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# SELF-SIMILARITY OF IMAGES IN THE CONTEXT OF THE NON-LOCAL MEANS FILTER

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The non-local means filter (NL-means) is very efficient in restoring images degraded by additive noise, thanks to its ability to exploit non local similarities between patches. In this talk we study the possibility to extend the number of similar patches by considering the self-similarity property of natural images. Although natural images are not really self-similar, the success of algorithms based on scale-invariance properties, such as fractal coding, let us expect that the NL-means could be enhanced by comparing patches at different scales. To our knowledge, the first investigation in this area has been done by Ebrahimi and Vrscay in 2008 [1], where they underlined that the distribution of similarities between patches at the same scale and patches across two scales are very close. Therefore, the use of patches at a coarser scale gives comparable results to the classical NL-means. In [2], a novel IFS-type fractal coding scheme with overlapping blocks is presented and its denoising performance is also comparable to NL-means. In [3], a model of self-similarity of images is proposed in order to describe both same-scale as well as cross-scale similarity. Despite these works, efficiently mixing same-scale and cross-scale similarities in a NL-means scheme remains an open problem.

## References

[1] M. Ebrahimi and E. R. Vrscay, Examining the role of scale in the context of the non-local-means filter, *Lecture Notes in Computer Science*, **5112** (2008) 170–181.

[2] S.K. Alexander, E. R. Vrscay, IFS imaging beyond compression, *Nonlinear Analysis*, 2009.

[3] D. La Torre, E. R. Vrscay, M. Ebrahimi, M. Barsnley, Measure-valued images, associated fractal transforms and the affine self-similarity of images, to appear in *SIAM Journal on Imaging Sciences*.