

PURE-LET SOFTWARE FOR MATLAB

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This software implements the algorithms described in:

[1] F. Luisier, T. Blu, M. Unser, "Image Denoising in Mixed Poisson-Gaussian Noise," IEEE Transactions on Image Processing, vol. 20, no 3, March 2011.

A. TEST PROGRAM

REPRODUCE_RESULTS: Reproduce the results presented in [1].

DENOISING_DEMO: Denoising demonstration based on the PURE-LET principle applied to pointwise thresholding in either an undecimated wavelet representation, an overcomplete BDCT or a dictionary containing undecimated wavelets & BDCT. To run this script, just type 'denoising_demo' in your Matlab Command Window.

B. TRANSFORMS

The "transforms" folder contains a collection of C MEX-files for 2D undecimated wavelet transform and 2D BDCT. You can compile these MEX-files for your own platform by running the script "mex_compile".

C. DENOISING FUNCTIONS

UWT_PURELET_DENOISE: Removes mixed Poisson-Gaussian noise using the PURE-LET principle in an undecimated wavelet transform (UWT).

BDCT_PURELET_DENOISE: Removes mixed Poisson-Gaussian noise using the PURE-LET principle in an overcomplete BDCT.

DICT_PURELET_DENOISE: Removes mixed Poisson-Gaussian noise using the PURE-LET principle in a dictionary combining an UWT and an overcomplete BDCT.

UWT_PURLET: Contains the core of the UWT-PURELET algorithm.

BDCT_PURELET: Contains the core of the BDCT-PURELET algorithm.

D. DIAG{DR} COMPUTATION

UWT_DIAGDR_COMPUTATION: Monte-Carlo computation of $\text{diag}\{\text{DR}\}$, when D and R are respectively the decomposition and the reconstruction matrix associated with the

undecimated wavelet transform. This computation is required if other boundary extensions than the standard periodic ones are considered. It can be performed offline, once the size of the image, the type of extensions and the type of wavelet filters are specified. Some pre-computed "diag{DR}" are provided in the "diagDR" folder.

BDCT_DIAGDR_COMPUTATION: Monte-Carlo computation of diag{DR}, when D and R are respectively the decomposition and the reconstruction matrix associated with an overcomplete BDCT. This computation is required if other boundary extensions than the standard periodic ones are considered. It can be performed offline, once the size of the image, the type of extensions and the type of wavelet filters are specified. Some pre-computed "diag{DR}" are provided in the "diagDR" folder.

E. OTHER AUXILIARY ROUTINES

AUX_BDCT_LUT: Groups together the Cartesian indices of the BDCT subbands that belong to the same radial frequency band.

AUX_COMPRESS: Rescales and converts the elements of an array into unsigned 8-bit integers.

AUX_DYADIC_MAX_SCALES: Computes the maximum number of dyadic scales.

AUX_NUM_OF_ITERS: Computes the most suitable number of iterations to be performed in the SURE-LET algorithm.

AUX_THETA: Computes some partial derivatives of the thresholding function.

AUX_THRESHOLD: Computes some derivatives of the signal-dependent threshold.

The folder also contains some standard test images.

Please, report any bugs, comments or suggestions to:
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