Statistical Sciences
UNIVERSITY OF TORONTO

SEMINAR SERIES

When:	**Thursday, April 5, 2018**
Time:	**3:30 – 4:30 pm**
	Refreshments at 3:15 pm
Where:	**Sidney Smith Hall Rm 1069**
Speaker:	**LINGLONG KONG, University of Alberta**
Host:	**Dehan Kong**

Empirical likelihood and robust regression in diffusion tensor imaging data analysis

With modern technology development, functional responses are observed frequently in various scientific fields including neuroimaging data analysis. Empirical likelihood as a nonparametric data-driven technique has become an important statistical inference methodology.

In this paper, motivated by diffusion tensor imaging (DTI) data we propose three generalized empirical likelihood-based methods that accommodate within-curve dependence on the varying coefficient model with functional responses and embed a robust regression idea. To avoid the loss of efficiency in statistical inference, we take into consideration within-curve variance-covariance matrix in the subjectwise and elementwise empirical likelihood methods. We develop several statistical inference procedures for maximum empirical likelihood estimators (MELEs) and empirical log likelihood (ELL) ratio functions, and systematically study their asymptotic properties. We first establish the weak convergence of the MELEs and the ELL ratio processes, and derived a nonparametric version of the Wilks theorem for the limiting distributions of the ELLs at any designed point.

We propose a global test for linear hypotheses of varying coefficient functions and construct simultaneous confidence bands for each individual effect curve based on MELEs, and construct simultaneous confidence regions for varying coefficient functions based on ELL ratios. A Monte Carlo simulation is conducted to examine the finite-sample performance of the proposed procedures. Finally, we illustrate the estimation and inference procedures on MELEs of varying coefficient model to a diffusion tensor imaging data from Alzheimer's Disease Neuroimaging Initiative (ADNI) study. Joint work with Xingcai Zhou (Nanjing Audit University), Rohana Karunamuni and Adam Kashlak (University of Alberta).