KENNESAW STATE
UNIVERSITY

CS 4732
MACHINE VISION

ASSIGNMENT 1

IMAGE RESOLUTION

INSTRUCTOR

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1. ABSTRACT

In this project I learn to down and up sample images using just for loops. I then also learn about how to adjust intensity levels in gray scale images using just for loops as well. In this assignment I use python, and matplotlib to visualize, read and visualize images. I also use numpy to create empty image arrays.

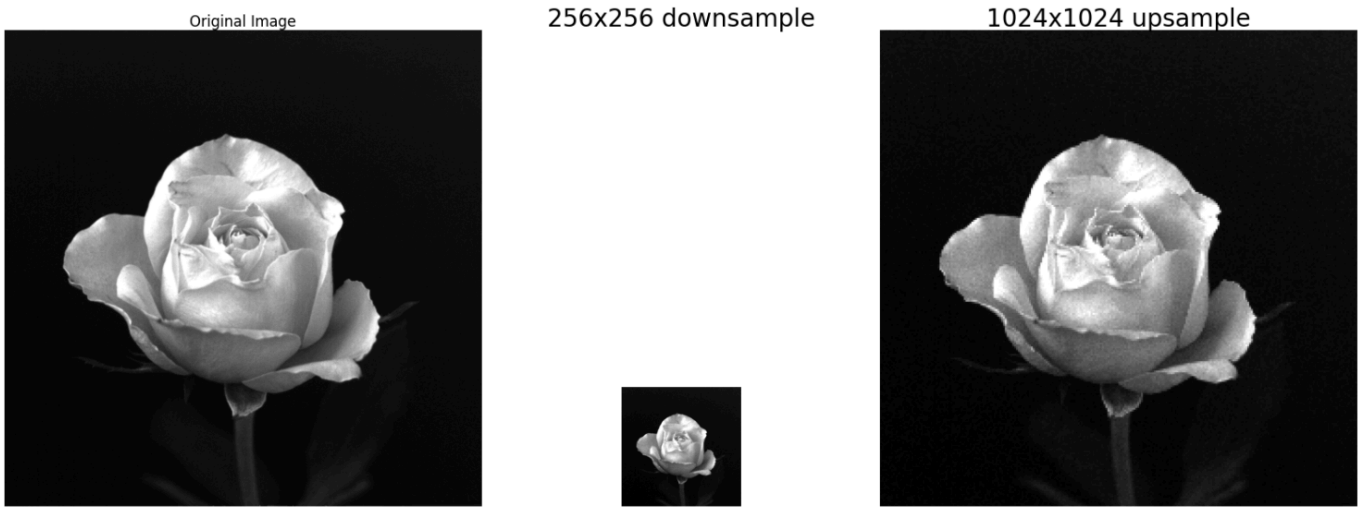
2. TEST RESULTS

2.1 Test Results for Image Downsampling and UpSampling

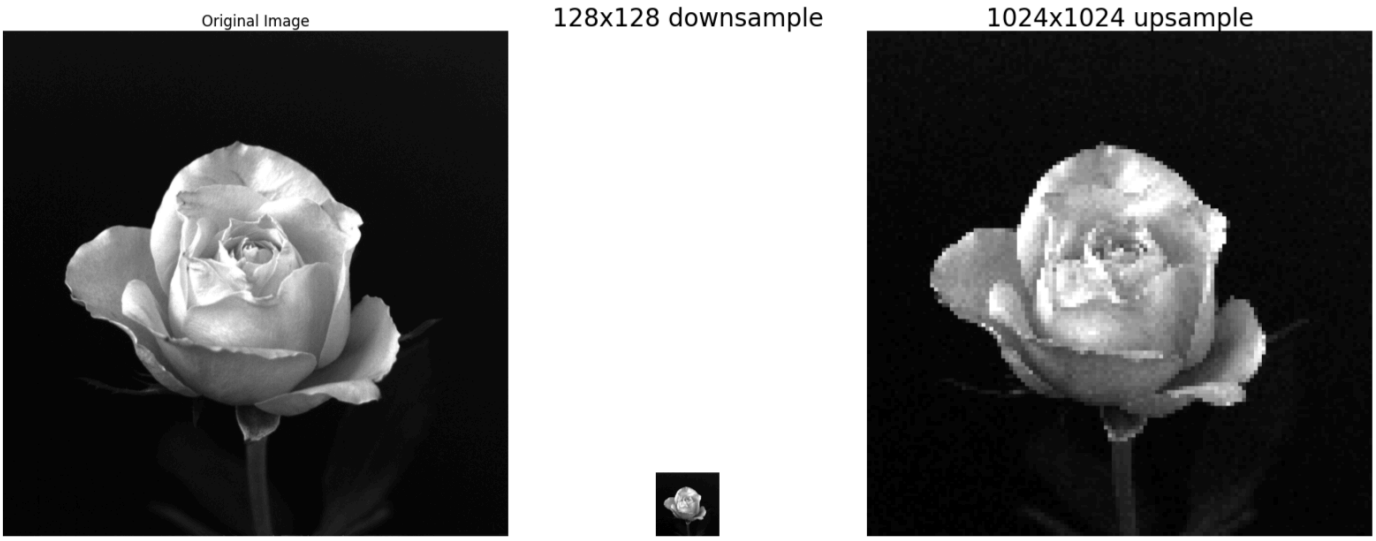
All images were put through my own down sampling function that would take the original image
and create a new image that was scaled down by the factor of the original image dimensions divided by the output image dimensions.

Then those same images were run through my own up sampling function that would create a new image by looping through the down sampled image and spreading the values of each pixel through the new image by the factor calculated earlier.

Fig (1) Original Image down sampled to 512x512 then back up to 1024x1024



Fig(2) Original Image down sampled to 256x256 then back up to 1024x1024



Fig(3) Original Image down sampled to 128x128 then back up to 1024x1024

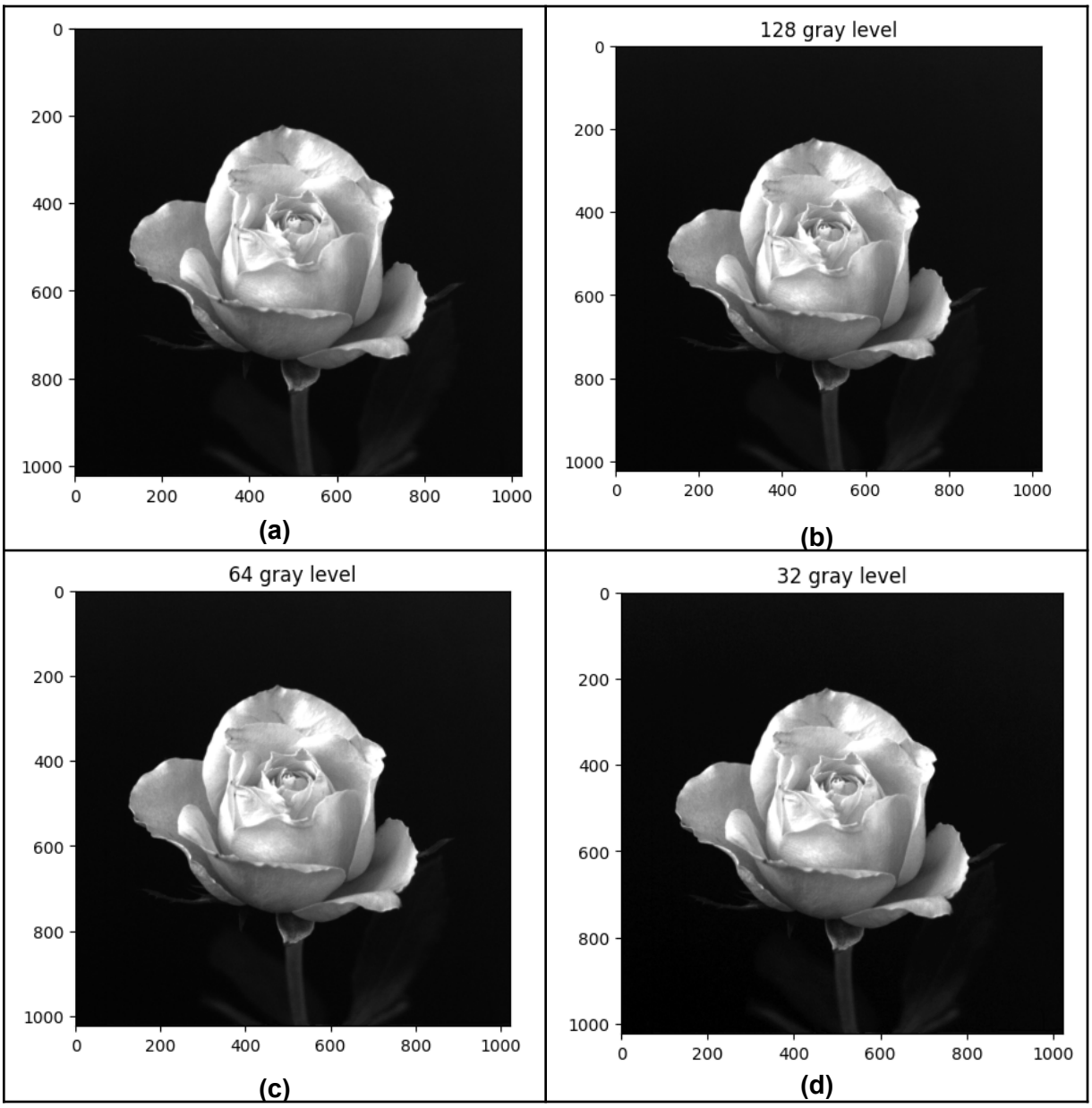


Figure 4: (a) Original grayscale image (rose.jpg) (b-d) Variations of original image with intensity level adjusted

2.2 Test Results for Image Upside-down

For each test the original image is through my own gray level changing function. This would take in the number of bits there should be. It would then create a new empty array for the new image and then loop through the input image. For each pixel in the original image a mask is created to find which bits we want to be discarded. Then a bitwise operation is down on the pixel to remove the lower bits that are no longer needed. And finally the bits are shifted to represent their new bit level and that pixel is added to the new image.

It is a bit hard to see the different intensity levels in these examples, but I tested this same function with a lower bit level like three and two and the difference there is much more noticeable.

3. DISCUSSION

From this assignment I learned simple down and up scaling. These were already concepts that I was familiar with but I had never implemented in a program. I also learned how to adjust the intensity level of a grayscale image. This concept I was not familiar with at all and had to do some research to learn how I would tackle this problem. I learned about creating masks and bitwise operations. I had heard of these before but never learned or researched them.

4. CODE