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Abstract

In this letter, the 1-bit compressive sensing (CS) technology is utilized to recover joint sparse signal. In the context of multi-bits quantization, compared to the single measurement vector (SMV) case, the successful recovery rate can be significantly improved using multiple measurement vectors (MMV) model. Therefore, we introduce the MMV model for signal recovery from 1-bit sampling. Due to the amplitude information loss using 1-bit quantizing, a new sampling framework is proposed to estimate the ℓ_2-norm of each measurement vector for continuous-time signal, followed by the corresponding estimation algorithm 1-bit iterative hard thresholding (1-bit IHT). Then we develop the algorithm of binary IHT for MMV (M-BIHT) to recover joint sparse signal under uncertain noise. Compared to the 1-bit SMV model and multi-bits quantization MMV mode, the experimental results illustrate the recovery performance is improved greatly by the 1-bit MMV model.

Keywords: 1-bit compressive sampling, multiple measurement vector (MMV), signal recovery, compressive sensing

1. introduction

Sub-Nyquist sampling methodology is employed for signal reconstruction with the underlying assumption of signal sparsity [1, 2]. This compressive sampling (CS) technology enables the sparse signal recovery from a small number of linear measurements [3]. However, the measurements must be quantized in practice, which is an irreversible process with the quantization error being introduced. Furthermore, as investigated in [4], the analog front end is beholden to the quantizer with multi-bits per measurement. The process of quantization significantly limits the maximum speed of the analog to digital convertor (ADC) and leads to large power consumption.

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