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A Simple Technique to Avoid the Impact of Correlated Covariates on Proportionality Tests

Communication Info

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Abstract

The impact of correlation between covariates on the proportionality test of a given covariate in the Cox model ([1]) has long been recognized and discussed by several authors. To address this issue, several solutions have been proposed in the literature. Among them is the approximation of the null distribution of the Kolmogorov–Smirnov (KS), Cramér–von Mises (CvM), and Anderson–Darling (AD) test statistics, since it is not known when the covariates are correlated ([2]). Another approach consists of introducing time-dependent effects to account for possible non-proportionality ([3]), not only for the covariate under study but also for the remaining covariates in the model ([4]).

In this communication, we present a simple way to deal with this problem by replacing the covariate under test with the residual from its linear regression on the remaining covariates ([5]). A simulation study is then used to compare the proposed approach with existing methods.

References

[1] D. R. Cox, J. R. Statist. Soc. B, 34, 187–220, 1972.
[2] J. T. Kvaløy and L. R. Neef, Lifetime Data Analysis, 10 No. 2, 139–157, 2004.
[3] D. Kraus, Lifetime Data Analysis, 13 No. 1, 1–16, 2006.
[4] D. Kraus, Communications in Statistics - Theory and Methods, 37 No. 4, 617–625, 2008.
[5] LAILI Lahcen, HAFDI Mohamed Ali and HAMIDI Mohamed Achraf, Statistics, Optimization & Information Computing, 15 No. 3, 1480–1489, 2025.