Public Abstract
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ABSTRACT

Failure time data arise in many fields and can involve different types of censoring structures and missing information. We consider three cases: right-censored data with missing censoring indicators, clustered current status data, and clustered intervalcensored data. Right-censored data with missing indicators appear when the censoring indicator, the information if the observed time is the survival time of interest or the censoring time, is missing. Clustered current status data arise when the failure times of interest are clustered into small groups and the observed times are either left- or right-censored. Clustered interval-censored data arise when the failure times of interest are clustered into small groups and the observed times are known to fall within certain intervals.

In Chapter 1, three real-life examples are discussed to illustrate right-censored data with missing censoring indicators, clustered current status data and clustered intervalcensored data. Also we will review the existing literature on statistical analysis of right-censored failure time data with missing censoring indicators, current status data, interval-censored data and general clustered failure time data.

Chapter 2 discusses regression analysis of right-censored failure time data with missing censoring indicators and presents an efficient estimation procedure based on the EM algorithm. The simulation study performed indicates that the proposed methodology performs well for practical situations. An illustrative example from a breast cancer clinical trial is provided.

Chapter 3 discusses regression analysis of clustered current status data. For inference, a Cox frailty model and a two-step EM algorithm are presented. A simulation study was conducted for the evaluation of the proposed methodology and indicates that the approach performs well for practical situations. An illustrative example from a tumorigenicity experiment is provided.

Chapter 4 generalizes the study of Chapter 3 to clustered interval-censored data. For inference, similar Cox frailty model and two-steps EM algorithm are adopted. Due to the more complex structure of the censoring mechanism, the EM algorithm and the inference procedure are much more complicated for clustered interval-censored data. A simulation study indicates that the approach performs well for practical situations. An illustrative example from a lymphatic filariasis study is provided.

Chapter 5 discusses some directions for future research.