Modern Regression Methods

Chair: Duncan Murdoch (University of Western Ontario)

SONG CAI, University of British Columbia
Two Fast Algorithms for L^1-type Estimation in Regression

Two algorithms are proposed for minimization of L^1-type objective functions in regression. The first algorithm is based on mixture of coordinate descent and steepest descent steps to partially relax the two problems of coordinate descent for non-smooth functions: convergence to local non-optimal kinks and slow convergence speed. The second algorithm is a relaxation method which finds a "smart" descent direction at each iteration step to avoid possible zigzag convergence phenomenon in coordinate and steepest descent algorithms. Both methods are efficient and work nicely in practice.

FUQI CHEN, University of Windsor
Shrinkage Estimation in Some Model Selection by LASSO in Multivariate Regression with Structural Changes

In this paper, we propose an estimation method in some multivariate regression models with multiple change-points occurring at unknown times. By a LASSO-type method, we estimate the parameter matrix and unknown change points, and we derive the asymptotic properties of the proposed estimators. Also, we consider the case where the parameter is suspected to be restricted to some linear subspaces. Further, we propose a class of shrinkage estimators and establish their asymptotic optimality. Finally, in order to illustrate the efficiency of the proposed method for small sample sizes, we present some simulation results.

NICHOLAS MITSAKAKIS, Toronto Health Economics and Technology Assessment, University of Toronto
Bayesian Regression Models for Estimation of Disease-Specific Net Costs using Aggregate Data

In order to estimate disease specific "net costs" from aggregate level (e.g. sample means and SD per strata) cost data, which are skew and heteroscedastic, we propose and study a Bayesian Gamma regression mixed model that utilizes as stochastic nodes both sample means and inverse coefficients of variation. We investigate its performance and goodness of fit using simulated and real data, and we compare it with two linear models, assuming known and unknown cost variances per stratum. Our results show that, despite its theoretical justification, the benefits of using the Gamma model over the much simpler linear models are questionable.

VANDA LOURENÇO, Faculdade de Ciências e Tecnologia da Universidade Nova de Lisboa, Portugal
Robust Outlier Detection in Genetic Association Studies of Quantitative Traits in the Context of M-regression

Robust multiple linear regression methods are a valuable asset to genetic association studies of quantitative traits, allowing us not to be concerned with the eventuality of outlying observations being present in the data disrupting our analysis results. However, knowledge of these observations may be of the utmost importance to the researcher in order to assess the underlying mechanisms of the data, since they are not always a result of measurement error. To this respect, we propose and discuss a robust outlier test together with an adequate FDR correction measure to be used in the context of a robust multiple-regression model.

SALIMAH ISMAIL, University of Victoria
A Skew-t Space-varying Regression Model for the Spectral Analysis of Magnetoencephalography Readings

Characterizing the brain rhythms of individuals with neurological disorders is of fundamental interest in neuroscience. We develop a Bayesian approach for comparing the resting state brain activity of individuals with Down syndrome (DS) with

controls. Magnetoencephalography is used to record time-series of neural activity across several brain regions, and the mean-frequency of the power spectral density is computed at each region. We develop a skew-t model for analysis, and use space-varying regression to examine associations across the scalp. Our analysis suggests spectral slowing in the brain rhythms of individuals with DS, and produces smoothed maps illustrating the scalp-topography of differences.