

LITHUANIAN COMPUTER SOCIETY

VILNIUS UNIVERSITY INSTITUTE OF DATA SCIENCE AND DIGITAL TECHNOLOGIES

LITHUANIAN ACADEMY OF SCIENCES



14th Conference on

DATA ANALYSIS METHODS for Software Systems

November 30 – December 2, 2023

Druskininkai, Lithuania, Hotel “Europa Royale”

<https://www.mii.lt/DAMSS>

VILNIUS UNIVERSITY PRESS

Vilnius, 2023

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<https://doi.org/10.15388/DAMSS.14.2023>

ISBN 978-609-07-0985-6 (digital PDF)

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Comparative Analysis of Homogeneity Tests for Censored Samples Under Crossing of Survival Functions

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Survival analysis is a statistical method used to analyze data where the time to a specific event is studied. In this work, a power simulation study was performed using modeling to compare homogeneity criteria for censored samples, when the survival functions may intersect. The following criteria were examined: log-rank ([2]), a two-stage procedure (TSPV), proposed by Qiu and Sheng (see [3]), modified log-rank (MLR), and modified informative criterion (MS) proposed by Bagdonavičius et al. ([1]). Modeling was conducted with various sample sizes and different distribution functions, covering various scenarios when survival functions do not intersect, intersect at the beginning, in the middle, and at the end of the time interval. To explore at what sample size these criteria can be reliably applied, a significance level computation was performed. The results of the analysis show that the power of the criteria depended on the specific characteristics of the simulated data. However, it was found that MLR and TSPV criteria performed best in various scenarios. The results provide researchers with recommendations on which statistical method to use when comparing survival curves with censored samples. Real data analysis was also conducted to illustrate the application of these criteria.

References

- [1] Bagdonavičius, V. B., Levulienė, R. J., Nikulin, M. S., Zdorova-Cheminade, O. Tests for Equality of Survival Distributions Against Non-Location Alternatives. *Lifetime Data Analysis* vol. 10, 2004, p. 445–46.
- [2] Mantel, N. Ranking Procedures for Arbitrarily Restricted Observation. *Biometrics*, vol. 23, no. 1, Mar. 1967, p. 65-78.
- [3] Peihua, Q., Sheng, J. A Two-Stage Procedure for Comparing Hazard Rate Functions. *Journal of the Royal Statistical Society: Series B (Statistical Methodology)*, vol. 70, no. 1, Nov. 2007, pp. 191-208.