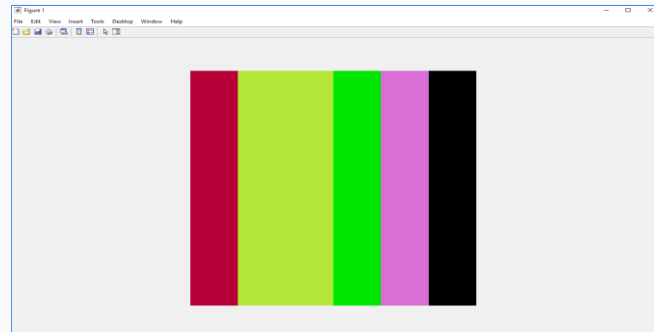
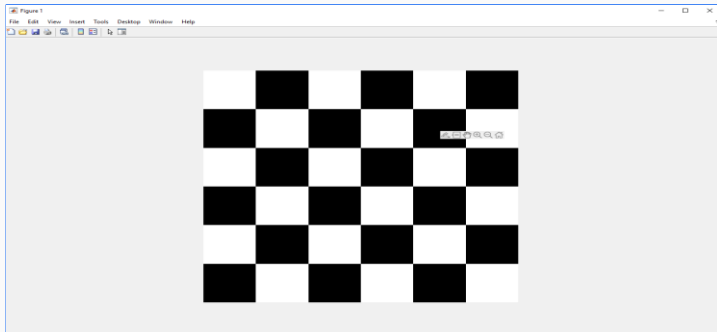


# Lab 2: Digital Signal Processing

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# Part 2: Image Processing with MATLAB



What is the main difference between how grayscale and color images are represented in Matlab?

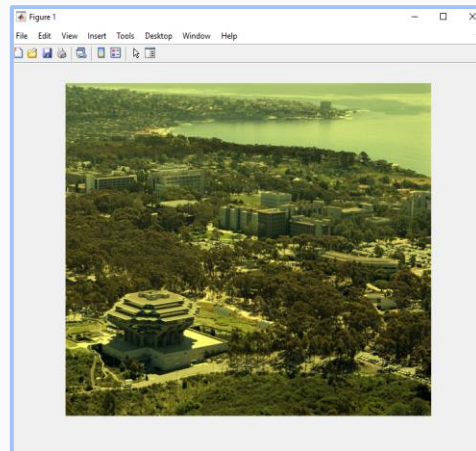
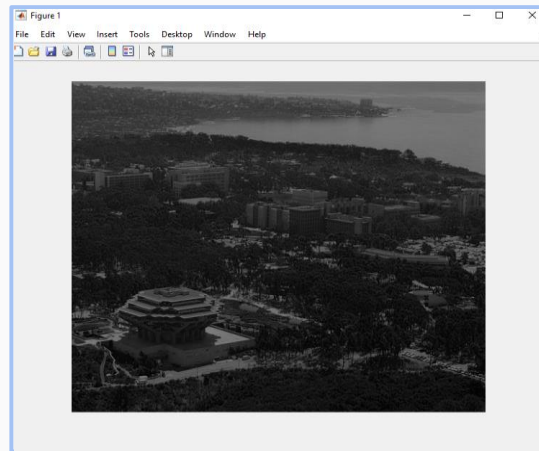
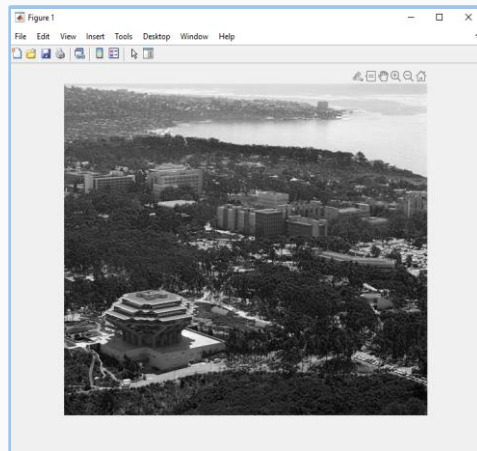
**A grayscale image is formed from a single matrix, and each element corresponds to one image pixel. Color images are formed from a 3D (or 3-layered) matrix. We concatenate our 3<sup>rd</sup> dimension to our 2D matrices using the `cat()` function. So in color images, each pixel has 3 components, R, G and B (RGB).**

Images are stored as large sets of numbers known as matrices. What do the values of these numbers represent?

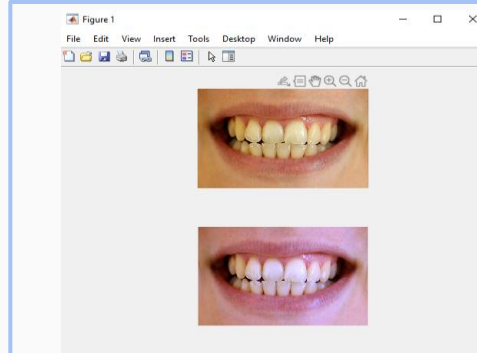
**Pixels.**

# Challenge #2 - Exploring Image Structure

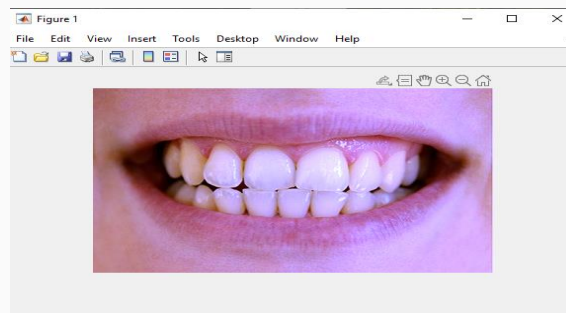
## Part 2



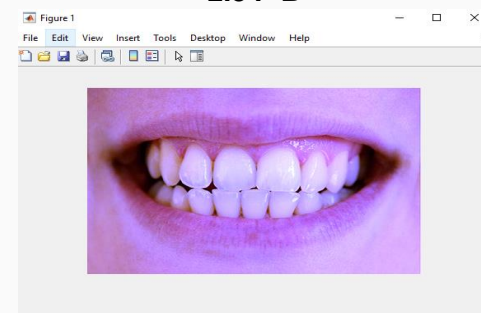
**Of course it looks worse, because there aren't much color in it compared to the original image.**

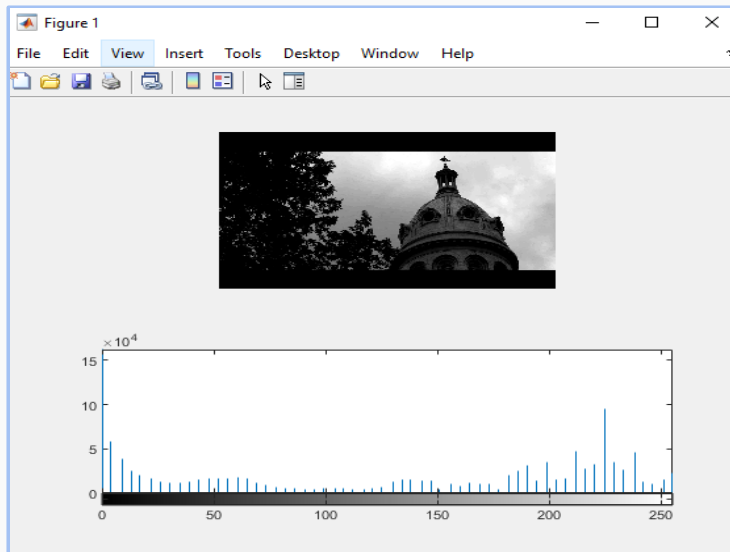
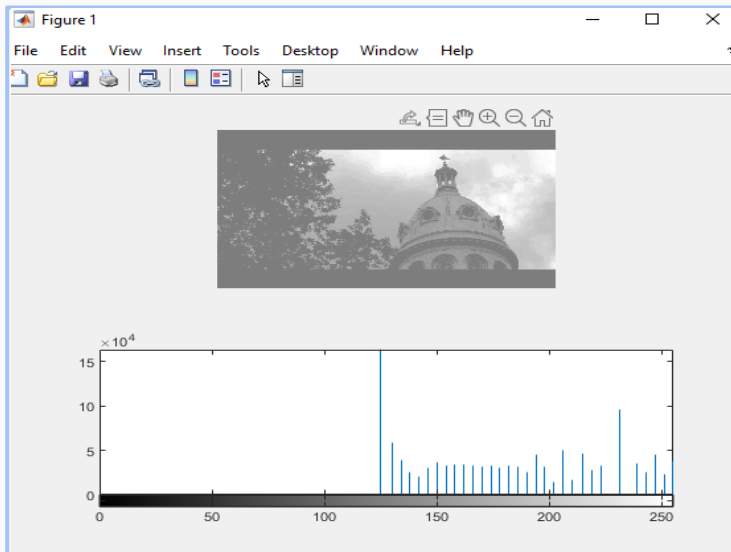


**2.0 \* B**



**2.8 \* B**





Exercise 3c: Which of the two images from the previous exercises looks better? Also, what are the differences between the two methods used?

**I personally think the second image (on the right) which uses the contrast stretching method looks way better. The contrast stretching method spreads the pixel values along the intensity range, so we have a somewhat even spread of contrast. The histogram equalization method flattens the distribution of pixel intensity.**



Top Sobel

Exercise 4b: Show your image with noise removed.

**KINDLY REFER NEXT SLIDE**

Explain in your own words what “noise” is in the context of images? What are some methods that are used to remove noise from images?

**I define noise in the context of images as something that distort the quality of an image, making it look less authentic compared to the original.**

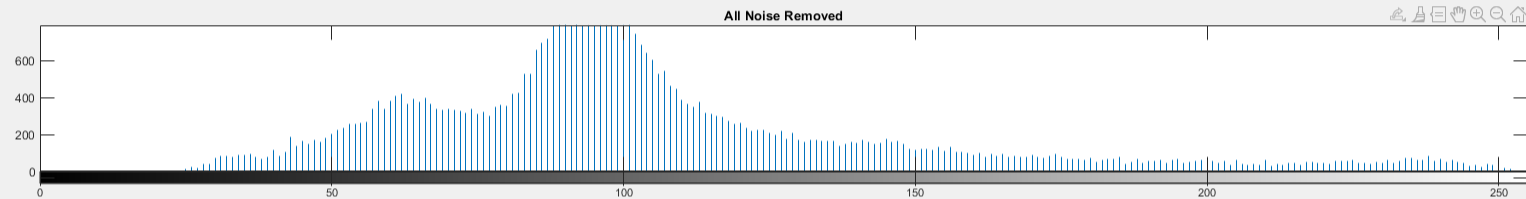
**Noises from images are removed through filtering process, and there are many kinds of filters like median filters which is under Kernel Filters.**



All Noise Removed



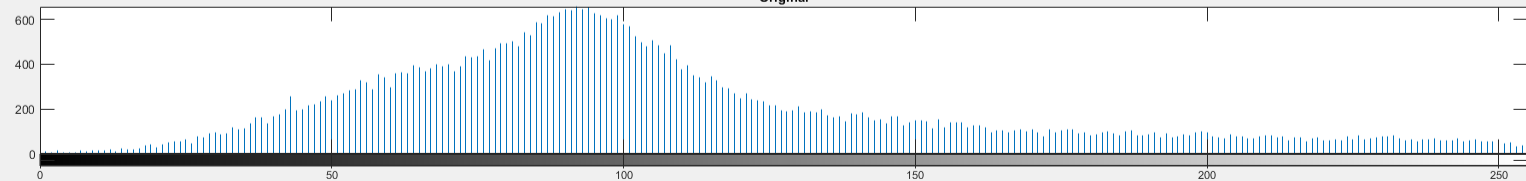
All Noise Removed



Original

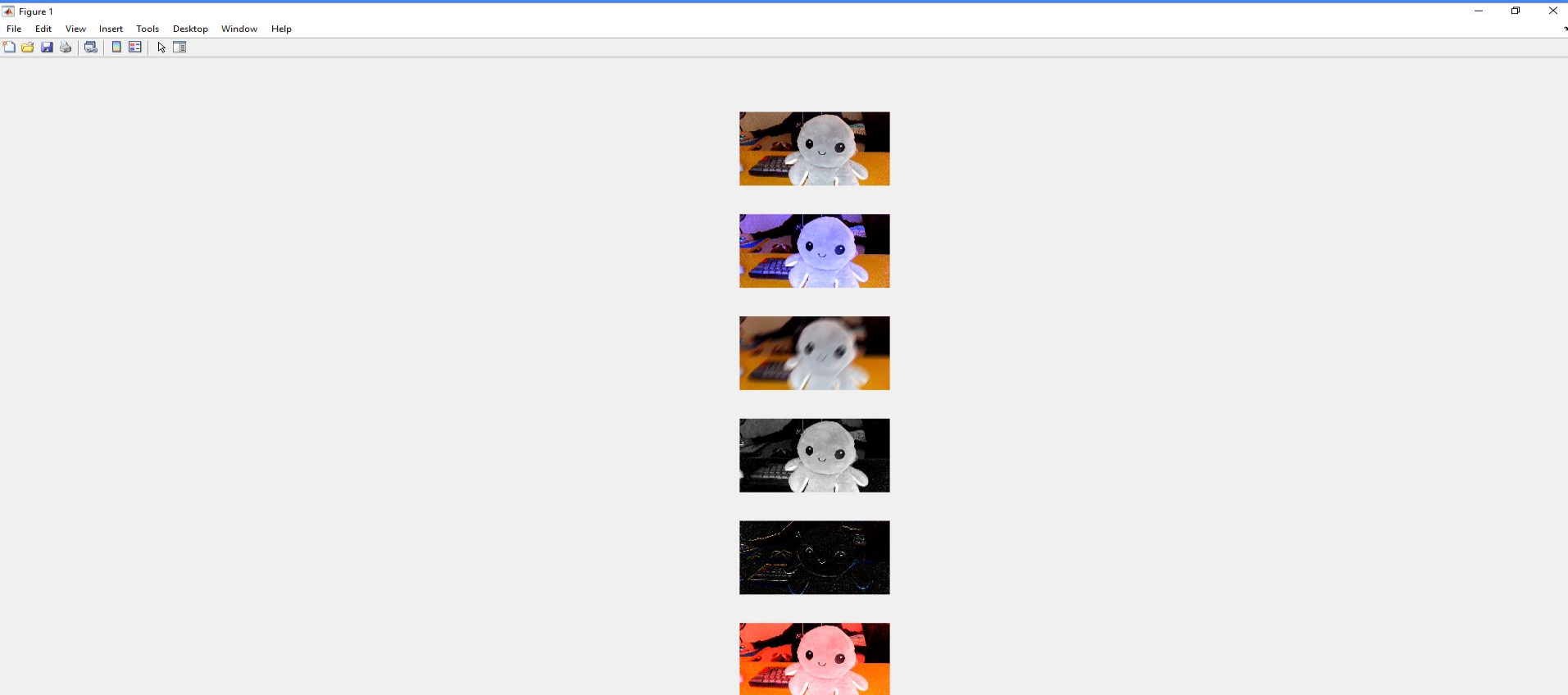


Original



# Final Challenge – The Photobooth Challenge

## Part 2





# Lab Experience

Now that you have seen signals being manipulated in both the analog and the digital domains, what are some advantages to using digital signal processing?

- **Less noise/distortion on signal**
- **We can simply reconfigure DSP system just by changing the program.**
- **Definitely cheaper.**

What was most valuable to you in this lab? Did you extend beyond the required challenges using what you have learned or did you have further questions regarding how something worked? Any other pictures/plots or ideas of projects or things you would like to share from your third lab?

**This lab 2 part 2 is one of the most interactive lab assignments in my opinion. The best thing is I think I can code faster now in Matlab :P**