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Sigma Delta quantization on wide-band signals

Abstract: Sigma Delta quantization has been known to work efficiently on low-frequency signals or on Gaussian samples of sparse signals, in the sense that the rate-distortion decreases quickly as the number of samples increases. Extending this result to the more practical spectrally sparse or wavelet domain sparse signals faces two issues. 1. the high-frequency components in the measurements cannot be well preserved by Sigma Delta quantization. 2. very little is known about the singular-vectors of the high order finite difference matrices which play a crucial role in the Sigma Delta analysis. In this talk, we will address these problems and subsequently prove the reconstruction guarantee under partial Fourier measurements and Haar basis. (This is joint work with Mark Iwen, Rayan Saab, and Wei-husan Yu).