Statistics Seminar for Fall 2018

Schedule and Abstract

Date	Speaker	Talk Title
September 21	Yinghao Pan, UNC Charlotte	**Improved doubly robust estimation in learning individualized treatment rules**
September 28	Yu Shen, The University of Texas MD Anderson Cancer Center	**Density Ratio Model for Analyzing Length-biased Data, Division of Quantitative Sciences**
October 5	Ram Tiwari, FDA	**(Part 1) Job/career opportunities at FDA, (Part 2) Bayesian approaches for benefit-risk assessment with examples**
October 12	Mei-Ling Ting Lee, University of Maryland	**First-hitting-time Based Threshold Regressions with Shocks for Degradation Processes**
October 26	Yang Feng, Columbia University	**TBA**
November 2		
November 9	Hongyuan Cao, Florida State University	**Regression analysis of longitudinal data with omitted asynchronous longitudinal covariate**
November 16	Yifan Cui, University of Pennsylvania	**Tree-based Survival Models and Precision Medicine**
November 30	Fei Gao, University of Washington	**TBA**
December 7	Final Exams	

Speaker #1:
Date: September 21, 2018
Time and location: 11:00am-12:00noon, Fretwell 315
Speaker: Prof. Yinghao Pan, UNC Charlotte

Title: Improved doubly robust estimation in learning individualized treatment rules
Abstract: Due to patient's heterogeneous response to treatment, there is a growing interest in developing novel and efficient statistical methods in estimating individualized treatment rules (ITRs). The central idea is to recommend treatment according to patient characteristics, and the optimal ITR is the one that maximizes the expected clinical outcome if followed by the patient population. We propose an improved estimator of the optimal ITR that enjoys two key properties. First, it is doubly robust, meaning that the proposed estimator is consistent if either the propensity score or the outcome model is correct. Second, it achieves the smallest variance among its class of doubly robust estimators when the propensity score model is correctly specified, regardless of the specification of the outcome model. Simulation studies show that the estimated optimal ITR obtained from our method yields better clinical outcome than its main competitors. Data from Sequenced Treatment Alternatives to Relieve Depression (STAR*D) study is analyzed as an illustrative example.

(Hosted by Dr. Yinghao Pan, UNC Charlotte)

Speaker #2
Date: September 28th, 2018
Time and location: 11:00am-12:00noon, Fretwell 315
Speaker: Professor Yu Shen, Division of Quantitative Sciences, The University of Texas MD Anderson Cancer Center, Houston, TX

Title: Density Ratio Model for Analyzing Length-biased Data
Abstract:
For analyzing complex length-biased failure time data, computational algorithms and theoretical properties are not readily available, especially when a likelihood function involves infinite-dimensional parameters. Relying on the invariance property of length-biased failure time data under the semiparametric density ratio model, we present two likelihood approaches for the estimation and assessment of the difference between two survival distributions. The most efficient maximum likelihood estimators are obtained by the EM algorithm and profile likelihood. We also provide a simple numerical method for estimation and inference based on conditional likelihood, which can be generalized to k-arm settings. Unlike conventional survival data, the mean of the population failure times can be consistently estimated given right-censored length-biased data under mild regularity conditions. To check the semiparametric density ratio model assumption, we use a test statistic based on the area between two survival distributions.

(Hosted by Dr. Yanqing Sun, UNC Charlotte)

Speaker #3:
Date: October 5, 2018
Time and location: 11:00am-12:00noon, Fretwell 315
Speaker: Ram Tiwari, Director, Division of Biostatistics, Center for Devices and Radiological Health, Office Surveillance and Biometrics, U.S. Food & Drug Administration

Title: (Part 1) Job/career opportunities at FDA, **(**Part 2) Bayesian approaches for benefit-risk assessment with examples

Abstract: An important aspect of the drug/device evaluation process is to have an integrated benefit-risk assessment to determine, using some quantitative measures, whether the benefit outweighs the risk for the target population. The subject-level benefit-risk response is a five-category random variable with cell counts following a multinomial distribution. Assuming that the cell probabilities follow a Dirichlet distribution, we develop a Bayesian approach for the longitudinal assessment of benefit-risk using the global measures proposed by Chuang-Stein et al. In a more generalized approach, a power prior is used through the likelihood function to discount the information from previous visits. For the subject-level benefit-risk assessment, the cell-probability of the subject, with respect to a reference category, is modeled, on the logarithmic scale, as a generalized linear model using a Dirichlet process as a prior. The model is applied to drug/device clinical trial datasets.

(Hosted by Dr. Yanqing Sun, UNC Charlotte)

Speaker #4:
Date: October 12, 2018
Time and location: 11:00am-12:00noon, Fretwell 315
Speaker: Prof. Mei-Ling Ting Lee, University of Maryland

Title: First-hitting-time Based Threshold Regressions with Shocks for Degradation Processes

Abstract: People's health or engineering systems experience gradual degradation while simultaneously being exposed to a stream of random shocks of varying magnitudes that eventually cause death or failure when a shock exceeds the residual strength. I'll present theory and statistical properties of this model. Applications including a study of osteoporotic hip fractures in the elderly.

(Hosted by Dr. Yang Li, UNC Charlotte)

Speaker #5:
Date: October 26, 2018

Time and location: 11:00am-12:00noon, (Fretwell 315 will be occupied, need a diff room)
Speaker: Dr. Yang Feng, Columbia University

Title:

Abstract:

(Hosted by Dr. Jiancheng Jiang, UNC Charlotte)

Speaker #6:
Date: November 9, 2018
Time and location: 11:00am-12:00noon, Fretwell 315
Speaker: Dr. Hongyuan Cao, Florida State University

Title: Regression analysis of longitudinal data with omitted asynchronous longitudinal covariate

Abstract: Long term follow-up with longitudinal data is common in many medical investigations. In such studies, some longitudinal covariate can be omitted for various reasons. Naïve approach that simply ignores the omitted longitudinal covariate can lead to biased estimators. In this article, we propose new unbiased estimation methods to accommodate omitted longitudinal covariate. In addition, if the omitted longitudinal covariate is asynchronous with the longitudinal response, a two stage approach is proposed for valid statistical inference. Asymptotic properties of the proposed estimators are established. Extensive simulation studies provide numerical support for the theoretical findings. We illustrate the performance of our method on dataset from an HIV study.

(Hosted by Dr. Shaoyu Li, UNC Charlotte)

Speaker #7:
Date: November 16, 2018
Time and location: 11:00am-12:00noon, Fretwell 315
Speaker: Dr. Yifan Cui, University of Pennsylvania

Title: Tree-based Survival Models and Precision Medicine

Abstract: In the first part, we develop a theoretical framework for survival tree and forest models. We first investigate the method from the aspect of splitting rules. We show that existing approaches lead to a potentially biased estimation of the within-node survival and cause non-optimal selection of the splitting rules. Based on this observation, we develop an adaptive concentration bound result which quantifies the variance component for survival forest models. Furthermore, we show with two specific examples how these concentration bounds, combined with properly designed splitting rules, yield consistency results. In the second part, we focus on one application of survival trees in precision medicine which estimates individualized treatment rules nonparametrically under right censoring. We extend the outcome weighted learning to right censored data without requiring either inverse probability of censoring weighting or semi-parametric modeling of the censoring and failure times. To accomplish this, we take advantage

of the tree-based approach to nonparametrically impute the survival time in two different ways. In simulation studies, our estimators demonstrate improved performance compared to existing methods. We also illustrate the proposed method on a phase III clinical trial of non-small cell lung cancer.

(Hosted by Dr. Yinghao Pan, UNC Charlotte)

Speaker #8:
Date: November 30, 2018
Time and location: 11:00am-12:00noon, Fretwell 315
Speaker: Dr. Fei Gao, University of Washington

Title:

Abstract:

(Hosted by Dr. Qinging Zhou, UNC Charlotte)