Robust 1-Bit Compressed Sensing via Hinge Loss Minimization

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We study the problem of estimating a structured high-dimensional signal from noisy 1-bit Gaussian measurements. The recovery approach is based on a simple convex program which uses the hinge loss function as data fidelity term. While such a risk minimization strategy is typically applied in classification tasks, its capacity to estimate a specific signal vector is largely unexplored. Our error bounds show that stable and robust estimation of the ground truth vector can be achieved with the optimal reconstruction error decay rate in terms of the number of measurements. Moreover, we permit a wide class of structural assumptions on the ground truth signal in the sense that it can belong to an arbitrary bounded convex set.