

Part(a)
Result: C-
Report: C
Code: A-

Part(b)
Result: A
Report: C
Code: A-

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Problem 1: Image Manipulation and Interpolation

a) Image Resizing via Bilinear Interpolation

I Abstract and Motivation

Bilinear interpolation is a fast way to achieve the resizing of an image. The basic idea is that, if an image is required to stretch larger, the original pixels are relocated to the corresponding locations in the desired image; the blank pixels are interpolated by the nearest four pixels with their distances to the interpolation location as weight values.

II Approach and Procedures

The core part is changing the coordinates. Suppose the output image is of size N by N with coordinates (x, y) , the input image is of n by n with coordinates (row, col) , then the stretch ratio will be N/n , and the stretched coordinates will be $(\text{row} * \text{ratio}, \text{col} * \text{ratio})$. Step 1, use this stretched coordinates to evaluate the value of (x, y) based on the formula given in the lecture. Step 2, construct a new image and assign pixel values obtain from step 1.

III Experimental Results

Shown below are the results for part a).

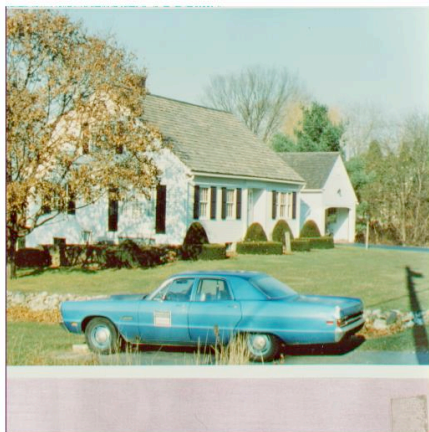


Figure 1 Original image of 'house.raw'

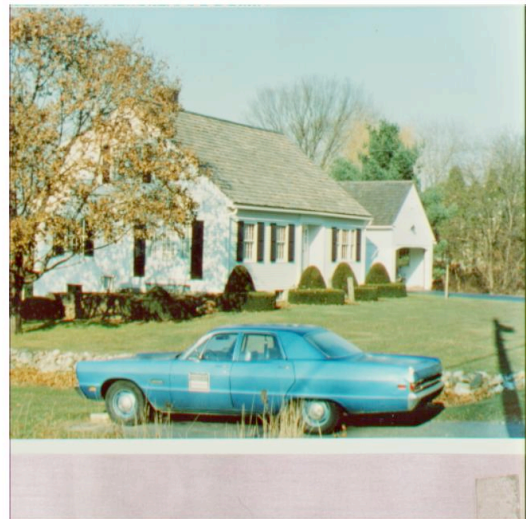


Figure 2 Resized 650*650 image of 'house.raw'

IV Discussion

The four pixels that is used for interpolation actually determine more than 1 interpolated pixel. So the certain area formed by the four pixels contains many interpolated pixels,

and they just have different weight values. Note that the interpolated image may be not as clear as original image.

b) Demosaicing of Bayer-patterned Color Image

I Abstract and Motivation

Since the digital camera sensors are arranged with a pattern called Bayer array, to recover a color RGB image from the picture captured by digital cameras needs to estimate the other two channels at a certain pixel.

II Approach and Procedures

There are two types of methods, one is bilinear demosaicing, and the other is MHC demosaicing.

III Experimental Results

Shown below are the results for part b).



Figure 3 'parrot_CFA.raw'

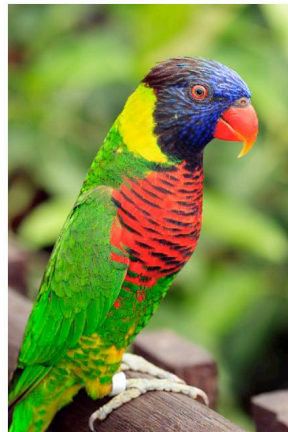


Figure 4 bilinear demosaicing image of 'parrot_CFA.raw'

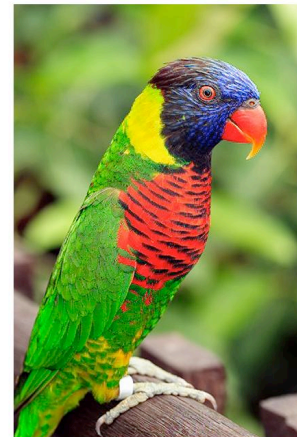


Figure 5 MHC demosaicing image of 'parrot_CFA.raw'

IV Discussion

The MHC demosaicing approach is better than the bilinear one. It takes more values into consideration, and use 8 masks to estimate the right pixel values.