

Computer Vision (SPRING 2019) Problem Set #1

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1a: Interesting Images



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

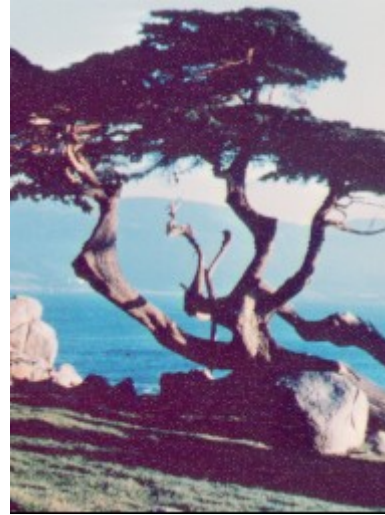


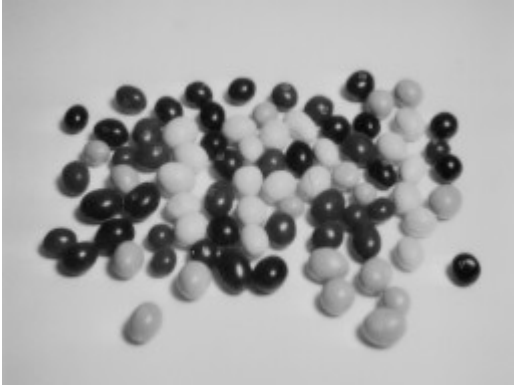
Image 2 - ps1-1-a-2.png

2a: Swapped Green and Blue



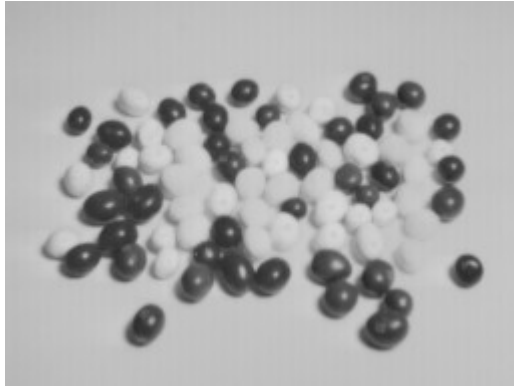
ps1-2-a-1.png

2b: Monochrome Green



Img1_green - ps1-2-b-1.png

2c: Monochrome Red



Img1_red - ps1-2-c-1.png

3a: Replacement of Pixels

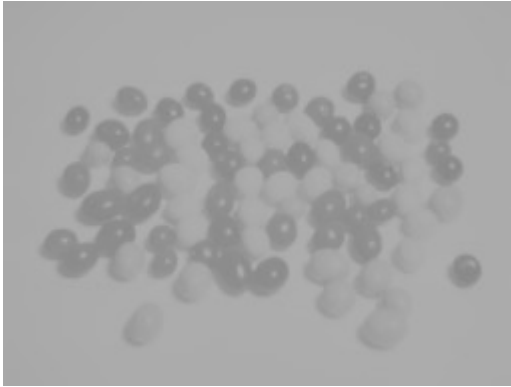


ps1-3-a-1.png

4a: Image Stats

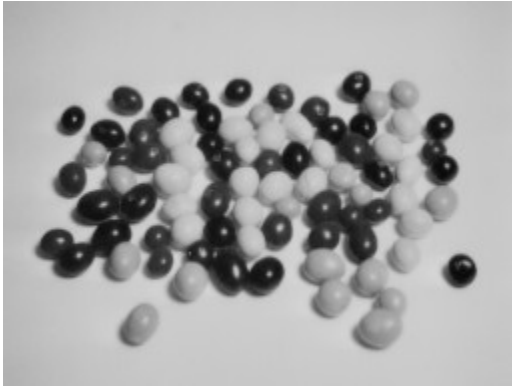
- Min: 9.0
- Max: 214.0
- Mean: 165.2079874674479
- Standard deviation: 56.89940073389302

4b: Arithmetic Operation



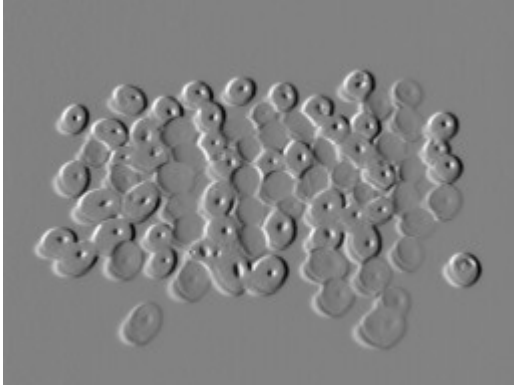
ps1-4-b-1.png

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)

A: The green channel grayscale conversion of the original seems to be most resembles.

Also, I think this will apply to all kinds of images, based on my reading & understanding, when camera captures the image, it usually places green filter over half of the sensor, which equals the sum of both green & blue filters. So the final image comes out weights more to the green channel than red and blue channels. Therefore, we will always feel the green channel grayscale conversion of the original seems to be most resembles to the original one.

6b: Discussion

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

A: I think image pixel values is just a definition and can have any range in Real number. If we obtain a negative pixel value, that most likely means the image type is not uint8, if we define pixel value from -128 to 127 with 0 in the middle, a negative sign means the color is more closer to black instead of white. Also the absolute value here is just a measure of how far we are from gray but the sign is actually telling us whether we are closer to black or white, which is why maintain the negative sign here is so important.

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?

A: adding noise to blue channel seems to be better.

Adding noise to the green channel is more visible/discernible than doing that to the blue channel.

With $\sigma = 10$, noises added to green channel can be easily observed, but still very difficult to spot the noises added to blue channel and I think the reason here is the eye is much more sensible to green than blue.

Below are four pictures, 1st one is the original, the next 3 are adding same noise to red/green/blue channel correspondingly, and we can see the noises added to the green channel are most obvious.

