Computational Statistics II

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Outline

1. **Cross-Validation**
   (a) Validation set approach
   (b) Leave-one-out cross-validation and k-fold cross-validation
   (c) Comparison of cross-validation methods
2. **Bootstrap**
   (a) Introduction to Bootstrap: empirical distributions, pulg-in principle, point estimate of the standard error
   (b) Bootstrap confidence intervals: percentiles method, Bootstrap t, BCa; coverage probability and consistency
   (c) Hypothesis testing with the Bootstrap
3. **Introduction to EM**
   (a) The algorithm: construction and convergence
   (b) Example: Gaussian mixtures and model-based clustering.

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.

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

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

Further readings.

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

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