Computer Vision (Fall 2016) Problem Set #1

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1a: Interesting Images

Image 1 - ps1-1-a-1.png

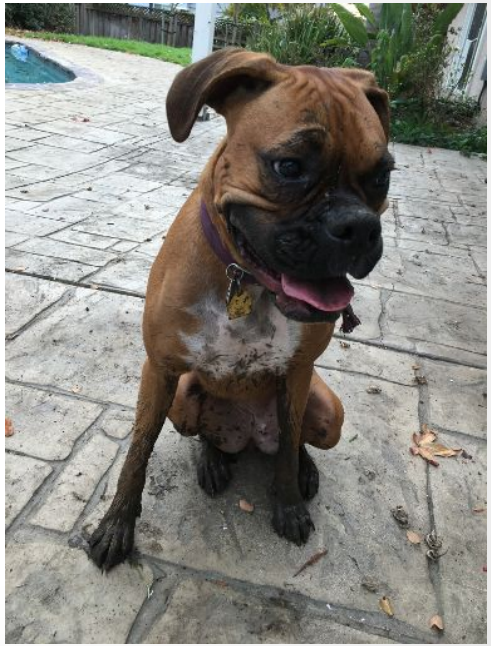


Image 2 - ps1-1-a-2.png

2a: Swapped Green and Blue

ps1-2-a-1.png

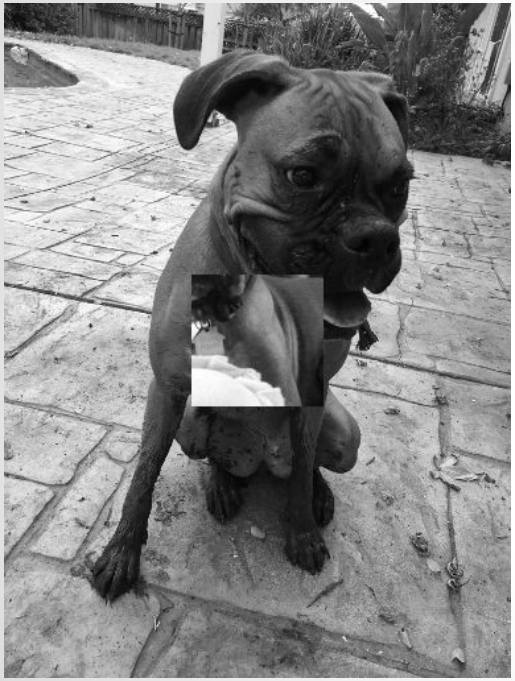
2b: Monochrome Green

Img1_green - ps1-2-b-1.png

2c: Monochrome Red

Img1_red - ps1-2-c-1.png

3a: Replacement of Pixels

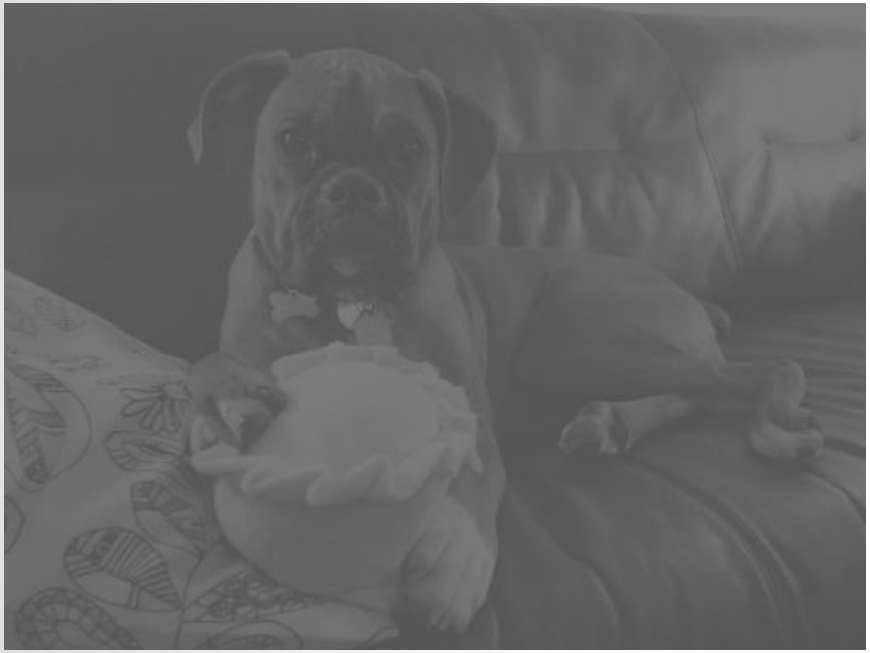


ps1-3-a-1.png

4a: Image Stats

- Min: 4
- Max: 255
- Mean: 100.29
- Standard deviation: 65.05

4b: Arithmetic Operation

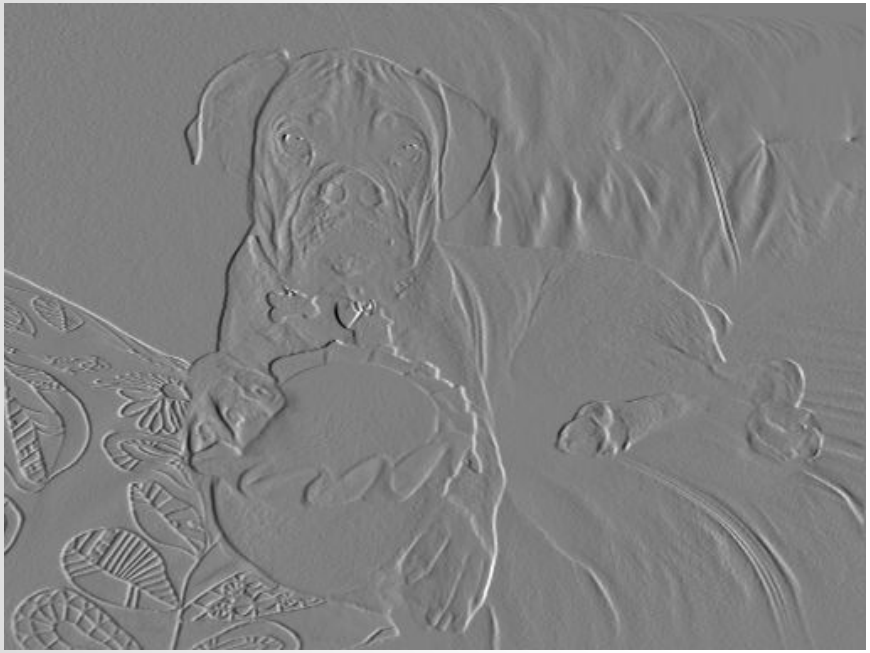


ps1-4-b-1.png

4c: Shifted Image

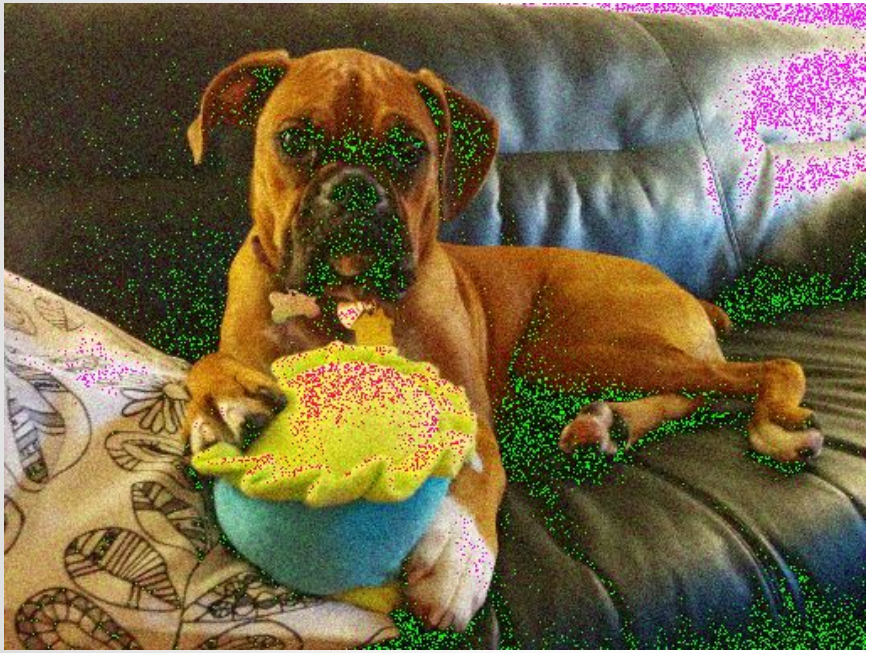
ps1-4-c-1.png

4d: Difference Image



ps1-4-d-1.png

5a: Noisy Green Channel



ps1-5-a-1.png

5b: Noisy Blue Channel

ps1-5-b-1.png

6: Discussion

a. Between all color channels, which channel, in your opinion, most resembles a grayscale conversion of the original. Why do you think this? Does it matter for each respective image? (For this problem, you will have to read a bit on how the eye works/cameras to discover which channel is more prevalent and widely used)

   The channel which most resembles a grayscale conversion of the original is the green channel. This is due to that green pixels are twice as much as red or blue pixels (i.e. ¼ red pixels, ¼ blue pixels, and ½ green pixels). The green channel is the channel most resembles a grayscale conversion regardless the image.

6: Discussion

b. What does it mean when an image has negative pixel values stored? Why is it important to maintain negative pixel values?

Generally, saved image are represented in uint8 so there is no negative value. However, when doing arithmetic calculation, we can have negative pixel value. This means that we need to normalize the negative pixel value. Implementation of the operator vary as to what they do if the output pixels are negative. Some operator implementation may convert negative pixels to zero (black). Another operator implementation might wrap negative values (e.g. -10 becomes 246). It is important to maintain negative pixel values so that the result of arithmetic calculation is correct.

6: Discussion

c. In question 5, noise was added to the green channel and also to the blue channel. Which looks better to you? Why? What sigma was used to detect any discernable difference?

   For this specific image, the image with added noise for blue channel looks better. This is due to that the overall image show more darker color so that the addition of green noise becomes more visible and render the image worse. For the green noise, we can detect discernible difference by setting sigma to 2. For the blue noise, setting the sigma to 4 makes the noise easier to detect.