

Accepted Manuscript

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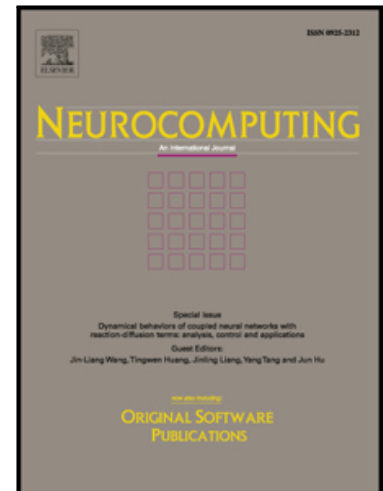
PII: S0925-2312(17)31718-6
DOI: [10.1016/j.neucom.2017.11.004](https://doi.org/10.1016/j.neucom.2017.11.004)
Reference: NEUCOM 19047

To appear in: *Neurocomputing*

Received date: 1 March 2017
Revised date: 30 October 2017
Accepted date: 2 November 2017

Please cite this article as: Zhiyuan Zha, Xinggan Zhang, Qiong Wang, Yechao Bai, Yang Chen, Lan Tang, Xin Liu, Group Sparsity Residual Constraint for Image Denoising with External Nonlocal Self-Similarity Prior, *Neurocomputing* (2017), doi: [10.1016/j.neucom.2017.11.004](https://doi.org/10.1016/j.neucom.2017.11.004)

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Group Sparsity Residual Constraint for Image Denoising with External Nonlocal Self-Similarity Prior

Zhiyuan Zha^a, Xinggan Zhang^a, Qiong Wang^{a,*}, Yechao Bai^a, Yang Chen^a,
Lan Tang^{a,b}, Xin Liu^c

^a School of Electronic Science and Engineering, Nanjing University, Nanjing 210023, China.

^b National Mobile Commun. Research Lab., Southeast University, Nanjing 210023, China.

^c The Center for Machine Vision and Signal Analysis, University of Oulu, 90014, Finland.

Abstract

Nonlocal image representation has been successfully used in many image-related inverse problems including denoising, deblurring and deblocking. However, most existing methods only consider the nonlocal self-similarity (NSS) prior of degraded observation image, and few methods use the NSS prior from natural images. In this paper we propose a novel method for image denoising via group sparsity residual constraint with external NSS prior (GSRC-ENSS). Different from the previous NSS prior-based denoising methods, two kinds of NSS prior (e.g., NSS priors of noisy image and natural images) are used for image denoising. In particular, to enhance the performance of image denoising, the group sparsity residual is proposed, and thus the problem of image denoising is translated into reducing the group sparsity residual. Because the groups contain a large amount of NSS information of natural images, to reduce the group sparsity residual, we obtain a good estimation of the group sparse coefficients of the original image by the external NSS prior based on Gaussian Mixture Model (GMM) learning, and the group sparse coefficients of noisy image are used to approximate the estimation. To combine these two NSS priors better, an effective iterative shrinkage algorithm is developed to solve the proposed GSRC-ENSS model. Experimental results demonstrate that the proposed GSRC-ENSS not

* Corresponding Author. E-mail: wajj131420@hotmail.com.

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