MAY 27th 2010 – New date!
California State University East Bay
Hayward, CA

Refreshments: 4:00 – 4:30 p.m.
Student presentations: 4:30 – 5:30 p.m.
Where: South Science 143

Award Recipients (Abstracts follow)

Marian Farah
Department of Applied Mathematics and Statistics
University of California, Santa Cruz
Title
An Application of Semiparametric Bayesian Isotonic Regression to the Study of Radiation Effects in Spaceborne Microelectronics

Karen McKeown
Division of Biostatistics
University of California, Berkeley
Title
Misclassification of Current Status Data

Ming Zhong
Department of Statistics
University of California, Davis
Title
Segmenting Nonstationary Time Series Via Quantile Autoregressions

Driving directions to CSU EB, Hayward Campus can be found at:

http://www20.csueastbay.edu/about/visitor-information/maps-campus-locations/hayward-campus-map/

Lots E1 and E2 are closest to the Science Buildings. There are parking permit dispensers in many of the parking lots including E2. Parking fee is $7/day. There are a very few metered spots at $1.50/hour.

ABSTRACTS

Student: Marian Farah, Dept of Applied Mathematics and Statistics
University of California, Santa Cruz

Title: An Application of Semiparametric Bayesian Isotonic Regression to the Study of Radiation Effects in Spaceborne Microelectronics

Abstract: This work is concerned with the vulnerability of spaceborne microelectronics to single event upset, a change of state caused by high energy charged particles in the solar wind or the cosmic ray environment striking a sensitive node. To measure the susceptibility of a semiconductor device to single event upsets, testing is conducted by exposing it to high-energy heavy ions or protons produced in a particle accelerator. The number of upsets depends on the linear energy transfer (LET), the cross-section of interaction, and the fluence. The interaction cross-section is assumed to be monotonically increasing with LET. The prediction of the on-orbit upset rate, one of the main scientific goals of particle accelerator experiments, is made by combining the device geometry and the cross-section vs. LET curve for the device with the model for the orbit-specific radiation environment. Standard practice in the device testing literature is to assume a Weibull or sometimes a Lognormal parametric form for the cross-section vs. LET curve. The choice of either parametric model is conventional and has little physical justification. We work with a Poisson model for the upset counts and propose a semiparametric isotonic regression method for count responses. Our approach is based on a Dirichlet process prior for the cross-section vs. LET curve, which allows the data to drive the shape of the cross-section vs. LET relationship, and can thus result in more accurate predictive inference for the on-orbit upset rate. We illustrate the practical utility of the proposed methodology with data obtained from two particle accelerator experiments corresponding to different experimental scenarios.

Student: Karen McKeown
Division of Biostatistics, University of California, Berkeley

Title: Misclassification of Current Status Data

Abstract: Current status data provides information on the survival status of individuals at various times rather than standard observation, possibly right-censored, of failure times. In many current status data applications, ascertainment of an individual’s current status is based on a screening test which may not have perfect sensitivity and specificity. For example, tests for the infection status of a viral disease like HIV or HPV are designed to detect antibodies and may be subject to error particularly when a test is performed soon after an infection.

We describe a simple method for nonparametric estimation of a distribution function based on current status data where observations of current status information are subject to misclassification. Nonparametric maximum likelihood techniques lead to use of a straightforward set of adjustments to the familiar pool-adjacent-violators estimator used when misclassification is assumed absent. The methods consider alternative misclassification models and are extended to regression models for the underlying survival time. The ideas are motivated by and applied to an example on human papilloma virus (HPV) infection status of a sample of women examined in San Francisco.

Student: Ming Zhong
Department of Statistics, University of California, Davis

Title: Segmenting Nonstationary Time Series Via Quantile Autoregressions

Abstract: Many time series observed in practice display non-stationarities, especially if data is collected over long time spans. Non-stationarities can arise in various ways such as in the trend or in the variance-covariance structure. Since parameter estimates as well as forecasts can be severely biased if non-stationarities are not taken into account, identifying and locating structural breaks has become an important issue in the analysis of time series.

Since in practice innovation sequences cannot always be modeled conveniently with a Gaussian process, parameter estimates obtained from an application of the Gaussian likelihood may be inefficient. In fact, one commonly observes error distributions with longer tails than that of the Gaussian distribution in many financial time series. To incorporate skewed and possibly heavy-tailed innovations into the model building process, we propose the use of quantile autoregression models with Asymmetric Laplace innovations. As a member of the class of random-coefficient models, quantile autoregression models allow the autoregressive coefficients to take distinct values over different quantiles of the innovation process, and may thus expand the modeling options for non-stationary and asymmetric time series.

In this setting, we try to detect structural breaks with the minimum description length principle selecting the number and locations of break points for non-stationary time series. The estimated segments with piecewise quantile

autoregression structures are expected to minimize a convex objective function, and a genetic algorithm is implemented to solve this optimization problem. We will present large sample properties and theoretical justifications for the consistency of this method. Numerical results from simulations and economic data applications show that our method consistently estimates the number and locations of the breaks.

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