

Current Methods for Recurrent Events Data with Dependent Termination: A Bayesian Perspective

Debajyoti Sinha

Department of Statistics, Florida State University

E-Mail: sinhad@stat.fsu.edu

Abstract: There has been a recent surge of interest in modeling and methods for analyzing recurrent events data with risk of termination dependent on the history of the recurrent events. To aid the future users deciding about appropriate models for the application at hand, we review state of the art statistical methods and present novel theoretical properties, identifiability results and practical consequences of key modeling assumptions of several fully specified stochastic models. After introducing stochastic models with non-informative termination process, we focus on a class of models which allows both negative and positive association between the risk of termination and the rate of recurrent events via a frailty variable. We also discuss the relationship as well as the major differences between these models in terms of their motivations and physical interpretations. We discuss associated Bayesian methods based on Markov chain Monte Carlo tools, and novel model diagnostic tools to perform inference based on fully specified models. We demonstrate the usefulness of current methodology through an analysis of a data set from a clinical trial. In conclusion, we explore possible future extensions and limitations of the methodology.

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