Michael Wakin
Applied and Computational Mathematics, California Institute of Technology
wakin@acm.caltech.edu

Abstract

Concise models for signal and image structure are essential to developing efficient algorithms for acquiring and processing data. Sparse signal representations, for example, are at the core of the emerging theory of compressive sensing (CS), in which a signal having some sparse representation can be recovered from a small number of nonadaptive (even random) linear measurements. In this talk we will overview the basic theory of CS while emphasizing applications in imaging. We will also discuss generalizations of sparse representations to include other concise models for signal structure, in particular where the signal families live along low-dimensional manifold-like structures within the ambient high-dimensional signal space. As we will discuss, the structure of such manifolds remains well preserved (with high probability) under random projection to a lower-dimensional space of suitable dimension, for reasons very similar to the arguments that underly CS. We will also discuss the implications of this fact, again in the context of CS and imaging.