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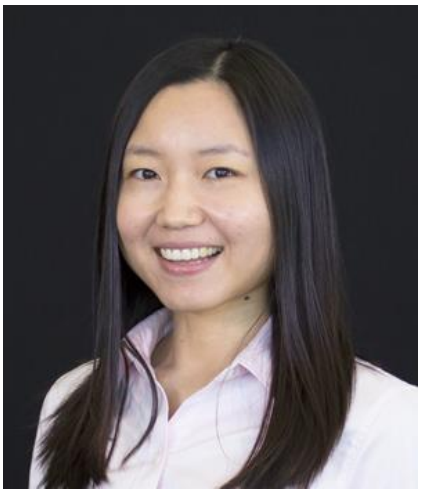

DR. NA ZOU
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Department of Industrial & Systems Engineering
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Date: Friday, Feb 9, 2018

Time: 1 - 1:50 pm

Location: D3 W122

Spatial-temporal Transfer Learning: From Brain Diseases to Networks

Abstract: Data analytics has been widely used in understanding complex engineering systems, such as healthcare, social and manufacturing systems, across spatial and temporal domains. How to utilize the abundant information in the source domains, which are related to but not exactly the same as target domains, is a challenging problem. Transfer learning could be utilized to integrate the knowledge of source domains to better understand the target domain qualitatively and quantitatively. In this talk, I will first present a spatial transfer learning framework to predict Parkinson's Disease severity, which is a common neurodegenerative brain disease, across patients. An empirical Bayes transfer learning (ebTL) model is developed that accounts for patient heterogeneity and meanwhile allows for knowledge transfer between the modeling processes of different patients. ebTL is also featured for prediction uncertainty quantification and automatic hyper-parameters estimation. In addition, the data may evolve naturally over time or change dramatically due to assignable causes in the form of networks, such as brain networks. Thus, I will present a temporal transfer learning framework to monitor and identify the onset of brain diseases in dynamic brain networks. This work integrates network state space model and statistical process control to characterize the natural evolution and facilitate detection of various changes, which may relate to many brain diseases.

Biography: Na Zou is an instructional assistant professor in the Department of Industrial & Systems Engineering at Texas A&M University. She obtained her Ph.D. in Industrial Engineering from Arizona State University. Her research focuses on data-driven modeling and system-level decision making for challenging problems raised by large-scale, dynamic and networked data in different applications, such as healthcare, brain science and social network analysis. Specifically, her interests include integrating Bayesian framework and sparse learning modeling for transfer learning, modeling of dynamic and multi-dimensional data for network evolution and change detection. She is also interested in brain informatics to model brain connectivity for cognitive performance assessment, biomarker identification and disease diagnosis. She has several papers published in top journals such as Technometrics, IISE Transactions and Journal of Cerebral Blood Flow & Metabolism. She got several awards including graduate college block grant award from ASU, the Irv Kaufman Award from IEEE foundation and TEES travel grant from Texas A&M University. Her research is also funded by Alibaba Innovative Research.