Recent Advances in Analysis of Survival Data from Cross Sectional Sampling

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PIERRE-JÉRÔME BERGERON, University of Ottawa
*Nonparametric Estimation of the Survival Function for Prevalent and Incident Cases under Stationary Incidence*

In epidemiological studies, subjects with disease (prevalent cases) differ from newly diseased (incident) cases. They tend to survive longer due to sampling bias. The usual estimator of the survival function for incident cases with right-censoring is the Kaplan-Meier (KM) estimator. Under stationary incidence, prevalent cases are length-biased. The nonparametric maximum likelihood estimator of the survival function correcting length-bias is obtained through a completely different approach than the KM estimator. In large longitudinal studies, both incident and prevalent cases may occur. We present a product-limit method that combines both estimators and uses all the data, and obtain some of its asymptotic properties. We finally provide an illustration on CSHA data.

MARCO CARONE, University of California, Berkeley
*Quantifying the Impact of Disease on Lifetime Under Cross-sectional Sampling*

Common regression models are inadequate to characterize the relationship between age at disease onset and time from onset to death because of the intricate dependence structure between the two. We propose a novel semiparametric model to study the impact of disease on lifetime, and discuss estimation and inference using data from a cross-sectional survey with follow-up. Such data are particularly challenging to analyze because they are subject to systematic biases and informative censoring. We conclude with a brief discussion of the impact of dementia on the lifetime of elderly Canadians using data from the Canadian Study of Health and Aging.

ASHKAN ERTEFAEI, University of Michigan
*Double Bias*

We consider estimating the grouping (exposure) effect on survival time from observational data when, in addition to the lack of randomization, the data constitute a length-biased sample; we hence term this a double-bias problem. We introduce two approaches based on weighted and double robust estimating equations for estimating grouping effect. We apply the proposed methods to a set of length-biased survival data collected as part of the Canadian Study of Health and Aging (CSHA) to compare survival of subjects with dementia among institutionalized patients versus those recruited from the community and depict their adjusted survival curves.

TAKI R. SHINOHARA, Johns Hopkins Bloomberg School of Public Health
*Alternating Event Processes during Lifetimes: Population Dynamics and Statistical Inference*

There are many biomedical applications in which patients experience nontrivial durations associated with each event. This results in a process where the disease status of a patient alternates between exacerbations and remissions. In this work, we consider the dynamics of a chronic disease and its associated exacerbation-remission process over two time scales: calendar time and time-since-onset. In particular, over calendar time, we explore population dynamics and the relationship between incidence, prevalence and duration for such alternating event processes. We provide nonparametric estimation techniques for characteristic quantities of the process, and we develop techniques for estimating semiparametric models of prevalence.