NON LOCAL DEMOSAICKING

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ABSTRACT

Most digital color images are represented by three color values at each pixel. There are indeed cameras performing three measurements per pixel. Such cameras split the light and project it onto three distinct CCD's or CMOS. Each one of these arrays requires its proper driving electronics, and the resulting three color images have to be registered accurately. These additional requirements add a large expense to the system. For this reason, most cameras use a single matrix measuring a single color per pixel. The other two colors must be interpolated from the neighboring pixels.

Demosaicking is the process by which from a matrix of colored pixels measuring only one color component per pixel, red, green or blue, one can infer a whole color information at each pixel. This inference requires a deep understanding of the interaction between colors, and the involvement of image local geometry. Although quite successful in making such inferences with very small relative error, state of the art demosaicking methods fail when the local geometry cannot been inferred from the neighboring pixels. In such a case, which occurs (e.g.) when thin structures of fine periodic patterns were present in the original, state of the art methods can create disturbing artifacts, known as zipper effect, blur, and color spots.

The demosaicking method discussed in the present work (see [1]) will have two differentiated steps. The first step is based on a non-local estimate using all image self-similarities. Similar non-local processes were introduced in [2] for the scope of texture synthesis and in [3] as a denoising algorithm (NL-means for non-local means.) We shall see that this algorithm can be adapted to interpolate the missing color values reducing typical artifacts. This super-resolution step achieves a better quality in the green channel than in the red and blue ones and therefore a color homogenization step is necessary. This second step modifies the bi-linear strategy of Cok in order to take advantage of the already filled red and blue values. We propose not to transfer the high frequencies of the green but to use them to complete the high frequencies of the red and blue channels. We shall call the new demosaicking algorithm *Coarse to Fine Non Local Demosaicking (CFNLD)*.

Finally, we compare the performance of the state of the art algorithms and the CFNLD algorithm.

1. REFERENCES

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