

Abstract

Introduction to Compressive Sensing

Holger Rauhut (University of Bonn)

Compressive sensing is a recent area in mathematical signal processing that predicts that certain signals (vectors, functions) can be recovered from what was previously believed to be incomplete information. The key observation is that many real-world signals are sparse in the sense that they can be well-represented by an expansion with only a small number of non-zero terms. Sparse signals can be accurately reconstructed from a small number of linear measurements via efficient algorithms such as ℓ_1 -minimization. Remarkably, all known provably optimal measurement matrices in this context are random matrices. Of particular interest for applications are structured random matrices such as random partial Fourier matrices, or partial random circulant matrices. Applications of compressed sensing include imaging, analog to digital conversion, radar, statistics and more.

This course gives an introduction to compressive sensing with emphasis on probabilistic techniques for condition number estimates of random matrices.