lesson 4 - 24/02/20 (3 hours). Introduction to EM

References

Efron, B., & Tibshirani, R. J. (1994). An introduction to the bootstrap. CRC press. Chapman & Hall/CRC Monographs on Statistics and Applied Probability.

Davison, A. C., & Hinkley, D. V. (1997). Bootstrap methods and their application (Vol. 1). Cambridge university press.

Davison, A. C., & Kuonen, D. (2002). An Introduction to the Bootstrap with Applications in R. Statistical computing & Statistical graphics newsletter, 13(1), 6-11.

Bishop, C. M. (2006). Pattern recognition and machine learning. Springer.

Further readings.

Hall, P. (2013). The bootstrap and Edgeworth expansion. Springer Science & Business Media.

Friedman, J., Hastie, T., & Tibshirani, R. (2001). The elements of statistical learning (Vol. 1, No. 10). Springer, New York. Springer series in statistics.

James, G., Witten, D., Hastie, T., & Tibshirani, R. (2013). An introduction to statistical learning (Vol. 112). New York: Springer.

Dempster, A. P., Laird, N. M., & Rubin, D. B. (1977). Maximum likelihood from incomplete data via the EM algorithm. Journal of the royal statistical society. Series B (methodological), 1-38.