9th Annual Women in Mathematics Day

Jean E. Rubin Memorial Lecture

Wednesday, October 7, 2015
4:30 p.m.
LWSN 1142

Refreshments will be served at 4:00 p.m. outside Lawson 1142

Recent Developments in the Sparse Fourier Transform

Abstract

The Discrete Fourier Transform (DFT) is a fundamental component of numerous computational techniques in signal processing and scientific computing. The most popular means of computing the DFT is the Fast Fourier Transform (FFT). However, with the emergence of big data problems, in which the size of the processed data sets can easily exceed terabytes, the "Fast" in Fast Fourier Transform is often no longer fast enough. In addition, in many big data applications it is hard ot aquire a sufficient amount of data in order to compute the desired Fourier Transform in the first place. The Sparse Fourier Transform (SFT) addresses the big data setting by computing a compressed Fourier transform using only a subset of the input data, in time sub-linear in the data set size. The goal of this talk is to survey these recent developements, to explain the basic techniques with examples and applications in big data, to demonstrate trade-offs in empirical performance of the algorithms, and to discuss the connection between the SFT and other techniques for massive data analysis such as streaming algorithms and compressive sensing.

Speaker:

Anna Gilbert
University of Michigan
Herman H. Goldstine Collegiate Professor

Anna Gilbert received an S.B. degree from the University of Chicago and a Ph.D. from Princeton University, both in mathematics. In 1997, she was a postdoctoral fellow at Yale University and AT&T Labs-Research. From 1998 to 2004, she was a member of the technical staff at AT&T Labs-Research in Florham Park, NJ. Since then she has been at the Department of Mathematics at the University of Michigan, where she is now the Herman H. Goldstine Collegiate Professor. She has received several awards, including the Sloan Research Fellowship (2006), and NSF CAREER award (2006), the National Academy of Sciences Award for Initiatives in Research (2008), the Association of COmputing Machinery (ACM) Douglas Engelbart Best Paper award (2008), the EURASIP Signal Processing Best Paper award (2010), a National Academy of Sciences Kavli Fellow (2012), and the SIAM Ralph E. Kleinman Prize (2013).

Her research interests include analysis, probability, networking, and algorithms. She is especially interested in randomized algorithms with applications to harmonic analysis, signal and image processing, networking and massive datasets.

Jean E. Rubin was Professor of Mathematics at Purdue University from 1967 until her death in 2002. She earned a B.S. from Queen's College in New York City in 1948, an M.A. from Columbia in 1949, and a Ph.D. from Stanford in 1955. She taught at the University of Oregon and Michigan State before coming to Purdue. Professor Rubin was the author of more than 40 papers and five books in set theory and questions related to the axiom of choice.