A simple procedure for testing the assumption of independent censoring under the mixture cure model when the cure status is partially known

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We develop a simple procedure for testing the independent censoring assumption under the mixture cure model (MCM) in the case that some censored individuals are identified to be cured. This procedure is based on the fact that when the independence assumption between the survival time and the censoring time holds, a MCM-based kernel estimator of the cure probability (Safari et al., 2022) is asymptotically unbiased and consistent. In contrast, the standard regression-based kernel estimator of the cure probability is biased and inconsistent. The regression-based estimator is an extension of the local imputation method in Aerts et al. (2002) to estimate a conditional mean with missingness in the response; the missing at random (MAR) assumption must be valid to apply this estimator. Nonetheless, the MAR condition is not plausible in the MCM with cure status partially known when the independence assumption holds. Consequently, a significant difference between the MCM-based and regression-based estimators is expected, especially when the censoring rate is high. A sensitivity study for the procedure is conducted based on a reasonable range of dependence between survival and censoring times and for different levels of observed cure status. A bootstrap method to approximate the critical values of the testing procedure is proposed.

Keywords: Bootstrap, Censored data, Nadaraya-Watson weights.

References

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