Demosaicing by Successive Approximation

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1 Introduction

This paper will introduce an implementation of the algorithm proposed in the paper "Demosaicing by Successive Approximation" by Xin Li [1]. This paper will first provide a quick overview of the algorithm and how it works, and then provide results which will compare this implementation with other demosaicing algorithms, both on objective and subjective performance.

2 Overview

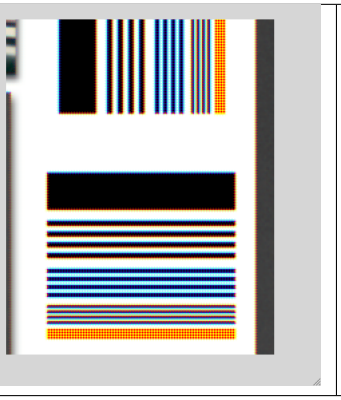
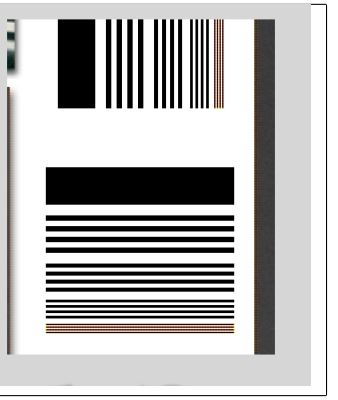
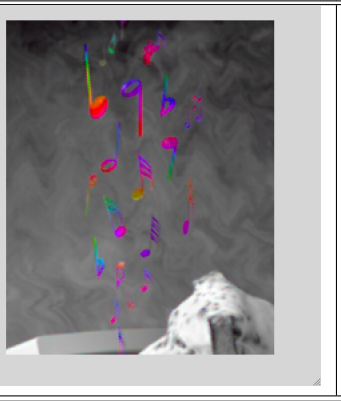
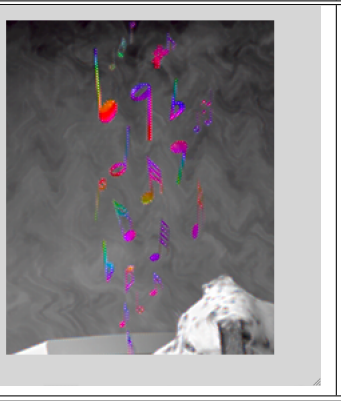
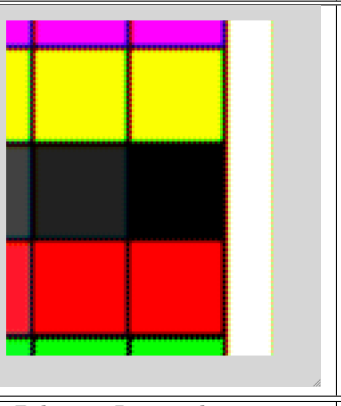
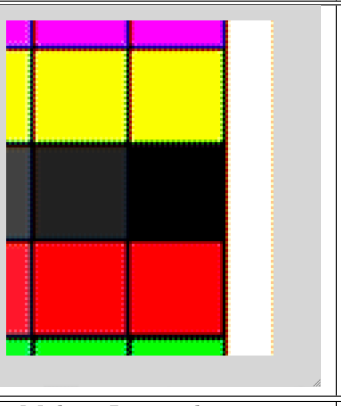
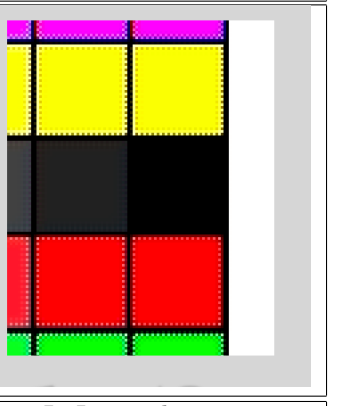
As evidenced by the title, the algorithm is iterative, and relies upon a good approximation of interpolation to start the algorithm. The paper then uses the color difference of the new interpolated values to determine the new red and blue channels, and then uses these new red and blue channels to reinterpolate the green channel. The paper demostrates that this reinterpolation of the color difference is beneficial for all channels, and is thus appropriate to put in an iterative method. The paper then proposes a stopping method based on the error difference between each successive image, so that once the algorithm has stopped improving the image it stops iterating.

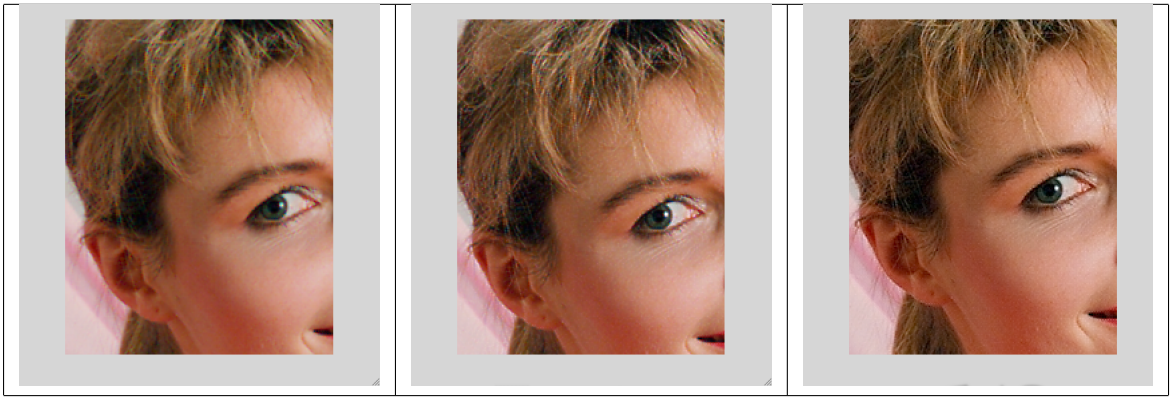
3 Results

3.1 Subjective Results

The following subjective results are all captures from the provided demosaicing test image [2]

[1] http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.60.74&rep=rep1&type=pdf
[2] https://www.cis.rit.edu/∼cnspci/courses/common/images/demosaick/demosaickTest.bayer.tif

		
Bilnear Interpolation	Malvar Interpolation	Li Interpolation
		
Bilinear Intepolation	Malvar Interpolation	Li Interpolation
		
Bilinear Interpolation	Malvar Interpolation	Li Interpolation



Bilinear Interpolation	Malvar Interpolation	Li Interpolation

3.2 Objective Results

	Bilinear	Malvar	Li
ΔE_R	10552	10007	4113
ΔE_G	13019	11406	7512
ΔE_B	14976	15362	9160

I understand these numbers are probably not calculated correctly (I don't have IDL on my machine), however at least my results are internally consistent.