

Projection Design for Compressive Source Separation using Mean Errors and Cross-Validation

Supplemental Material

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This document contains supplemental results on source separation from real image binary mixtures using the proposed method. The separation is carried out in the compressive regime with 12.5% measurements. For the set of experiments in this document, we compare the projections with the proposed method ($k = 0$) with projections based on the upper bound [1] and random projections. Each image consists of measurements taken on non-overlapping 16×16 blocks, as per the Block-SPC framework [2, 3]

$$\mathbf{y}_i = \Phi(\mathbf{x}_i + \lambda \mathbf{c}_i) + \eta_i \quad (1)$$

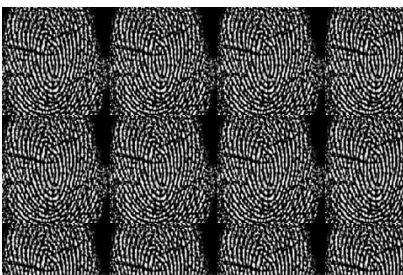
with 2% noise. Results on images from standardized datasets [4, 5] with $\lambda = 0.2$ are shown in figures 1–4, and with $\lambda = 0.1$ are shown in figures 5–8. For each figure: (a) source signal \mathbf{x} , (b) source signal \mathbf{c} , (c) binary mixture $\mathbf{x} + \lambda \mathbf{c}$, (d) $\hat{\mathbf{x}}$ with random projection, (e) $\hat{\mathbf{x}}$ with [1], and (f) $\hat{\mathbf{x}}$ with proposed scheme.

References

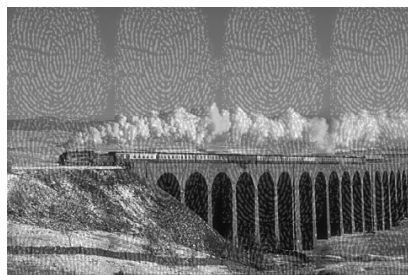
- [1] S. Jain, A. Soni, and J. D. Haupt, “Compressive measurement designs for estimating structured signals in structured clutter: A Bayesian Experimental Design approach,” in *Proc. Asilomar Conf. SSC*, 2013.
- [2] R. Kerviche, N. Zhu, and A. Ashok, “Information Optimal Scalable Compressive Imager Demonstrator,” in *Proc. IEEE ICIP*, Oct 2014.
- [3] D. Shah, A. Kotwal, and A. Rajwade, “Designing Constrained Projections for Compressed Sensing: Mean Errors and Anomalies with Coherence,” in *Proc. GlobalSIP*, 2018.
- [4] D. Martin, C. Fowlkes, D. Tal, and J. Malik, “A database of human segmented natural images and its application to evaluating segmentation algorithms and measuring ecological statistics,” in *Proc. ICCV*, 2001.
- [5] Ujwalla Gawande, Mukesh Zaveri, and Avichal Kapur, “Bimodal biometric system: feature level fusion of iris and fingerprint,” *Biometric Technology Today*, 2013.



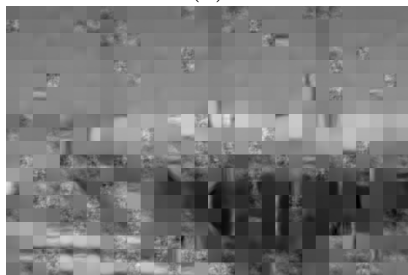
(a)



(b)



(c)



(d)



(e)

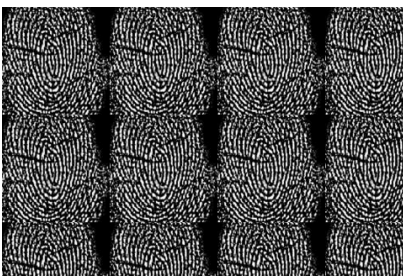


(f)

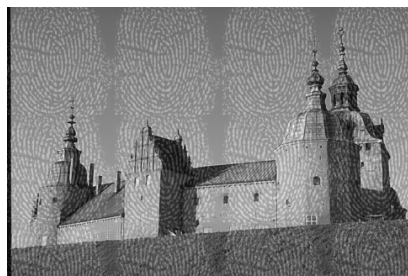
Figure 1



(a)



(b)



(c)



(d)



(e)

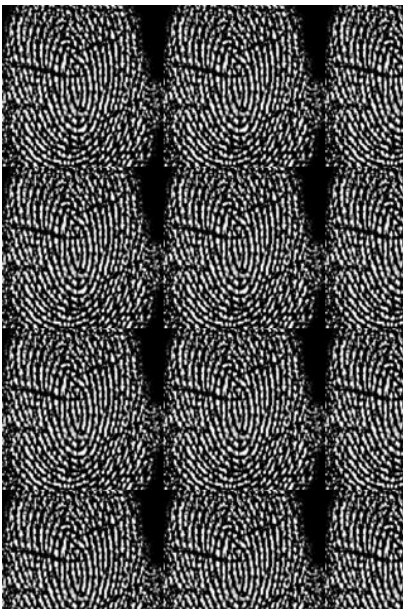


(f)

Figure 2



(a)



(b)



(c)



(d)



(e)

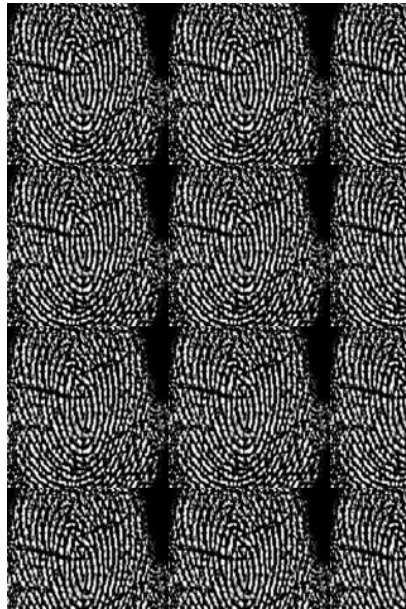


(f)

Figure 3



(a)



(b)



(c)



(d)



(e)

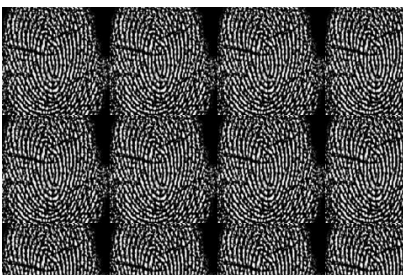


(f)

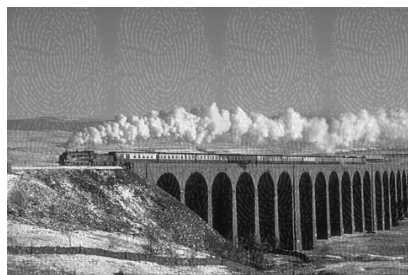
Figure 4



(a)



(b)



(c)



(d)



(e)

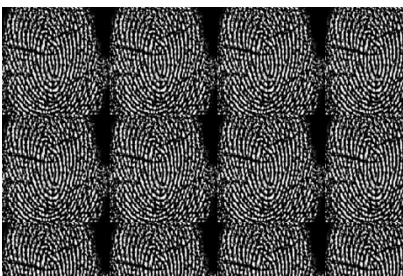


(f)

Figure 5



(a)



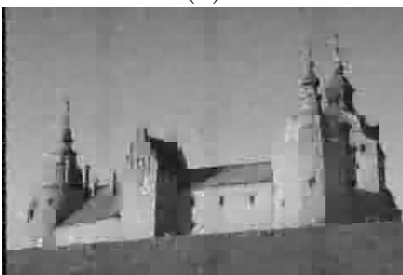
(b)



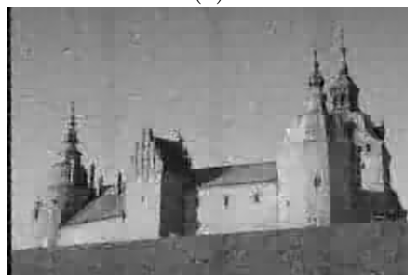
(c)



(d)



(e)

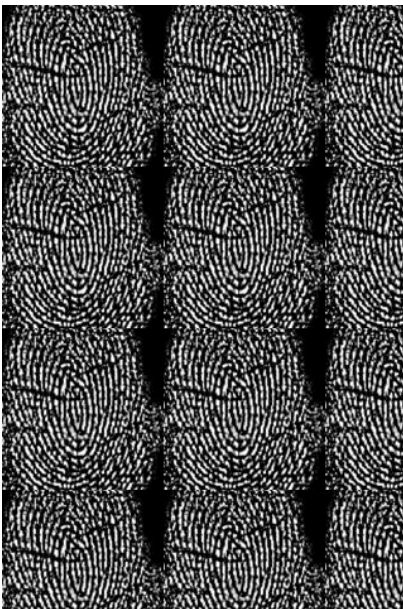


(f)

Figure 6



(a)



(b)



(c)



(d)



(e)

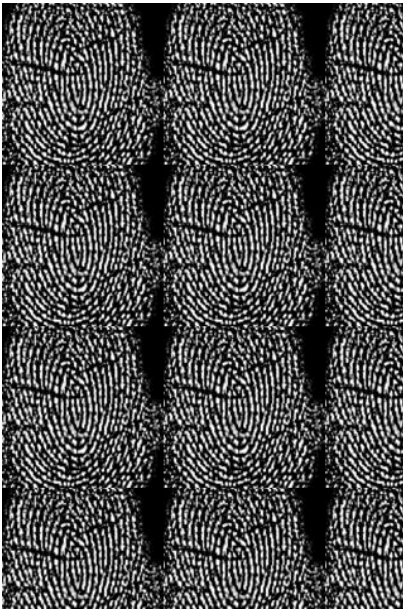


(f)

Figure 7



(a)



(b)



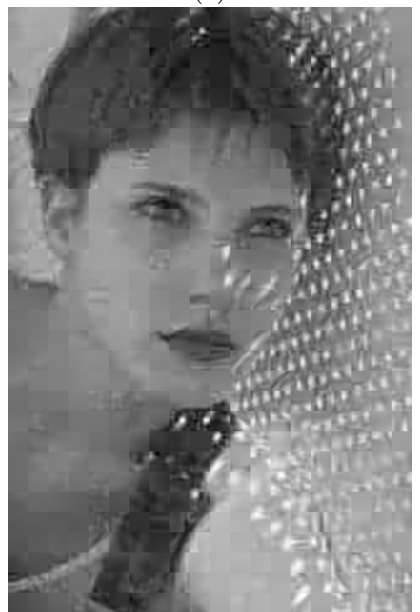
(c)



(d)



(e)



(f)

Figure 8