

Semi-competing Risks Data Analysis

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Abstract

In this paper, we derive the copula-graphic estimator (Zheng and Klein 1996) for marginal survival functions using Archimedean copula models based on competing risks data subject to univariate right censoring and prove its uniform consistency and asymptotic properties. We then propose a parameter estimation strategy to analyze the semi-competing risks data using Archimedean copula models. Our method is important and flexible in that it allows us to determine dependence levels between competing risks when two dependent competing risks are subject to independent censoring. Based on our estimation strategy, we propose a new model selection procedure. We also describe an easy way to accommodate possible covariates in data analysis using our strategies. Simulation studies have shown that our parameter estimate outperforms the estimator proposed by Lakhal, Rivest and Abdous (2008) for the Hougaard model and the model selection procedure works quite well. We fit a leukemia data set using our model and end our paper with some discussion.

Some key words: Archimedean Copula Models, Copula-graphic estimator, Semi-competing risks data, Marginal survival functions.