Matrix Computations & Scientific Computing Seminar

Organizer: James Demmel & Ming Gu

Wednesday, 12:10–1:00pm, 380 Soda

Oct. 12 **Michael W. Mahoney**, Stanford University

Linear Algebra and Machine Learning of Large Informatics Graphs

A Very large informatics graphs such as large social and information networks typically have properties that render many popular machine learning and data analysis tools largely inappropriate. While this is problematic for these applications, it also suggests that these graphs may be useful as a test case for the development of new algorithmic tools that may then be applicable much more generally. Many of the popular machine learning and data analysis tools rely on linear algebra, and they are typically used by calling traditional numerical linear algebra code as a black box. After briefly reviewing some of the structural properties of large social and information networks that are responsible for the inapplicability of traditional linear algebra and machine learning tools, I will describe several examples of "new linear algebra" and "new machine learning" that arise from the analysis of such informatics graphs. These new directions involve looking "inside" the black box, and they place very different demands on the linear algebra than are traditionally placed by numerical, scientific computing, and small-scale machine learning applications.

Bio:

Michael Mahoney is at Stanford University. His research interests focus on theoretical and applied aspects of algorithms for large-scale data problems in scientific and Internet applications. Currently, he is working on geometric network analysis; developing approximate computation and regularization methods for large informatics graphs; and applications to community detection, clustering, and information dynamics in large social and information networks. In the past, he has worked on randomized matrix algorithms and applications in genetics and medical imaging. He has been a faculty member at Yale University and a researcher at Yahoo, and his PhD was is computational statistical mechanics at Yale University.