LPA with ICI rule: 2D case

Mathematical Models and Methods for Image Processing

Edoardo Peretti

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LPA in 2D

LPA in 2D

N = 5, h = 5

N = 5, h = 10

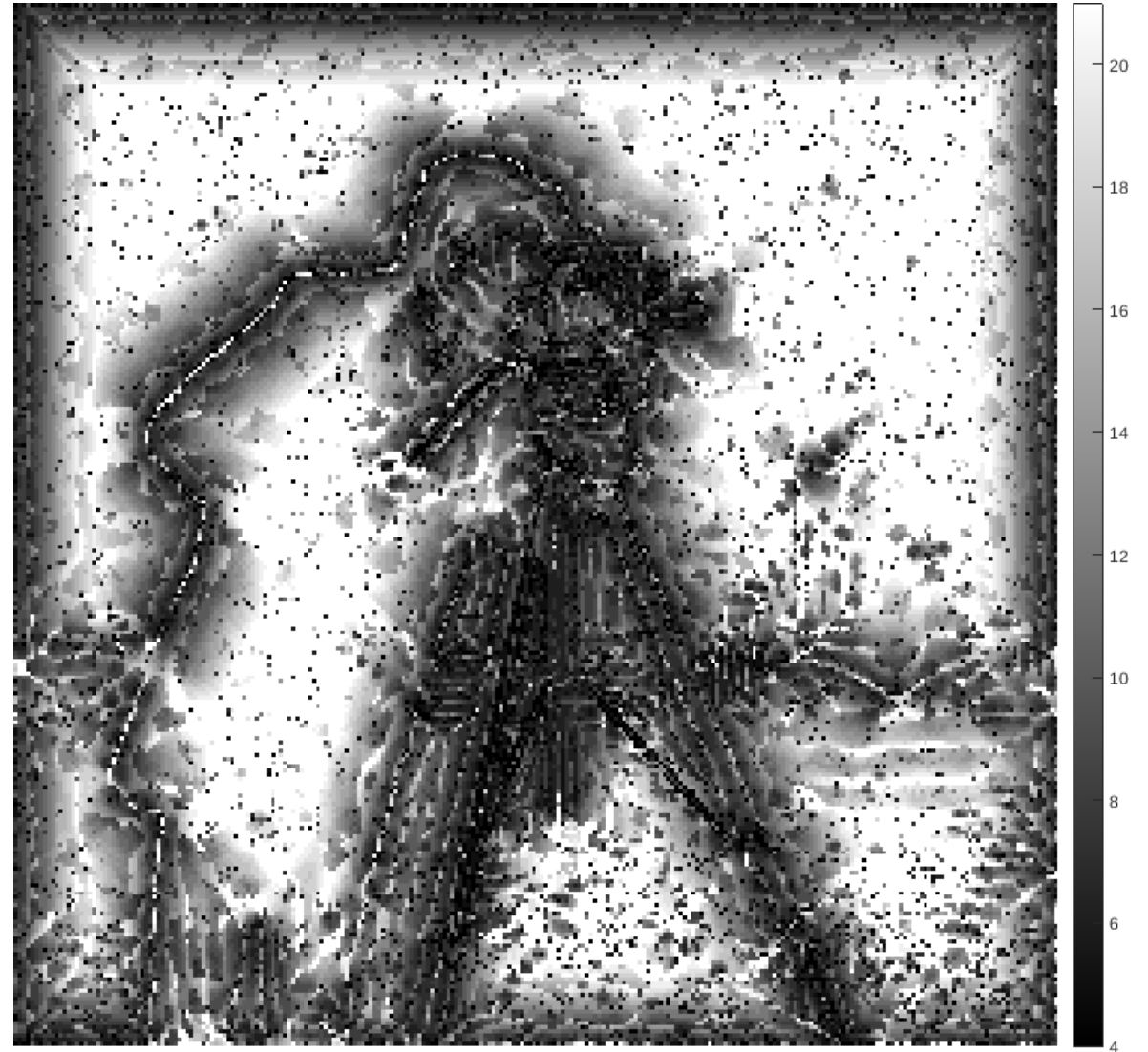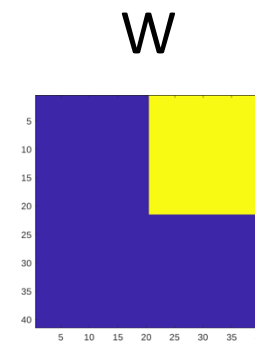E. Peretti

LPA in 2D

N = 5, h = 15

N = 5, h = 20

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LPA-ICI

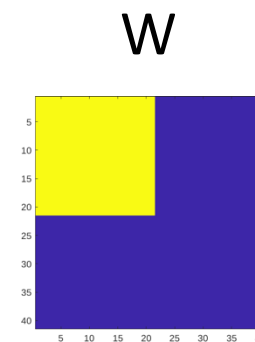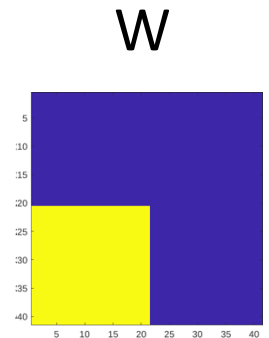N = 5, PSNR = 24.4443

LPA-ICI with directional kernel

W

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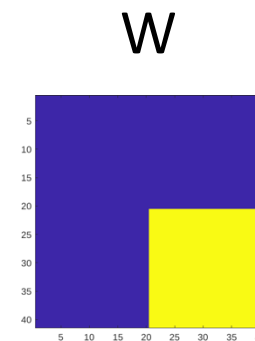# LPA-ICI with directional kernel

W

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LPA-ICI with directional kernel

W

LPA-ICI with directional kernel

W

Final Estimate

LPA-ICI estimate, PSNR = 26.38

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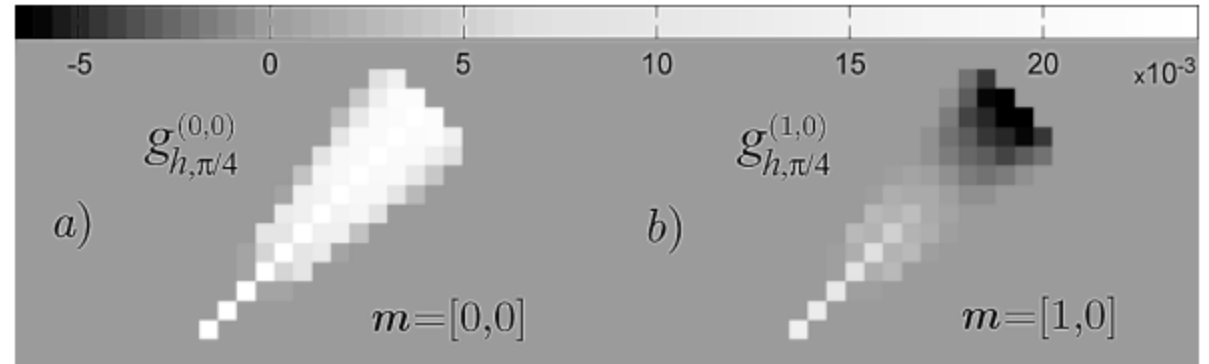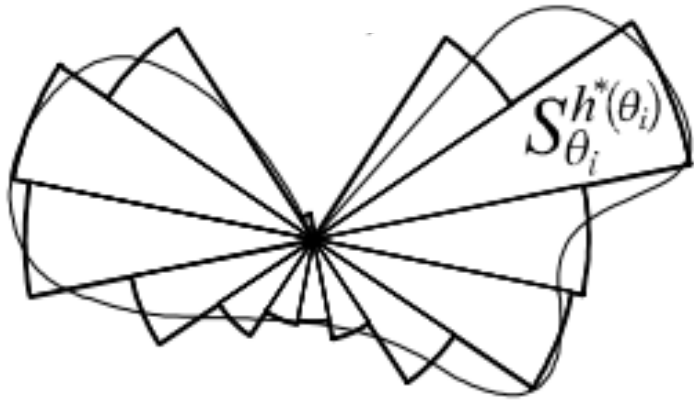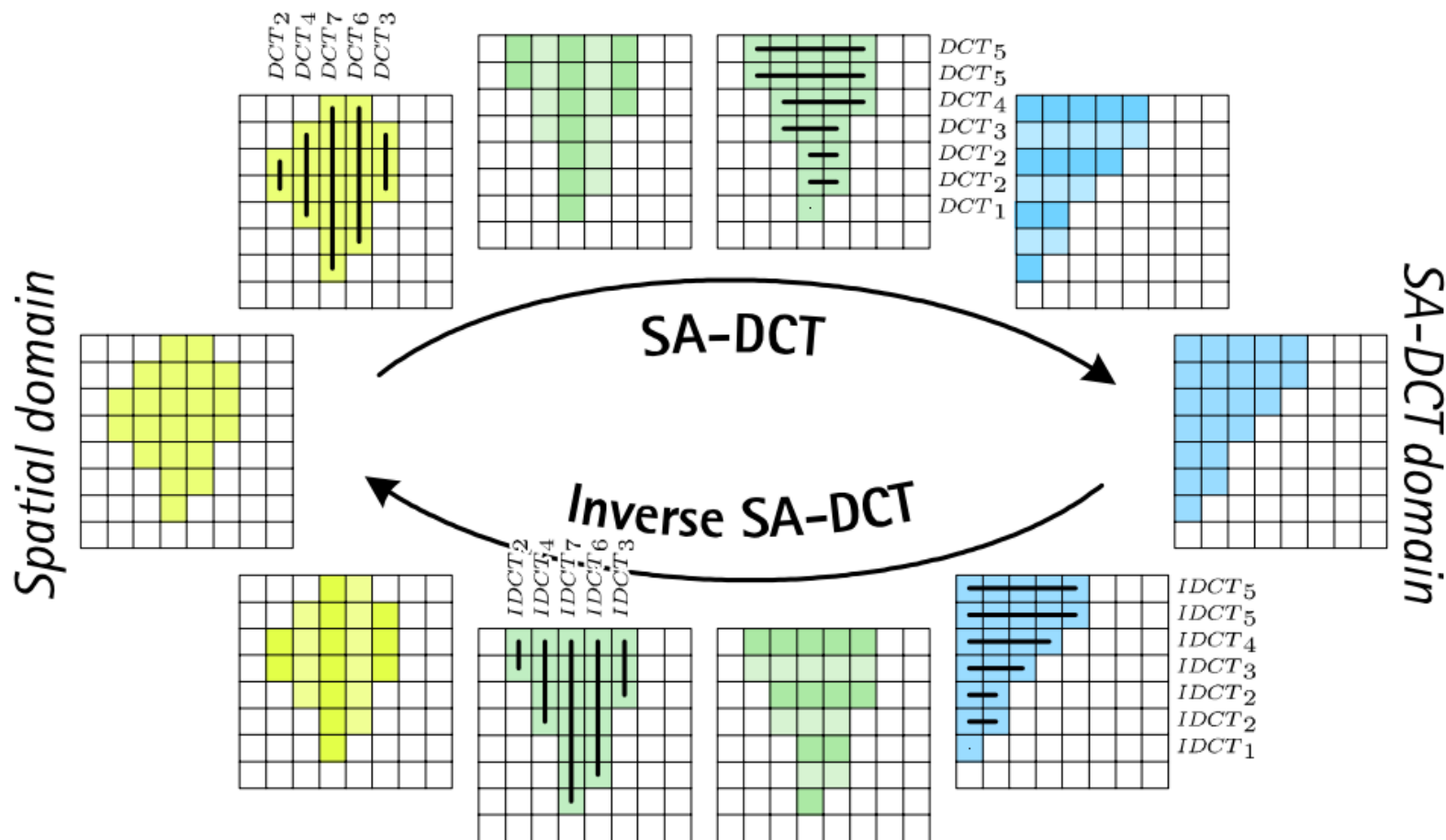
Further Improvements

- Use better shapes for the directional kernel

- Use polynomials in polar coordinates

V. Katkovnik, A. Foi, K. Egiazarian, and J. Astola, "Directional varying scale approximations for anisotropic signal processing",
Proc. of XII European Signal Process. Conf., EUSIPCO 2004, pp. 101-104, 2004.

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Shape Adaptive DCT

Idea: use LPA-ICI to define the neighborhood of a pixel, then perform denoising in the transform domain

A. Foi, V. Katkovnik, and K. Egiazarian, "Pointwise Shape-Adaptive DCT denoising with structure Preservation in Luminance-Chrominance Space", Proc. of the 2nd Int. Workshop on Video Process. and Quality Metrics for Consumer Electronics, VPQM2006, Scottsdale, AZ, January 2006

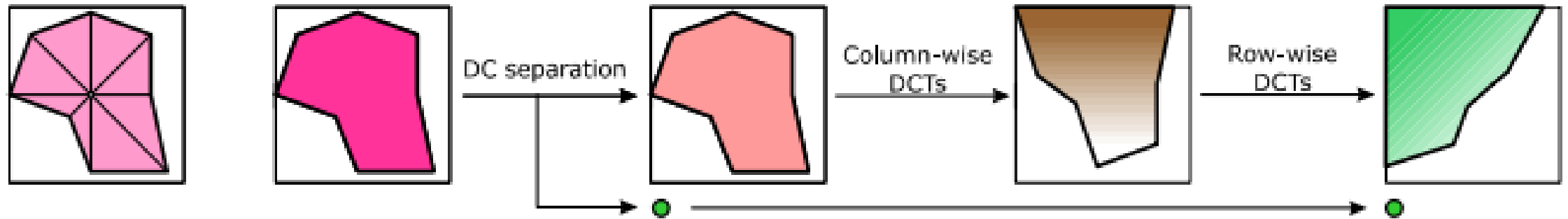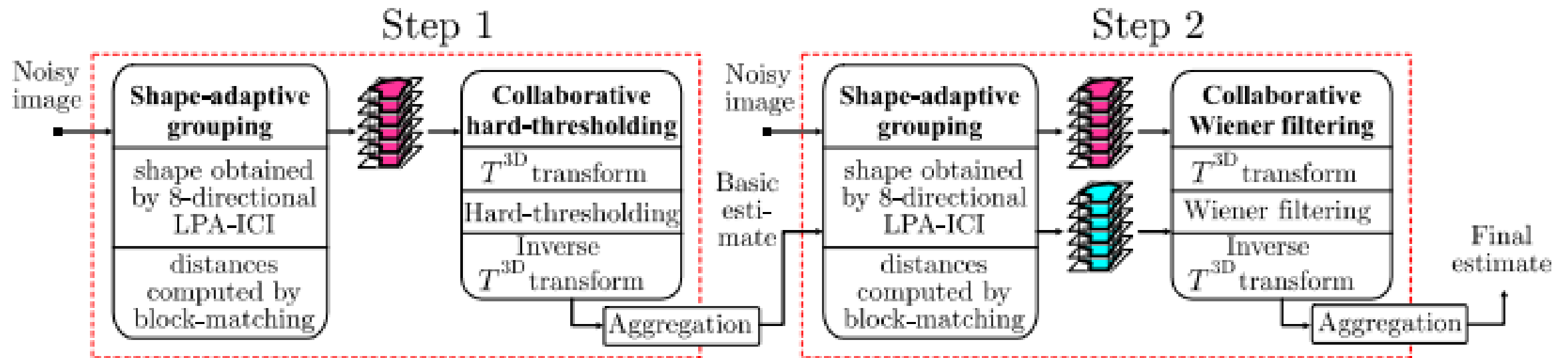E. Peretti

Integrate Shape-Adaptive DCT in BM3D

Figure 2: Illustration of the forward SA-DCT with DC-separation.

K. Dabov, A. Foi, V. Katkovnik, and K. Egiazarian, "A nonlocal and shape-adaptive transform-domain collaborative filtering", Proc. Int. Workshop on Local and Non-Local Approx. in Image Process., LNLA 2008, Lausanne, Switzerland, August 2008.

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Assignments

- Implement the LPA-ICI in the 2D case with symmetric (squared) windows

- Implement the LPA-ICI with directiona kernels (defined over the quadrants)