Quantitative component analysis

Results and Discussion

Quantitative evaluations

Visual comparisons

Overview: Better similar patches → better denoising results

Figure 1. Our patch searching method leads to better denoising results

Patch-based denoising algorithms have achieved outstanding performance.

The key idea is to exploit the recurrence of similar patches in input images.

Traditional Nearest Neighbour Search can select patches with similar noise patterns to the reference patch and retain them in the denoising results.

Better patch searching scheme could be exploited to boost the performance of patch-based image denoising techniques, such as BM3D, PLOW, LPCA.

A good patch searching approach should (c) be able to distinguish valid similar patches and outliers by classifying them into different sub-groups, (d) select similar patches that are closest to the patch group center rather than the noisy reference.

Good Similar Patch Searching (Methodology)

Original similar patch groups

Unreliable patch searching

Pixel estimation

Our final similar patches

Patching patches

Denoised patches

Clean images

Noisy inputs

Original results

Boosted results

Unreliable pixel estimation: truncated mean, adaptive threshold.

Clustering optimization: solve clustering and cluster number simultaneously.

MDL(K; θ) = \(-\log p_Q(Q|K, \theta) + \lambda L \log(mn)\)

\(-\log p_Q(Q|K, \theta) = \sum_{i=1}^{K} \| \mathbf{w}_i - \mathbf{m}_i \|^2 \)

L = K[1 + n + (n + 1)n/2] - 1

Acknowledgements. This work was in part supported by NSF grants 1321119.