

# EXPONENTIAL TILT MODELS IN THE PRESENCE OF CENSORING

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abstract

Various semiparametric models can be used to describe survival distributions in randomized clinical trials. Assuming a constant hazard ratio between the two treatment groups leads to the proportional hazards model (Cox, 1972). Alternatively, assuming a scale change in survival time, equivalently, an acceleration of the time scale, leads to the accelerated failure time model (Louis, 1981; Tsiatis, 1990). In this dissertation, we consider the Exponential Tilt Model (ETM) that assumes a parametric form for the ratio of densities of the two survival distributions, and develop a nonparametric likelihood method for estimation in the presence of censoring. The ETM with no censoring has been extensively studied in connection with case-control studies (Qin, 1998) and biased sampling (Gilbert et al., 1999). Our work presents a first step in extending application of the ETM to censored, event-time data. Compared to other survival models, the ETM is especially appealing when the data are heterogeneous. We illustrate applications of the ETM in the following three aspects: a proportion of subjects are cured; only a subgroup of subjects respond to the treatment; genetic quantitative trait loci analysis with phenotype being the survival time.