PHD DISSERTATION DEFENSE ANNOUNCEMENT

TWO-SAMPLE LOCATION-SCALE ESTIMATION AND TESTING FROM SEMIPARAMETRIC RANDOM CENSORSHIP MODELS

Rianka Bhattacharya
Ph.D. Candidate in Probability and Applied Statistics
Department of Mathematical Sciences, New Jersey Institute of Technology, Newark, NJ

Advisor:
Dr. Sundar Subramanian, Associate Professor, Department of Mathematical Sciences, NJIT

Committee Members:
Dr. Sunil Dhar, Professor, Department of Mathematical Sciences, NJIT
Dr. Jimeng Loh, Associate Professor, Department of Mathematical Sciences, NJIT
Dr. Sudhakar Rao, Senior Director, Janssen Research & Development, Raritan, NJ
Dr. Antai Wang, Associate Professor, Department of Mathematical Sciences, NJIT
Dr. Zhi Wei, Associate Professor, Department of Computer Science, NJIT

Date: Monday, April 25, 2016 Time: 3:00 PM – 4:30 PM Venue: Central King Building, Room 316

ABSTRACT

This dissertation has two independent parts. The first part exploits semiparametric random censorship models to develop new estimators in censored two-sample problems. Further research focuses on testing for model adequacy of censored location-scale models. When a new medication is introduced there would be considerable interest in determining its efficacy relative to an existing one. If it is known that the relief times from the existing and new medications belong to a location-scale family of distributions, this is often helpful for performing comparisons to determine efficacy. For example, the proportion of individuals who find relief within a certain time period with the new medication can be estimated directly from the estimated cumulative distribution function plot for the time-to-relief pertaining to the existing one. Provided that estimates of the location and scale parameters are available, one simply has to calculate a transformed time point and then read off the value from the available plot for the existing medication. To estimate the parameters from right censored data, a currently existing paradigm is a minimum distance criterion combined with Kaplan–Meier quantiles. A new procedure that employs the estimated quantiles from a semiparametric random censorship framework is introduced and produces improved parameter estimates. Such a procedure assumes the availability of good fitting models for group-specific conditional probabilities. When the models are correctly specified for each group, the new location and scale estimators are shown to be asymptotically as or more efficient than the estimators obtained using the Kaplan–Meier quantiles. This permits improved individual and joint confidence intervals for the model parameters. Model adequacy for censored location-scale models is addressed through newly proposed simultaneous confidence bands for horizontal shift functions. The methods are illustrated using real examples.

The second part develops an R package called **AdaptSlopeCut** for estimating the optimal cutoff point for the primary analysis in a clinical study for cure rate survival data. The procedure to estimate the cutoff is based on the cumulative events curve of the control group and is illustrated with a simulation study.