



SIAM Conference on Applied Linear Algebra (SIAM-ALA18) • 4-8 May 2018 • Hong Kong Baptist University

MS06 Discovery from Data • 5-7 May 2018 • Tsang Chan Sik Yue Auditorium, 2/F Academic and Administration Building
Sri Priya Ponnappalli,¹ Katherine A. Aiello,¹ Orly Alter¹
¹University of Utah

The number of large-scale high-dimensional datasets recording different aspects of interrelated phenomena is growing, accompanied by a need for mathematical frameworks for discovery from data arranged in structures more complex than that of a single matrix. In the three sessions of this minisymposium we will present recent studies demonstrating “Discovery from Data,” in “I: Systems Biology,” and “II: Personalized Medicine,” by developing and using the mathematics of “III: Tensors.”

I: Systems Biology • 5 May 2018

- 10:45am–11:15am Patterns of DNA Copy-Number Alterations Revealed by the GSVD and Tensor GSVD Encode for Cell Transformation and Predict Survival and Response to Platinum in Adenocarcinomas
Orly Alter,¹ Katherine A. Aiello,¹ Cody A. Maughan,¹ Sri Priya Ponnappalli,¹ Heidi A. Hanson¹
¹University of Utah
- 11:15am–11:45am Systems Biology of Drug Resistance in Cancer
Antti Hakkinen,¹ Sampsa Hautaniemi¹
¹University of Helsinki
- 11:45am–12:15pm Single-Cell Entropy for Estimating Differentiation Potency in Waddington’s Epigenetic Landscape
Andrew E. Teschendorff¹
¹Shanghai CAS-MPG Computational Biology Institute and University College London
- 12:15pm–12:45pm Dimension Reduction for the Integrative Analysis of Multilevel Omics Data
Gerhard G. Thallinger,¹ Bettina Pucher,¹ Natascha Fladischer,¹ Oana A. Zeleznik²
¹Graz University of Technology, ²Harvard Medical School

II: Personalized Medicine • 6 May 2018

- 1:45pm– 2:15pm Mathematically Universal and Biologically Consistent Astrocytoma Genotype Encodes for Transformation and Predicts Survival Phenotype
Sri Priya Ponnappalli,¹ Katherine A. Aiello,¹ Orly Alter¹
¹University of Utah
- 2:15pm– 2:45pm Statistical Methods for Integrative Clustering Analysis of Multi-Omics Data
Qianxing Mo¹
¹Baylor College of Medicine
- 2:45pm– 3:15pm Structured Convex Optimization Method for Orthogonal Nonnegative Matrix Factorization with Applications to Gene Expression Data
Junjun Pan,¹ Michael Ng¹
¹Hong Kong Baptist University
- 3:15pm– 3:45pm Mining the ECG Using Low Rank Tensor Approximations with Applications in Cardiac Monitoring
Sabine Van Huffel¹
¹KU Leuven

III: Tensors • 7 May 2018

- 10:35am–11:05am Tensor Higher-Order GSVD: A Comparative Spectral Decomposition of Multiple Column-Matched but Row-Independent Large-Scale High-Dimensional Datasets
Sri Priya Ponnappalli,¹ Katherine A. Aiello,¹ Orly Alter¹
¹University of Utah
- 11:05am–11:35am The GSVD: Where are the Ellipses?
Alan Edelman,¹ Yuyang Wang²
¹Massachusetts Institute of Technology, ²Amazon AI
- 11:35am–12:05pm Tensor Convolutional Neural Networks (tCNN): Improved Featurization Using High-Dimensional Frameworks
Elizabeth Newman,¹ Lior Horesh,² Haim Avron,³ Misha E. Kilmer¹
¹Tufts University, ²IBM TJ Watson Research Center, ³Tel Aviv University
- 12:05pm–12:35pm Three-way Generalized Canonical Correlation Analysis
Arthur Tenenhaus,¹ Arnaud Gloaguen,² Laurent Le Brusquet,² Cathy Philippe,² Vincent Frouin²
¹CentraleSupélec, ²NeuroSpin