

Compressing Data Signals and Information



Deanna Needell

Assistant Professor, Mathematical Sciences

CURRENT RESEARCH

Storing and recovering large streams of data efficiently and with high quality

The rapid advancement of technology has resulted in an influx of large-scale data (i.e., signals) and massive data applications. With so much information emerging out there, a system to obtain and recover signals more quickly and efficiently is desperately needed. In order to make this possible, much work has been done in Compressive Signal Processing (CSP), but there is still a disconnect between the theoretical work in CSP and the use of CSP in practical settings. Dr. Deanna Needell, a Mathematical Sciences professor of Claremont McKenna College, aims to bridge this gap by providing compressed sensing (CS) methods and analysis that apply to real-world signals and settings.

Compressed sensing is significant because it skips the process of measuring the entirety of the signal as was traditionally done in normal signal processing and acquires compression automatically. For example, instead of measuring every pixel in a picture taken by a digital camera in order to process it into a piece of data, compressed sensing would reconstruct high-resolution images from fewer samples, or pixels, taken in already compressed form. Therefore, the social implications of compressed sensing methods are many. Super-resolution, for one, is critical in many applications ranging from detecting objects in military settings to enhancing medical imaging used for diagnosis, treatment, and understanding of serious diseases. Analysis methods also have numerous applications, ranging from image and data compression to radar and sonar. Moreover, in telecommunication, the use of CS techniques leads to faster communication, less data storage, and therefore less cost and energy consumption. Adaptive sensing used in medical imaging could...

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AFFILIATION



Claremont McKenna College

EDUCATION

- Ph.D., in Mathematics, 2009, University of California, Davis
- M.A., in Mathematics, 2005, University of California, Davis
- B.S., in Mathematics, Computer Science, 2003, University of Nevada, Reno

AWARDS

- NSF Career Award #1348721, 2014
- Alfred P. Sloan Research Fellowship, 2014
- ICERM Research Fellowship, 2014
- University of Nevada Alumni of the Year Award, 2014
- ACHA Top 1 Hottest Article, 2013

RESEARCH AREAS

Technology, Computational Sciences / Mathematics, IOT, Devices, Data, Women in STEM

FUNDING REQUEST

Dr. Deanna Needell's research is an interdisciplinary project that calls for talented individuals in mathematics, computer science, and other sectors of engineering. Your contributions will support her diverse team of undergraduate, graduate, and postdoc students as well as accommodate necessary travels for collaboration, software, and computing. Technological innovations often come at a cost, but your donations will enable small and big breakthroughs that will be key to facilitating big data solutions.