

Computer Vision (Fall-2019) Problem Set #1

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1a: Interesting Images



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

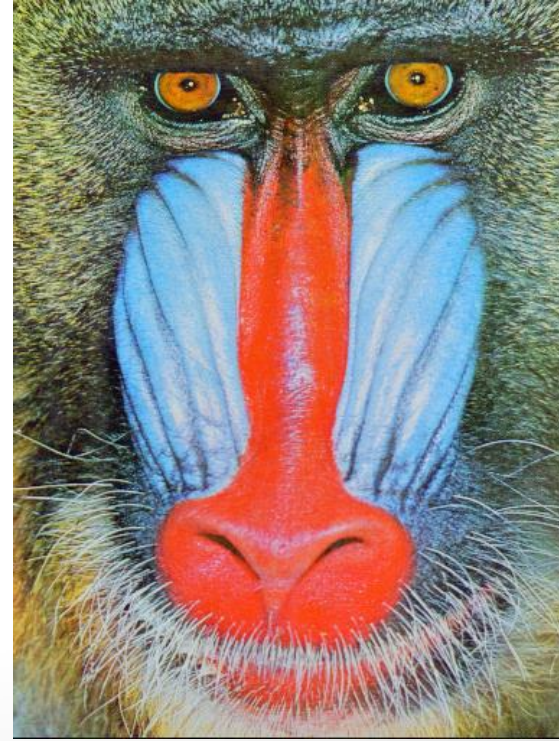


Image 2 - ps1-1-a-2.png

2a: Swapped Green and Blue



ps1-2-a-1.png

2b: Monochrome Green



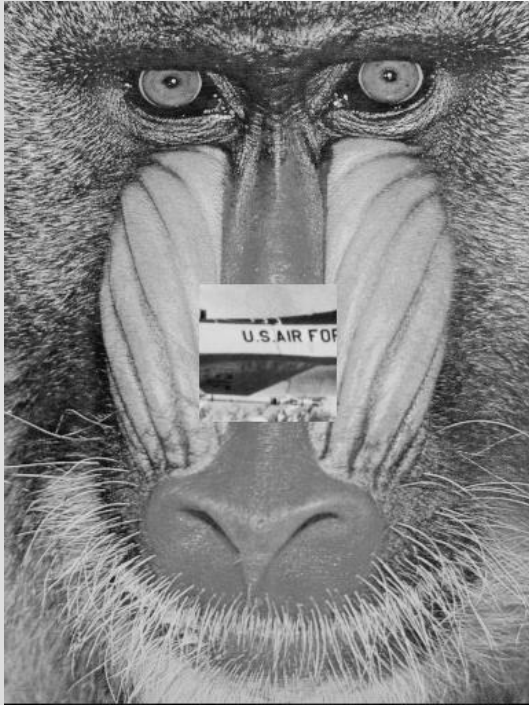
Img1_green - ps1-2-b-1.png

2c: Monochrome Red



Img1_red - ps1-2-c-1.png

3a: Replacement of Pixels



ps1-3-a-1.png

4a: Image Stats

- Min: 0.0
- Max: 234.0
- Mean: 175.3355
- Standard deviation: 55.7291

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

6a: Discussion

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)

Green channel resembles a grayscale conversion the most. Because human vision is most sensitive to green and least sensitive to blue, intensity values from the green channel have the maximum weightage when the image is being converted to grayscale. For that reason, it does not matter for each image and would be valid irrespective of any particular image. As a general rule, intensity from the green channel will always have the maximum weight.

6b: Discussion

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

The image is not in unsigned data type and the range of intensity values might include negative to positive values. The darkest regions would be represented by negative values and the lightest regions by positive value with a mean value of 0 representing a grey shade. Therefore, it's important to maintain the negative pixel values because the negative part of the range contains information on the darker end spectrum of the image. If ignored and set to 0, all the pixels with negative intensity would instead be replaced by a single grayscale value.

6c: Discussion

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 discernible difference?

The picture where noise was added to the green channel looks better. Since human vision is most sensitive to green and least sensitive to blue, our eye perceives noise in the green channel more strongly as well than the noise in the blue channel and therefore it is more discernible in the overall image.

Around sigma 15, the noise is discernible.