

181 Longwood Avenue
Boston, Massachusetts 02115-5804

Department of Medicine
Channing Division of Network Medicine

Channing Microbiome Seminar

March 22 (Friday), 2024, 9AM (ET)

MCP 5th-floor large conference room & Zoom:

<https://us02web.zoom.us/j/81070959105?pwd=RFJNd3dSZmR6dXJZNjJiYVVzQ3NEQT09>

Meeting ID: 810 7095 9105; Passcode: 984617



Pixu Shi, PhD

Department of Biostatistics and Bioinformatics
Duke University

Statistical Analysis of Longitudinal Microbiome Data

Complex dynamics of microbial communities underlie their essential roles in health and disease, but our understanding of these dynamics remains incomplete. To bridge this gap, longitudinal microbiome data are being rapidly generated, yet their power is limited by technical challenges in design and analysis, such as varying temporal sampling, noisy temporal patterns, complex correlation structures over feature and time, and high dimensionality. In this talk, we will first present TEMPoral TENSOR Decomposition (TEMPTED), the only time-informed dimensionality reduction method that extracts the underlying microbial dynamics while overcoming the statistical challenges posed by this type of data. TEMPTED extracts major temporal dynamics and key contributing features, facilitates beta-diversity analysis at both sample and subject levels, and promotes reproducibility by enabling the transfer of the learned low-dimensional representation from training data to unseen test data. We will then present PairMN, a taxonomic tree based paired two-sample testing method for comparison of microbiome samples before and after intervention in microbiome studies. PairMN models count data directly with minimal assumptions on the distribution of the data, allows identification of differential abundance at multiple taxonomic levels and overall simultaneously, and achieves superior performance over existing methods.

Bio: Pixu Shi is an assistant professor in the Department of Biostatistics and Bioinformatics at Duke University and a member of the Duke Microbiome Center. She obtained her PhD in biostatistics from University of Pennsylvania, MS in statistics from Rutgers University, and BS in statistics from Peking University. Her research centers around the statistical challenges arising in modern microbiome research and multi-omic studies. She has developed several statistical methods for the analysis of microbiome data and genomic data. Her current research interests include longitudinal microbiome analysis and integration of multi-omic data.

Hosted by Yang-Yu Liu