



CLAREMONT CENTER
for MATHEMATICAL SCIENCES

C C M S C O L L O Q U I U M

LESS IS MORE:

ROBUST IMAGE RECOVERY VIA TOTAL VARIATION MINIMIZATION

by

Deanna Needell

Claremont McKenna College

Abstract: Compressed sensing is a new field which shows that reliable, nonadaptive data acquisition, with far fewer measurements than traditionally assumed, is possible. In this talk we will introduce the fundamental ideas behind compressed sensing, focusing on imaging techniques, as well as new results for imaging via total variation. Discrete images, composed of patches of slowly-varying pixel values, have sparse or compressible wavelet representations which allow the techniques from compressed sensing such as L1-minimization to be utilized. In addition, such images also have sparse or compressible discrete derivatives which motivate the use of total variation minimization for image reconstruction. Although image compression is a primary motivation for compressed sensing, stability results for total-variation minimization do not follow directly from the standard theory. In this talk, we present provable near-optimal reconstruction guarantees for total-variation minimization using properties of the bivariate Haar transform along with numerical studies demonstrating its advantages.

About the speaker: Deanna Needell is an Assistant Professor of Mathematics at Claremont McKenna College. She received her B.S. (as class valedictorian) in Mathematics and Computer Science from the University of Nevada at Reno in 2005 and her Ph.D. in Mathematics from the University of California at Davis in 2009. She has held an NSF VIGRE postdoctoral appointment at Stanford University prior to arriving at CMC in the Fall of 2011. Deanna's research interests are in compressed sensing, geometric functional analysis, computational mathematics, scientific computing, statistics, probability, and applications to computer science. Her work has won a ScienceWatch Fast-Breaking Paper Award and has passed the official Communications of the ACM paper selection.

Wednesday, April 11, 2012, at 4:15pm

Freeburg Forum (Kravis Center, LC 62), Claremont McKenna College

Refreshments at 3:45 p.m. in Freeburg Forum Courtyard & wine and cheese after the talk in CMC Math Commons Room (Adams 208)

*The dinner will be hosted by Prof. Mike O'Neill.
Please contact Prof. O'Neill if you are interested in attending the dinner.*