Provable Phase retrieval via Mirror descent

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Abstract: We consider the problem of phase retrieval, recovering an $n-$dimensional real vector from the magnitude of its $m-$ linear measurements. This paper presents a new approach [1] allowing to lift the classical global Lipschitz continuity requirement through the use of a non-euclidean Bregman divergence, to solve the nonconvex formulation of the phase retrieval problem [2]. We show that when the measurements are sufficiently large, with high probability we can recover the desired vector up to a global sign change. Our set-up uses careful initialization via a spectral method and refines it using the mirror descent with a backtracking procedure to find the optimal solution. We show local linear convergence with a rate and step-size independent of the dimension. Our results are stated for two types of measurements: those drawn independently from the standard Gaussian, and those obtained by Coded Diffraction Patterns (CDP) for Randomized Fourier Transform.

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