

Department of Mathematics and Statistics Colloquium

From mixed effects modeling to spike and slab variable selection: A Bayesian regression model for group testing data

Chris McMahan

Clemson University

Abstract:

Due to reductions in both time and cost, group testing is a popular alternative to individual-level testing for disease screening. These reductions are obtained by testing pooled biospecimens (e.g., blood, urine, saliva, etc.) for the presence of an infectious agent. However, these reductions come at the expense of data complexity, making the task of conducting disease surveillance more tenuous when compared to using individual-level data. This is because an individual's disease status may be obscured by a group testing protocol and the effect of imperfect testing. Further, unlike individual-level testing, a given participant could be involved in multiple testing outcomes and/or may never be tested individually. To circumvent these complexities and to incorporate all available data, we propose a Bayesian generalized linear mixed model that accommodates data arising from any group testing protocol, estimates unknown assay accuracies, and accounts for the potential heterogeneity in the covariate effects across population subgroups (e.g., clinic sites); this latter feature being of key interest to practitioners tasked with conducting disease surveillance. To achieve model selection, our proposal uses spike and slab priors for both fixed and random effects. The developed methodology is illustrated through numerical studies and is applied to chlamydia surveillance data collected in Iowa.

Speaker Bio:

Dr. Chris McMahan is an Associate Professor in the School of Mathematical and Statistical Sciences at Clemson University. His research interests include categorical data analysis, group testing, survival data analysis, nonparametric methods, measurement error models, shape analysis, Bayesian parametric/nonparametric estimation, statistical computing, epidemiology/public health, and biomedical applications.

Monday, September 30 at 3:50 pm in Roop 103

Refreshments at 3:30 pm