

Beta duals of finite frames and near-optimal quantization of random measurements

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We introduce a new algorithm for the so-called "Analysis Problem" in quantization of finite frame representations which is near-optimal for most frames. More specifically, if L quantization levels per measurement are used to encode the unit ball in k dimensions via a Gaussian frame of m vectors, then with overwhelming probability the reconstruction error of this new algorithm is shown to be bounded by $\sqrt{k}L^{-(1-\eta)m/k}$ where η becomes arbitrarily small for sufficiently large k and m/k . The algorithm is based on the notion of beta duals of frames, and is part of a more general quantization framework called distributed noise-shaping. Additional features of the proposed algorithm include low computational cost and parallel implementability. Time permitting, we will also discuss extensions of this algorithm to compressive sampling as well as infinite dimensional frames. Joint work with Evan Chou.