

Joint Analysis of Longitudinal Growth and Interval Censored Mortality Data

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Abstract. Joint analysis of longitudinal and survival data has received considerable attention in the recent literature. This talk will review methods developed for such joint analysis and develop a joint model for the analysis of longitudinal data monitoring the growth and survival of trees subject to various interventions in a designed experiment. Of interest is the development of methods for handling features of the data which are not common in considerations of joint analyses. Two main features are interval censoring of the survival response and the need to account for spatial effects jointly in the survival and longitudinal outcomes. We adopt linkages in random effects over multiple outcomes such as considered in Chi and Ibrahim (2006). To handle interval censoring in the survival context we propose to use functional approaches to smooth the data. To account for covariate effects, we propose an iterative approach in a framework similar to an accelerated failure time formulation: covariate effects are used to back-transform the timescale for individual level data and then smoothing methods imposed on the back-transformed time-scales. Properties of the algorithmic scheme of iteration between estimation of covariate effects and imputation of the survival data using smoothing on back-transformed data will be developed in the context of the spatial joint analysis. We also discuss the conditions under which there are efficiency gains in joint analyses with regard determination of treatment effects.