MATH-IMS Joint Applied Mathematics Colloquium Series
The Chinese University of Hong Kong

This MATH-IMS Joint Colloquium Series is organized by Center for Mathematical Artificial Intelligence (CMAI), under Department of Mathematics and Institute of Mathematical Sciences (IMS) at The Chinese University of Hong Kong. The colloquium series focuses on mathematics and applications of artificial intelligence, big data and related topics.

Date: August 13, 2021 (Friday)
Time: 10:00-11:00 (Hong Kong Time)
Zoom Link: https://cuhk.zoom.us/j/92775210812

Geometric Graph-Based Methods for High Dimensional Data

Speaker: Andrea Bertozzi
University of California at Los Angeles (UCLA)

Abstract: High dimensional data can be organized on a similarity graph - an undirected graph with edge weights that measure the similarity between data assigned to nodes. We consider problems in semi-supervised and unsupervised machine learning that are formulated as penalized graph cut problems. There are a wide range of problems including Cheeger cuts, modularity optimization on networks, and semi-supervised learning. We show a parallel between these modern problems and classical minimal surface problems in Euclidean space. This analogy allows us to develop a suite of new algorithms for machine learning that are both very fast and highly accurate. These are analogues of well-known pseudo-spectral methods for partial differential equations.

Bio: Prof. Bertozzi received her Ph.D in mathematics from Princeton University in 1991. Prior to joining UCLA in 2003, she was an L. E. Dickson Instructor at the University of Chicago, and then Professor of Mathematics and Physics at Duke University. She spent one year at Argonne National Laboratory as the Maria Goeppert-Mayer Distinguished Scholar. She is currently a faculty member of the University of California, Los Angeles, as a Distinguished Professor of Mathematics and Mechanical and Aerospace Engineering and Director of Applied Mathematics. Prof. Bertozzi has contributed to many areas of applied mathematics including the theory of swarming behavior, aggregation equations and their solution in general dimension, the theory of particle-laden flows in liquids with free surfaces, data analysis/image analysis at the micro and nano scales, and the mathematics of crime. Prof. Bertozzi has received numerous awards and recognitions. In 1996, she received the Presidential Early Career Award for Scientists and Engineers from the U.S. Office of Naval Research. In 2010, she was elected as a SIAM fellow and the American Academy of Arts and Sciences fellow. In 2013 she was named the Betsy Wood Knapp Chair for Innovation and Creativity at UCLA. In 2016 she became a Fellow of the American Physical Society. In 2015 and 2016 she was named a Thomson-Reuters/Clarivate Analytics 'highly cited' researcher. In 2017 she became a Simons Investigator. In 2018 she was elected to the US National Academy of Sciences. In 2019 she was awarded SIAM's Kleinman Prize.