Sunday
May 6

MS16
Machine Learning: Theory and Practice
10:45 AM - 12:45 PM
WLB204

Machine learning is experiencing a period of rising impact on many areas of the sciences and engineering such as imaging, advertising, genetics, robotics, and speech recognition. On the other hand, it has deep roots in various aspects in mathematics, from optimization, approximation theory, to statistics, etc. This mini-symposium aims to bring together researchers in different aspects of machine learning for discussions on the state-of-the-art developments in theory and practice. The mini-symposium has a total of four talks, which are about fast algorithms solving linear inequalities, genetic data analysis, theory and practice of deep learning.

Organizers:
Haixia Liu, Department of Mathematics, The Hong Kong University of Science and Technology, mahxliu@ust.hk
Yuan Yao, Department of Mathematics, The Hong Kong University of Science and Technology, yuany@ust.hk

10:45-11:15 Approximation of Inconsistent Systems of Linear Inequalities: Fast Solvers and Applications
Mila Nikolova, CMLA, CNRS, ENS Cachan, University Paris-Saclay

11:15-11:45 Theory of Distributed Learning
Ding-Xuan Zhou, City University of Hong Kong

11:45-12:15 Scattering Transform for the Analysis and Classification of Art Images
Roberto Leonarduzzi, Lab de Physique, Ecole Normale Superieure de Lyon, CNRS

TALK CANCELED
~~**12:15-12:45 TBA**~~
~~*Can Yang, The Hong Kong University of Science and Technology*~~

NEW TALK
12:15-12:45 REMI: Regression with Marginal Information and Its Application in Genome-Wide Association Studies
Yuling Jiao, Zhongnan University of Economics and Law

Sunday
May 6

MS06 Part II
Discovery from Data
1:45 PM - 3:45 PM
AAB201

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."

Organizers:
Sri Priya Ponnapalli, Scientific Computing and Imaging Institute, University of Utah,
priya@sci.utah.edu
Katherine A. Aiello, Scientific Computing and Imaging Institute, University of Utah,
kaiello@sci.utah.edu
Orly Alter, Scientific Computing and Imaging Institute, University of Utah, orly@sci.utah.edu

UPDATED INFORMATION
1:45-2:15 Mathematically Universal and Biologically Consistent Astrocytoma Genotype Encodes for Transformation and Predicts Survival Phenotype
Sri Priya Ponnapalli, University of Utah

2:15-2:45 Statistical Methods for Integrative Clustering Analysis of Multi-Omics Data
Qianxing Mo, Baylor College of Medicine

2:45-3:15 Structured Convex Optimization Method for Orthogonal Nonnegative Matrix Factorization with Applications to Gene Expression Data
Junjun Pan, Hong Kong Baptist University

3:15-3:45 Mining the ECG

Using Low Rank Tensor Approximations with Applications in Cardiac Monitoring
Sabine Van Huffel, KU Leuven

Sunday May 6

MS30 Part II

Rank Structured Methods for Challenging Numerical Computations
4:15 PM - 6:15 PM
WLB204

Rank-structured methods have demonstrated significant advantages in improving the efficiency and reliability of some large-scale computations and engineering simulations. These methods extend the fundamental ideas of multipole and panel-clustering methods to general non-local solution operators. While there exist various more or less closely related methods, the unifying aim of these methods is to explore efficient structured low-rank approximations, especially those exhibiting hierarchical or nested forms. These help the methods to achieve nearly linear complexity. In this minisymposium, we aim to present and exchange recent new developments on rank structured methods for some challenging numerical problems such as high frequencies, ill conditioning, eigenvalue perturbation, and stability. Studies of structures, algorithm design, and accuracy control will be discussed. The minisymposium will include experts working on a broad range of rank structured methods.

Organizers:
Sabine Le Borne, Institute of Mathematics, Hamburg University of Technology, leborne@tuhh.de
Jianlin Xia, Department of Mathematics, Purdue University, xiaj@math.purdue.edu

UPDATED INFORMATION

4:15-4:45 Analytical Compression via Proxy Point Selection and Contour Integration
Jianlin Xia, Purdue University

4:45-5:15 The Perfect Shift and the Fast Computation of Roots of Polynomials
Nicola Mastronardi, Istituto per le Applicazioni del Calcolo "Mauro Picone"

5:15-5:45 Structured Matrices in Polynomial System Solving
Simon Telen, KU Leuven

5:45-6:15 Preserving Positive Definiteness in HSS Approximation and Its Application in Preconditioning
Xin Xing, Georgia Tech

Sunday
May 6

MS34 Part II
Recent Applications of Rank Structures in Matrix Analysis
4:15 PM - 6:15 PM
WLB109

The development of applied science and engineering raised attention on large scale problems, generating an increasing demand of computational effort. In many practical situations, the only way to satisfy this request is to exploit obvious and hidden structures in the data. In this context, rank structures constitute a powerful tool for reaching this goal. Many real-world problems are analyzed by means of algebraic techniques that exploit low-rank structures: fast multipole methods, discretization of PDEs and integral equations, efficient solution of matrix equations, and computation of matrix functions.
The representation and the theoretical analysis of these algebraic objects is of fundamental importance to devise fast algorithms. Several representations have been proposed in the literature: $\mathcal{H}$, $\mathcal{H}^2$, and HSS matrices, quasiseparable and semiseparable structures. The design of fast methods relying on these representations is currently an active branch of numerical linear algebra. The talks in this minisymposium present some recent advances in this field.

Organizers:
Thomas Mach, Department of Mathematics, School of Science and Technology Nazarbayev University,
thomas.mach@nu.edu.kz
Stefano Massei, EPF Lausanne,
stefano.massei@epfl.ch
Leonardo Robol, ISTI, Area della ricerca CNR, Pisa,
leonardo.robol@isti.cnr.it

UPDATED INFORMATION
4:15-4:45 The Exact Fine Structure of the Inverse of Discrete Elliptic Linear Operators
Shiv Chandrasekaran, UC Santa Barbara

4:45-5:15 Fast Direct Solvers for Boundary Value Problems on Globally Evolving Geometries
Adrianna Gillman, CAAM, Rice University

5:15-5:45 Matrix Aspects of Fast Multipole Method
Xiaofeng Ou, Department of Mathematics, Purdue University

5:45-6:15 Adaptive Cross Approximation for Ill-Posed Problems
Thomas Mach, Nazarbayev University