Data Science Seminar

Hosted by Department of Mathematical Sciences

- Date: Tuesday, December 7, 2021
- Time: 12:00pm – 1:00pm
- Room: ZOOM
- Speaker: Dr. Annie Qu (University of California Irvine)
- Title: Correlation Tensor Decomposition and Its Application in Spatial Imaging Data

Abstract

Multi-dimensional tensor data has gained increasing attention in recent years, especially in biomedical imaging analyses. However, most existing tensor models are only based on the mean information of imaging pixels. Motivated by multimodal optical imaging data in a breast cancer study, we develop a new tensor learning approach to utilize pixel-wise correlation information, which is represented through the higher-order correlation tensor. We propose a novel semi-symmetric correlation tensor decomposition method that effectively captures the informative spatial patterns of pixel-wise correlations to facilitate cancer diagnosis. We establish the theoretical properties for recovering structure and for classification consistency. In addition, we develop an efficient algorithm to achieve computational scalability. Our simulation studies and an application on breast cancer imaging data all indicate that the proposed method outperforms other competing methods in terms of pattern recognition and prediction accuracy.

Biography of the speaker: Dr. Annie Qu is a Chancellor’s Professor of Statistics at the University of California Irvine. Before joining UC Irvine, she was Data Science Founder Professor of Statistics and the Director of the Illinois Statistics Office at the University of Illinois at Urbana-Champaign. She was awarded as the Brad and Karen Smith Professorial Scholar by the College of LAS at UIUC, a recipient of the NSF Career award in 2004-2009, and is a Fellow of the Institute of Mathematical Statistics and a Fellow of the American Statistical Association. She obtained her Ph.D. from the Department of Statistics at the Pennsylvania State University. Dr. Qu's research focuses on solving fundamental issues regarding structured and unstructured large-scale data, and developing cutting-edge statistical methods and theory in machine learning and algorithms on personalized medicine, text mining, recommender systems, medical imaging data, and network data analyses for complex heterogeneous data. The newly developed methods are able to extract essential and relevant information from large volume high-dimensional data. Her research has impacts in many fields such as biomedical studies, genomic research, public health research, social and political sciences.

This talk is endorsed by the Data Science Transdisciplinary Area of Excellence and the Center for Imaging, Acoustics, and Perception Science at Binghamton University.