

REGRESSION ANALYSIS OF CLUSTERED INTERVAL-CENSORED FAILURE TIME DATA

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ABSTRACT

Clustered failure time data occur when the failure times of interest are clustered into small groups, while interval censoring occurs when the event of interest cannot be observed directly and is only known to have occurred over a time interval. Clustered failure time data often arise together with interval-censoring, which leads to the clustered interval-censored failure time data. In this dissertation, we will focus on the regression analysis of such data.

In the first part of the dissertation, a regression analysis under a Cox frailty model is discussed by employing a sieve estimation procedure. In particular, a two-step algorithm is developed for the regression parameter estimation and the asymptotic properties of the resulting sieve maximum likelihood estimates are established.

The second part of this dissertation proposes an estimating equation-based approach for the additive hazards model. A major advantage of the proposed method is that it does not involve estimation of any baseline hazard function. Both asymptotic and finite sample properties of the proposed estimates of regression parameters are established and the method is illustrated by the data arising from a lymphatic filariasis study.

The last part of the dissertation considers the regression analysis of the same type of data in the context of the linear transformation models. For the inference about the regression parameters, a marginal model approach based on within-cluster resampling (WCR) method is proposed and its large sample properties are also established.