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Efficient reconstruction of compressively sensed images and videos using non-iterative method

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Abstract – Compressed sensing is widely applied for compression and reconstruction of images and videos by projecting the pixel values to smaller dimensional measurements. These measurements are reconstructed at the receiver using various reconstruction procedures. Greedy algorithms are often used for such recovery. These solve the least squares problem to find the best match with minimum error. This is a time consuming and complex process, giving rise to a trade-off between reconstruction performance and algorithmic performance. This work proposes a non-iterative method, viz., non-iterative pseudo inverse based recovery algorithm (NIPIRA), for reconstruction of compressively sensed images and videos with small complexity and time consumption, provided the reconstruction quality is maintained. NIPIRA gives a minimum PSNR of 32 dB for very few measurements ($M/N = 0.3125$) and accuracy of above 97%. There is more than 92% of decrease in elapsed time compared with other iterative algorithms. NIPIRA is tested for its performance with respect to many other objective measures as well. The complexity of NIPIRA is s times less than existing recovery algorithms.

Keywords: Compressed sensing, image and video reconstruction, non-iterative recovery, objective measures, elapsed time.

1. Introduction

Transmission of images and videos over wireless sensor networks (WSNs) require compression for effective usage of bandwidth and storage capacity. Development of an

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