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Graphical user interface for *Theta* applications (Schrausser, 2009) within ConsoleApp_Distribution Functions (Schrausser, 2024), generating distributions and estimators for several parameters θ via *bootstrap* method, with given number of resamples B , where bootstrap estimator

$$\hat{\theta}_B = B^{-1} \cdot \sum_{i=1}^B \theta_i^*,$$

introduced by Efron (1979, 1981, 1982) as a further development of the *Jackknife* method (Quenouille, 1949). See also *Monte-Carlo* Methode (Metropolis & Ulam, 1949) and *permutation or randomization* tests, first mentioned by Fisher (1935), based on his own account of experiments in agriculture (Fisher, 1926) and the work by Neyman (1923).

In this context see further Pitman (1937a, b, 1938), Fisher (1966, 1971), Efron et al. (1992), Good (2006), Edgington and Onghena (2007), Beasley and Rodgers (2009), Oneto (2020) or Kauermann et al. (2021). A fundamental comparative overview of the different methods and approaches is given by Schrausser (1996, 2025, res.).

References

- Beasley, W. H., & Rodgers, J. L. (2009). Resampling Methods. In *The Sage Handbook of Quantitative Methods in Psychology*, edited by Millsap, R. E., & Maydeu-Olivares, A., 362–86. Thousand Oaks, California: Sage Publications Ltd. <https://psycnet.apa.org/doi/10.4135/9780857020994.n16>
- Edgington, E. S., & Onghena, P. (2007). *Randomization Tests*. 4th ed. New York: Chapman and Hall/CRC. <https://doi.org/10.1201/9781420011814>
- Efron, B. (1979). Bootstrap Methods: Another Look at the Jackknife. *The Annals of Statistics*, 7(1), 1–26. <https://doi.org/10.1214/aos/1176344552>
- Efron, B. (1981). Nonparametric Estimates of Standard Error: The Jackknife, the Bootstrap and Other Methods. *Biometrika*, 68(3), 589–99. <https://doi.org/10.1093/biomet/68.3.589>
- Efron, B. (1982). The Jackknife, the Bootstrap and Other Resampling Plans. *CBMS-NSF Regional Conference Series in Applied Mathematics, Monograph*, 38. Philadelphia: SIAM, Society for Industrial and Applied Mathematics. <https://doi.org/10.1137/1.9781611970319>
- Efron, B., & Kotz, S., & Johnson, N. L. (1992). Bootstrap Methods: Another Look at the Jackknife. In *Breakthroughs in Statistics: Methodology and Distribution*, 569–93. New York, NY: Springer New York. https://doi.org/10.1007/978-1-4612-4380-9_41
- Fisher, R. A. (1926). The Arrangement of Field Experiments. *Journal of the Ministry of Agriculture*, 33, 503–15. <https://doi.org/10.23637/rothamsted.8v61q>

- Fisher, R. A. (1935). *The Design of Experiments*. 1st ed. Edinburgh: Oliver & Boyd. <https://psycnet.apa.org/record/1939-04964-000>
- Fisher, R. A. (1966). *The Design of Experiments*. 8th ed. Edinburgh: Hafner. <https://scirp.org/reference/referencespapers.aspx?referenceid=895747>
- Fisher, R. A. (1971). *The Design of Experiments*. 9th ed. New York: Hafner Press. <https://home.iitk.ac.in/~shalab/anova/DOE-RAF.pdf>
- Good, P. (2006). *Resampling Methods*. 3rd ed. Basel: Birkhäuser. <https://www.amazon.com/Resampling-Methods-Practical-Guide-Analysis/dp/0817643869>
- Kauermann, G., Küchenhoff, H., & Heumann, C. (2021). Bootstrapping. In *Statistical Foundations, Reasoning and Inference: For Science and Data Science*, 197–229. Cham: Springer International Publishing. https://doi.org/10.1007/978-3-030-69827-0_8
- Metropolis, N., & Ulam, S. (1949). The Monte Carlo Method. *Journal of the American Statistical Association*, 44(247), 335–41. <https://doi.org/10.1080/01621459.1949.10483310>
- Neyman, J. (1923). Sur les applications de la theorie des probabilités aux expériences agricoles: Essay de principes. *Roczniki Nank Polniczek*, 10, 1–51. https://link.springer.com/chapter/10.1007/978-94-015-8816-4_10
- Oneto, L. (2020). Resampling Methods. In *Model Selection and Error Estimation in a Nutshell*, 25–31. Cham: Springer International Publishing. https://doi.org/10.1007/978-3-030-24359-3_4
- Pitman, E. J. G. (1937a). Significance Tests Which May Be Applied to Samples from Any Populations. *Supplement to the Journal of the Royal Statistical Society*, 4(1), 119–30. <http://www.jstor.org/stable/2984124>
- Pitman, E. J. G. (1937b). Significance Tests Which May Be Applied to Samples from Any Populations. II. The Correlation Coefficient Test. *Supplement to the Journal of the Royal Statistical Society*, 4(2), 225–32. <http://www.jstor.org/stable/2983647>
- Pitman, E. J. G. (1938). Significance Tests Which May Be Applied to Samples from Any Populations. III. The Analysis of Variance Test. *Biometrika*, 29(3/4), 322–35. <http://www.jstor.org/stable/2332008>
- Quenouille, M. H. (1949). Approximate Tests of Correlation in Time-Series. *Journal of the Royal Statistical Society B, Methodological*, 11(1), 68–84. <https://doi.org/10.1111/j.2517-6161.1949.tb00023.x>
- Schrausser, D. G. (1996). *Permutationstests: Theoretische und praktische Arbeitsweise von Permutationsverfahren beim unverbundenen 2 Stichprobenproblem*. Universität Graz: Naturwissenschaftliche Fakultät. <https://zenodo.org/records/11529663>
- Schrausser, D. G. (2009). ThetaWin Overview. *Software Academia*. <https://www.academia.edu/81800920>
- Schrausser, D. G. (2024). Schrausser/ConsoleApp_Distribution_Functions: Console applications for distribution functions (version v1.5.0). <https://doi.org/10.5281/zenodo.7664141>
- Schrausser, D. G. (2025). Mathematical and Statistical Applications for HP Prime. *SocArXiv Papers*, August, 1–15. https://doi.org/10.31235/osf.io/vs8a6_v1