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Competing risks data analysis under the accelerated failure time model with missing cause of failure

Ming Zheng · Renxin Lin · Wen Yu

Abstract Competing risks data with missing cause of failure are analyzed under the accelerated failure time model which is a popular semiparametric linear model in survival analysis. The missing mechanism is assumed to be missing at random. The inverse probability weighted and double robust techniques are used to modify the rank-based estimating functions for competing risks data with complete observations on cause of failure. Proper optimization technique is utilized to obtain the desired estimators. The proposed algorithm overcomes the difficulty in solving the rank estimating equations with discontinuous estimating functions. The asymptotic properties of the proposed estimators are established. To implement the related inferences, a nonparametric bootstrap approach as well as a score test is developed. Simulation studies are carried out to assess the finite sample performance of the proposed method and validate the theoretical findings. The new estimating procedure is illustrated with the data from a bone marrow transplant study.

Keywords Bootstrap · Cause-specific hazard · Competing risks · Double robust · Inverse probability weighted · Missing at random · Rank estimator

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