THE LAPLACIAN MATRICES OF GRAPHS: ALGORITHMS AND APPLICATIONS

A Talk by Daniel A. Spielman, Henry Ford II professor of Computer Science and Statistics and Data Science at Yale University

March 20, 2018 5:00-6:00pm
Askwith Hall
13 Appian Way, Cambridge, MA

The Laplacian matrices of graphs arise in many fields, including Machine Learning, Computer Vision, Optimization, Computational Science, and of course Network Analysis. We will explain what these matrices are and why they appear in so many applications.

We then survey recent ideas that allow us to solve systems of linear equations in Laplacian matrices in nearly linear time, emphasizing the utility of graph sparsification---the approximation of a graph by a sparser one---and a recent algorithm of Kyng and Sachdeva that uses random sampling to accelerate Gaussian Elimination.

Daniel Alan Spielman received his B.A. in Mathematics and Computer Science from Yale in 1992, and his Ph.D in Applied Mathematics from M.I.T. in 1995. He spent a year as a NSF Mathematical Sciences Postdoc in the Computer Science Department at U.C. Berkeley, and then taught in the Applied Mathematics Department at M.I.T. until 2005. Since 2006, he has been a Professor at Yale University. He is presently the Henry Ford II Professor of Computer Science, Statistics and Data Science, Mathematics, and Applied Mathematics.

He has received many awards, including the 1995 ACM Doctoral Dissertation Award, the 2002 IEEE Information Theory Paper Award, the 2008 and 2015 Godel Prize, the 2009 Fulkerson Prize, the 2010 Nevanlinna Prize, the 2014 Polya Prize, an inaugural Simons Investigator Award, and a MacArthur Fellowship. He is a Fellow of the Association for Computing Machinery and a member of the National Academy of Sciences and the Connecticut Academy of Science and Engineering. His main research interests include the design and analysis of algorithms, network science, machine learning, digital communications and scientific computing.

This talk is part of the Program on Combinatorics and Complexity hosted by the Center of Mathematical Sciences and Applications during AY2017-18. The program will feature workshops, seminars, and additional public talks throughout the year. For more information please visit http://cmsa. fas.harvard.edu/combinatorics/ or contact Sarah LaBauve at slabauve@ math.harvard.edu.
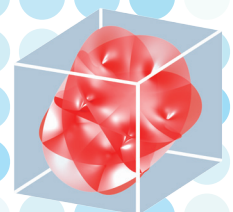
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