Public Abstract

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Title:SEMIPARAMETRIC AND NONPARAMETRIC METHODS FOR THE ANALYSIS OF PANEL COUNT DATA

Panel count data are one type of event-history data concerning recurrent events. Ideally for an event-history study, subjects should be monitored continuously, so for the events that may happen recurrently over time, the exact time of each event occurrence is recordable. In reality, however, subjects may only be observed at their clinical visits or discrete times. As a result, instead of observing the exact event times,one only knows the numbers of events that happen between the observation times. Such interval-censored recurrent event data are usually referred to as panel count data (Kalbfleisch and Lawless,1985; Sun and Kalbfleisch,1995; Thall and Lachin, 1988). The primary interest with panel count data is about the underlying recurrent event process. Meanwhile for the analysis, one needs to consider the times when the observations occur, which can be regarded as realizations of an observation process with follow-up times. This dissertation consists of four parts. In the first part, we will consider regression analysis of panel count data with dependent observation processes,while the follow-up times may subject to an informative terminal event like death. Simulation studies are conducted to evaluate finite sample properties of the proposed approach, and the approach is applied to a bladder cancer study. The second part will focus on regression analysis of multivariate panel count data in the presence of a terminal event. The asymptotic properties of the proposed estimators are established and a model-checking procedure is derived for practical situations. The third part will discuss two-sample nonparametric comparison based on panel count data. Most approaches that have been developed in the literature require an equal observation process for all subjects. However, such assumption may not hold in reality. A new class of test procedures are proposed that allow unequal observation processes for the subjects from different treatment groups, and both univariate and multivariate panel count data are considered. The approach works especially well for sparsely distributed data. It is then applied to a skin cancer study which motivated our study. Finally, the last part will discuss some directions for future research.