Lab 8: Image Processing

Laboratory Report

Fundamentals of Imaging Science

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Introduction

This lab is all about applying various digital imaging processing techniques on different types of images. The image editing software, Fiji, was used on the four given images.

Methods

To begin, the first image, *enhance-me.gif*, was edited. This image appears to be entirely black. After minor adjustments with the maximum slider, the image appears to be a woman's face with noise throughout. Next, a filter was applied to remove the white sparkling dots.

The second image, *boats.gif*, was used to test edge detection operations. The filter, Convolve was applied to it, and a specified matrix was applied to it to find the horizontal lines. This image was saved, then another matrix was applied to find the vertical lines. These two files were then combined to create one individual image.

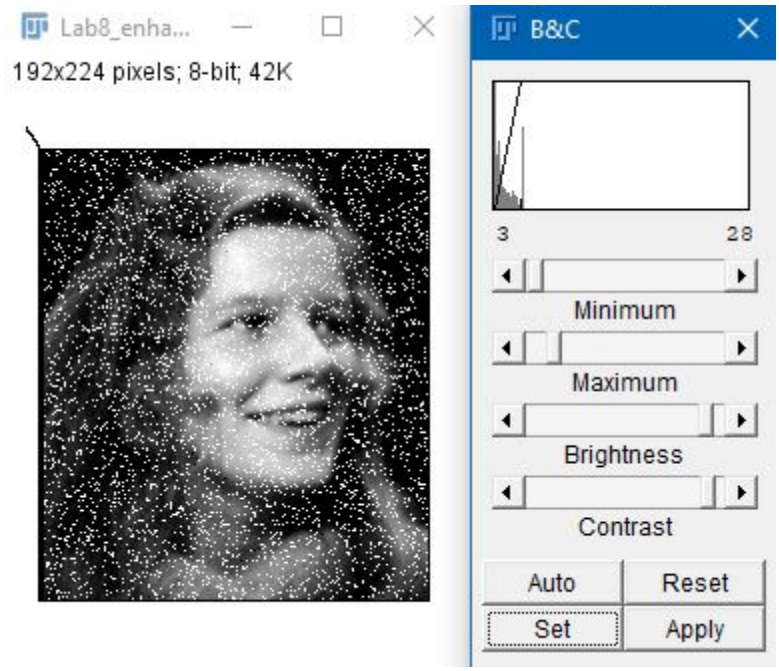
The third image, *baboon.jpg*, was used to process and analyze a color image. This image was split into its red, green, and blue channels to form 3 individual images. For the first image, the Red channel had the Mean filter applied to it, then merged again with the Green and Blue channels. The second image had its Green channel changed, then merged again. The third image had its Blue channel changed, then merged again.

The last image, *TEM_filter_sample.jpg*, was used to find its lookup tables. Three lookup tables were found then saved. The first table was one that gives a good visualization, then the other two give a less appealing visualization.

Results

enhance-me.gif:

Slider adjustments (A1):

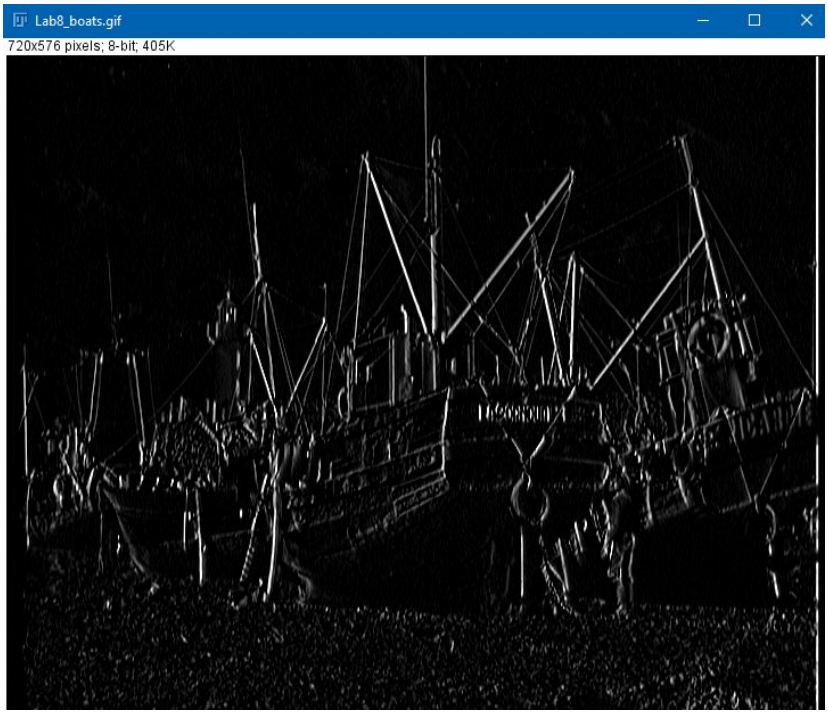


Mean (A2):

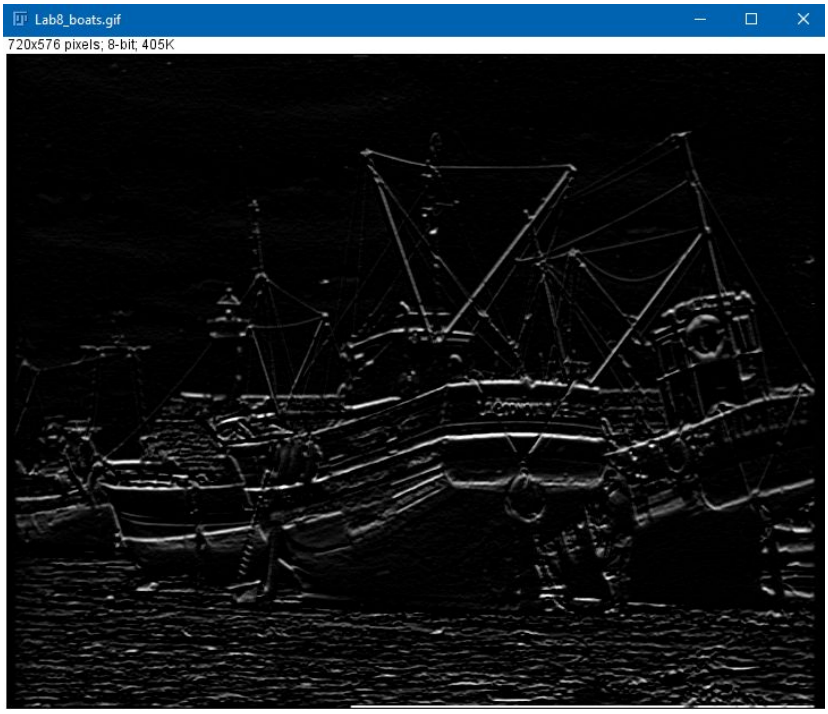
Median (A3):

boats.gif:

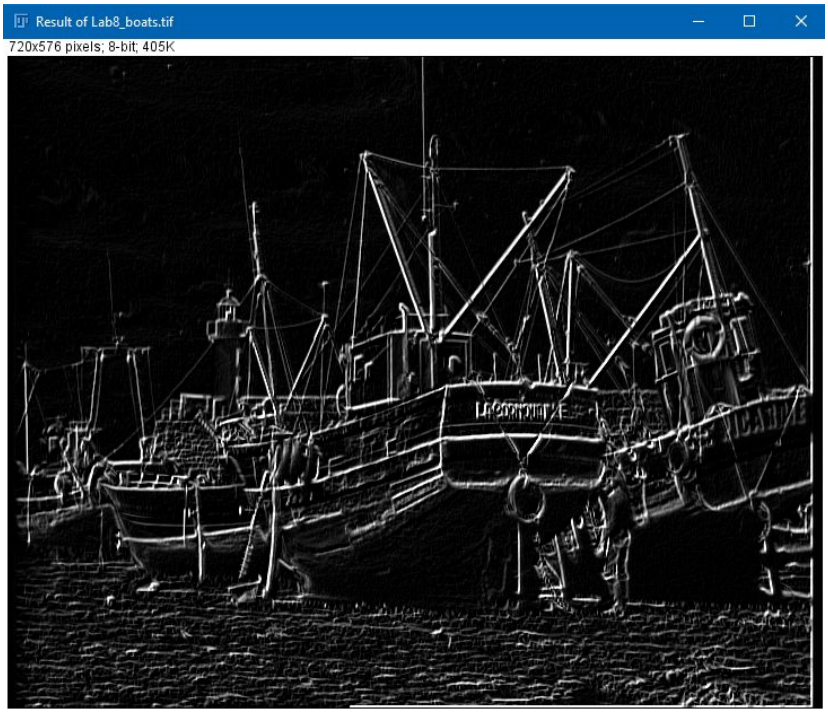
Horizontal lines (B1):



Vertical lines (B2):

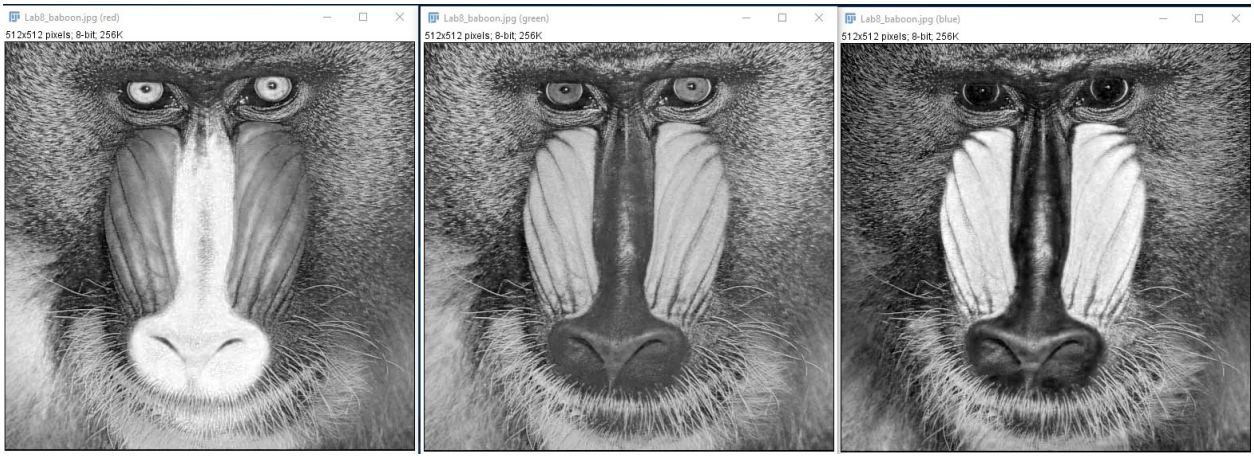


Combined (B3):

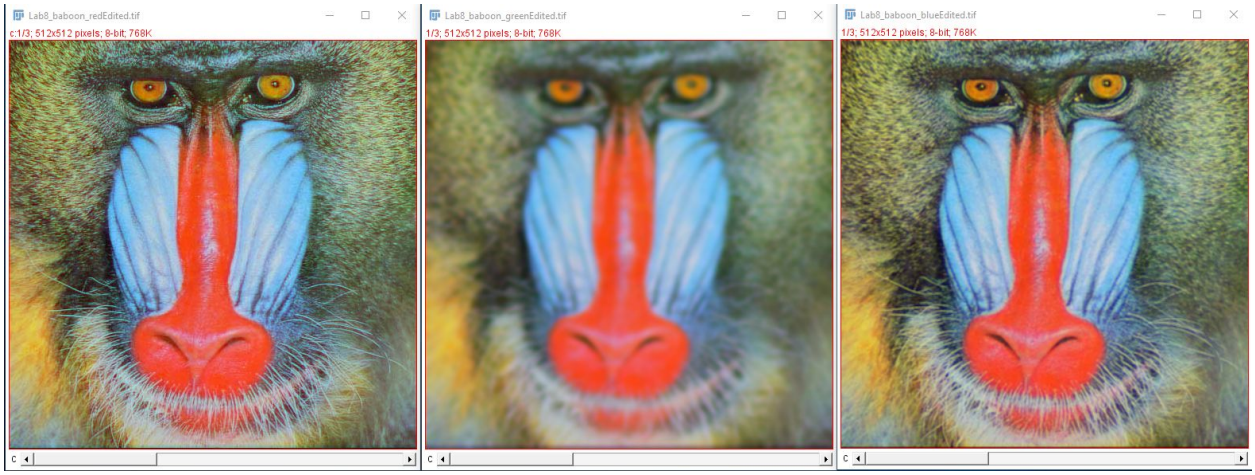


baboon.jpg:

Split into red, green, and blue scales(C1)

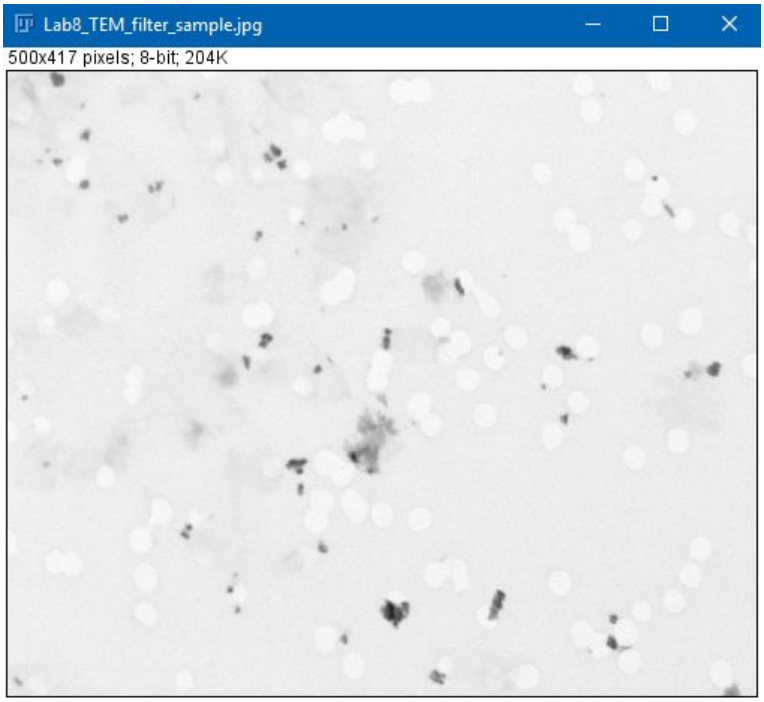


Each image has its respective channel changed Red, Green, then Blue (C2):

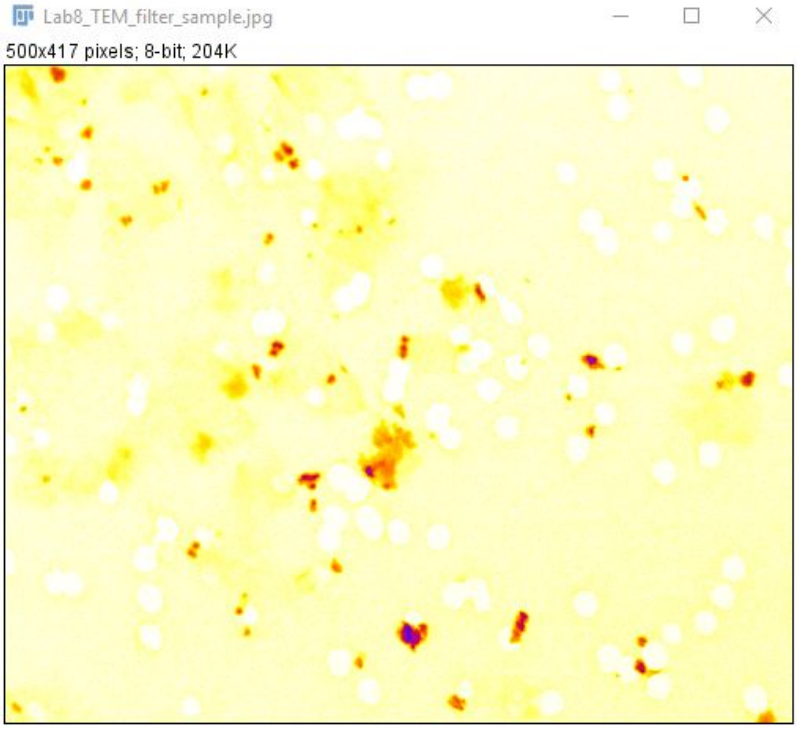


TEM_filter_sample.jpg

Original Images (D1):

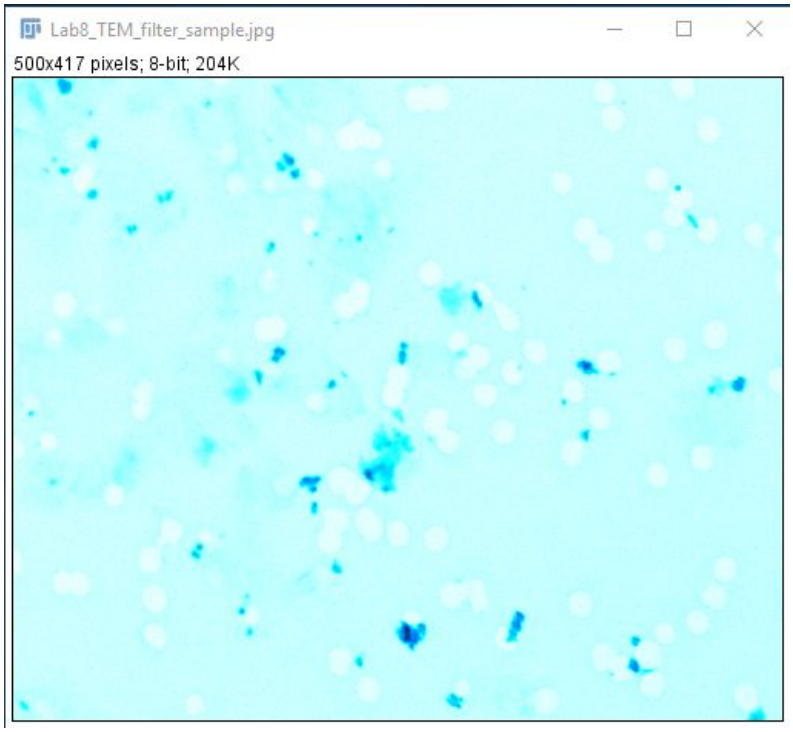


Fire Look Up Table (D2):



Ice Look Up Table (D3):

Cyan Hot Look Up Table (D4):



Results

For the first image, the implications of the process were to change the light and dark levels of a previously dark image. The edits turned the image into a relatively clear image of a woman's face (A1) with white spots throughout. Then two filters were applied to remove the spots (A2) and (A3).

For the second image, the implications were to separate the horizontal (B2) and vertical (B3) aspects of the image and merge them back into one (B4).

For the third image, the implications were to separate the baboon image into its three channels (C1). When the red channel (C2) was changed and merged back, parts of the nose appeared to be more blurry. When the green channel (C2) was changed and merged back, most

of the baboon's fur was significantly more blurry. When the blue channel (C2) was changed and merged back, only some parts of the baboon's face next to the nose were mildly blurry.

For the last image, three lookup tables were created for the original image (D1). The first table (D2) shows a higher contrast between the other two tables (D3) and (D4).