Corrections

Correction for "On the Convergence of the Iterative Shrinkage/Thresholding Algorithm with a Weakly Convex Penalty"

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The proof of Lemma 8 in our recent paper [1] contains a mistake. In this note, we provide a correct proof for this lemma, without altering its statement.

The new proof makes use of the following Lemma.

Lemma 1: Suppose $f : \mathbb{R}^n \to \mathbb{R}$ is convex and differentiable. Then, ∇f is σ-Lipschitz continuous if and only if $\sigma \parallel x \parallel_2^2/2 - f(x)$ is convex.

Proof: This is the equivalence $(\mathrm{i}) \Leftrightarrow (\mathrm{vi})$ stated in [2, Theorem 18.15]. □

Let us now recall Lemma 8 of [1].

Lemma 2 [1, Lemma 8]: Suppose f is ρ-strongly convex, differentiable and its gradient is σ-Lipschitz continuous with $\sigma > \rho$. Also, let $g(x) = f(x) - \rho \parallel x \parallel_2^2/2$. Then, ∇g is $(\sigma - \rho)$-Lipschitz continuous.

Proof: We first note that, thanks to the strong convexity of f, g is convex.

Since ∇f is σ-Lipschitz continuous, it follows by Lemma 1 that $\sigma \parallel x \parallel_2^2/2 - f(x)$ is convex. But

$$\frac{\sigma}{2}\|x\|_2^2 - f(x) = \frac{\sigma - \rho}{2}\|x\|_2^2 - g(x). \tag{1}$$

Therefore, it follows again by Lemma 1 that ∇g is $(\sigma - \rho)$-Lipschitz continuous. □

Manuscript received May 24, 2016; accepted May 24, 2016. Date of current version June 1, 2016. The associate editor coordinating the review of this manuscript and approving it for publication was Prof. Sergios Theodoridis.

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Digital Object Identifier 10.1109/TSP.2016.2572978

References

[1] İ. Bayram, "On the convergence of the iterative shrinkage/thresholding algorithm with a weakly convex penalty," *IEEE Trans. Signal Process.*, vol. 64, no. 6, pp. 1597–1608, Mar. 2016.

[2] H. H. Bauschke and P. L. Combettes, *Convex Analysis and Monotone Operator Theory in Hilbert Spaces*. New York, NY, USA: Springer, 2011.