

Matrix Computations & Scientific Computing Seminar

Organizer: James Demmel & Ming Gu

Wednesday, 11:00am–12:00pm, 380 Soda

Feb. 2 **Dr. David Gleich**, Sandia National Lab., Livermore
Fast Katz and Commuters - Quadrature Rules and Sparse Linear Solvers for Link Prediction Heuristics

Motivated by social network data mining problems such as link prediction and collaborative filtering, significant research effort has been devoted to computing topological measures including the Katz score and the commute time. Existing approaches approximate all pairwise relationships simultaneously. We are interested in computing the score for a single pair of nodes; the top-k nodes with the best scores from a given source node.

For the pairwise problem, we introduce an iterative algorithm that computes upper and lower bounds for the measures we seek. This algorithm exploits a relationship between the Lanczos process and a quadrature rule.

For the top-k problem, we propose an algorithm that only accesses a small portion of the graph, similar to algorithms used in personalized PageRank computing. To test scalability and accuracy, we experiment with three real-world networks and find that our algorithms run in milliseconds to seconds without any preprocessing.