

Presmoothed Estimation for Multi-State Survival Data

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We consider multi-state models to represent time to event data. We focus on nonparametric estimation of important targets, e.g. the joint distribution of several gap times, the transition and occupation probabilities, or the mean lengths of stay. Unlike for Aalen-Johansen, we do not assume that the model is Markov. Besides, we introduce new estimators based on presmoothing ideas in order to reduce the variance in the estimation. Two specific, important models are worked out in detail: the k -state progressive model and the illness-death model (or disability model). Asymptotic properties of the proposed estimators are established, while we illustrate their finite-sample performance via simulations and real data analysis.