Saturday, January 20th

Emerson Alumni Hall, President's Ball Room

9:00 AM

Dr. Subhashis Ghoshal

Professor of Statistics
North Carolina State University

" Bayesian Analysis of Connectome Data For Studying Alzheimer Disease"

In human brain, the connectome consisting of white matter strings connecting different regions of the brain is responsible for coordination of various activities. It is believed that with the onset of Alzheimer disease, the connectome gets weaker. We investigate this phenomenon on subjects of different age, gender and disease status using a dataset collected by the Alzheimer Disease Neuroimaging Initiative (ADNI). We build generalized regression models for the extent of connectedness and also incorporate subject inhomogeneity through random effects with unknown distributions. Several thousand parameters are needed to describe the model which makes inference difficult. Using a graphon function, we introduce a key dimension reduction technique essential for precise inference. The connecting graphon functions are considered unknown but smooth, thus allowing putting priors of low complexity on them. We pursue a nonparametric Bayesian approach by assigning a Dirichlet process scale mixture of normal prior on the distributions of the random effects and finite random series of tensor products of B-splines priors on the underlying graphon functions. We demonstrate that the resulting Bayesian procedure is easily implementable and has strong performance in various simulation settings. In an asymptotic setting where the number of subjects increases to infinity, we show that the posterior distribution is consistent. Our analysis leads to several interesting conclusions on the ADNI data.

Bio

Subhashis Ghoshal is a professor of statistics at North Carolina State University, Raleigh. His research interest spans over many areas including Bayesian statistics, asymptotics, nonparametrics and high dimensional models, with diverse applications. In particular, his pioneering work on concentration of posterior distributions led to theoretical understanding of nonparametric Bayesian procedures. His research has been supported by several federal funding agencies in the United States, European granting institutions and industry grants. He served or has been serving on the editorial boards of many leading statistics journals including the Annals of Statistics, Bernoulli, Electronic Journal of Statistics and Sankhya. Seventeen doctoral students thus far graduated under his advising.

Saturday, January 20th

Emerson Alumni Hall, President's Ballroom

9:55 AM

Dr. Cun-Hui Zhang

Distinguished Professor of Statistics and Biostatistics
Rutgers University

"Simultaneous Bootstrap Inference with High-Dimensional Data"

We propose bootstrap methodologies for simultaneous inference of low-dimensional parameters with high dimensional data. We focus on simultaneous confidence intervals for individual coefficients in linear regression, although our approach is applicable in much broader contexts. The problem can be solved by de-biasing regularized estimators such as the Lasso. However, the Bonferroni adjustment is overly conservative and asymptotic theory is complicated, especially for non-Gaussian and heteroscedastic errors. We propose residual, wild and empirical bootstrap methodologies for more accurate and robust simultaneous inference and study sample size requirements and other properties of such procedures. Our theory is complemented by many empirical results.

Bio

Cun-Hui Zhang, Distinguished Professor of Statistics at Rutgers University, is a Fellow of the Institute of Mathematical Statistics and a Fellow of American Statistical Association. He is Editor of Statistical Science and serves on the editorial boards of Annals of Statistics, Bernoulli, Statistica Sinica, and Statistics Surveys. His research interests include high-dimensional data, machine learning, empirical Bayes, nonparametric methods, multivariate analysis, survival data and biostatistics, functional MRI, closed loop diabetes control, and network tomography.

Saturday, January 20th
Emerson Alumni Hall, President's Ballroom
11:20 AM

Dr. Bodhisattva Sen

Associate Professor of Statistics
Columbia University

" Spatial Adaptivity in Trend Filtering"

I will talk about a recent univariate nonparametric regression technique called trend filtering which is a generalization of total variation denoising, a special case of the fused Lasso and closely related to locally adaptive regression splines. Trend filtering presents a natural way of fitting splines where the knots are selected adaptively based on the data points. It is supposed to have attractive spatial adaptivity properties many of which have not yet been established rigorously. I will present some results on the spatial adaptivity of trend filtering. I will also mention connections to shape constrained regression. This is joint work with Adityanand Guntuboyina, Donovan Lieu and Sabyasachi Chatterjee.

Bio

Bodhisattva Sen is an (tenured) Associate Professor of Statistics at Columbia University, New York. His core statistical research centers around nonparametrics and large sample theory --- nonparametric function estimation (with special emphasis on shape constrained estimation), likelihood and bootstrap based inference in (non-standard) parametric and nonparametric models. He is also involved in interdisciplinary research, especially in astro-statistics. He was awarded the National Science Foundation (NSF) CAREER award in 2012. He has held a Lectureship position at the University of Cambridge (UK) between 2011-2012, was a visiting scholar at the University of California at Berkeley between 2016-2017 and was a visiting Associate Professor of Statistics at Stanford University during Spring 2017.

Saturday, January 20th
Emerson Alumni Hall, President's Ballroom
12:18 PM

Dr. Moulinath Banerjee
Professor of Statistics and Biostatistics
University of Michigan

"Intelligent Sampling for Estimating Change Points in Very Long Sequential Data "

We consider the problem of picking out multiple change points of interest in a massively long time series, where the number of change-points of interest is few relative to the length. State of the art techniques can accomplish this in slightly over $O(N)$ time where N is the total length of the series, which is still quite prohibitive for series with several million observations and larger. Our proposed intelligent sampling procedure, which uses a two-stage method to analyze the problem, and relies on a locality principle that only data around the change-point are useful for its detection, provides the same degree of precision as methods that analyze the full data while using a vanishingly small fraction of it, and can achieve almost $O(\sqrt{N})$ time for sparse change-point regimes.

Bio

Moulinath Banerjee was born and raised in India where he completed both his Bachelors and Masters in Statistics at the Indian Statistical Institute, Kolkata. He obtained his Ph.D. from the Statistics department at University of Washington, Seattle, in December 2000, served as lecturer there for Winter and Spring quarters, 2001, and joined University of Michigan in Fall 2001. Mouli's research interests are in the fields of non-standard asymptotics, empirical process theory, threshold and boundary estimation, and graphical networks. Mouli is the recipient of the 2011 IISA Young Investigators Award and a fellow of IMS. He has a broad range of interests outside of statistics which include classical music, literature, history, philosophy, physics and ancestral genetics. He is, also, most emphatically, a gourmet and believes that a life without good food is a life less lived.