香港浸會大學
HONG KONG BAPTIST UNIVERSITY

Organized by: Department of Mathematics

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Sponsored by: Hong Kong Society for Industrial and Applied Mathematics

Distinguished Lecture Series

Graphical Models in Machine Learning, Networks, and Uncertainty Quantification

Professor Andrea L. Bertozzi

Distinguished Professor of Mathematics and Mechanical and Aerospace Engineering, UCLA
Betsy Wood Knapp Chair for Innovation and Creativity, UCLA
Director of Applied Mathematics, UCLA
Member of California NanoSystems Institute, UCLA

Ralph E. Kleinman Prize, SIAM (2019)
Member of the US National Academy of Sciences (2018)
Simons Math + X Investigator Award (2017)
Fellow of the American Physical Society (2016)
Highly Cited Researcher in Mathematics, Thomson-Reuters/Clarivate Analytics (2015 and 2016)
Fellow of the American Mathematical Society (2013)
SIAM Fellow (2010)
Member of the American Academy of Arts and Sciences (2010)
AWM-SIAM Sonia Kovalevsky Prize Lecture (2009)
Presidential Early Career Award for Scientists and Engineers (1996)
Sloan Research Fellowship (1995)

Date: 30 September 2020 (Wednesday)

Time: 10:00-11:00 a.m. GMT+8 (Hong Kong Time)

Venue: Online via Zoom (Meeting ID: 965 8739 2106)

Abstract

This talk is an overview of recent work graph models for classification using similarity graphs, for community detection in networks, and for the subgraph isomorphism problem in multichannel networks. The equivalence between the graph mincut problem and total variation minimization on the graph allows one to cast graph-cut variational problems in the language of total variation minimization, thus creating a parallel between low dimensional data science problems in Euclidean space (e.g. image segmentation) and high dimensional clustering. Semi-supervised learning with a small amount of training data can be carried out in this framework with diverse applications ranging from hyperspectral pixel classification to identifying motion in video data. It can also be extended to the context of uncertainty quantification with Gaussian noise models. The problem of community detection in networks also has a graph-cut structure and algorithms are presented for the use of threshold dynamics for modularity optimization. With efficient methods, this allows for the use of network modularity for unsupervised machine learning problems with unknown number of classes.

✦✦✦ All are welcome ✦✦✦

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