Assignment1: Basic Image Manipulation Techniques

Pariyakorn Chuisakun

Department of Computer Science and Engineer

University of South Florida

1. Introduction

This assignment focuses on introducing basic image formats, manipulation techniques, and the sample code. In this assignment, HW0 was expanded to explore more image manipulation techniques. We also started implementing regions of interest, ROIs, and preprocessing those. This assignment also explored the augmentation of gray level and color images.

2. Implementation

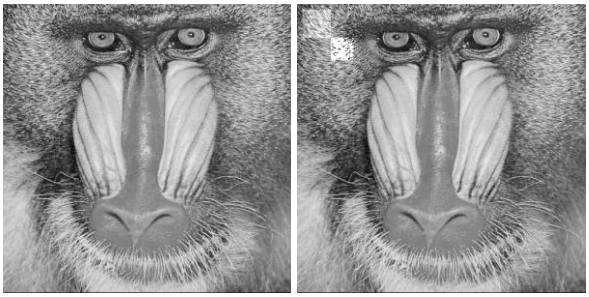
The immediate approach to the implementation was to modify the previous utility functions and code to accept more parameters. The code is given a parameter text file where it reads through to retrieve information about the input image, output image, number of ROIs, position of ROIs, functions to be applied, and their function specific parameters. The previous utility functions were all modified to work with ROIs. A utility function to overly the ROIs with the original image was also implement. This was done so the final output image would display the source image with the modified ROI's overlapping it.

When augmenting the ROIs, new rotate, brightness, and scale functions were implemented to better handle the parameters. A utility function was implemented to extract the ROIs positions prior to preprocessing the functions for each ROI. The augmentation of gray level ROI occur in the main function once the ROI have been extracted. It then calls on the rotate function to produce the 3 rotated images. It then calls the new scale function to scale the image without changing the size. For the final set, it calls the new brightness function and then calls rotation again for another 3 images. When implementing augmentation in fsprime, the output is not properly saved as a pgm.

I was unable to implement the augmentation of color images in fsprime. When that portion of the code is included, the program will not compile due to linker and header issues that I was unable to resolve.

3. Resulting images with parameters

This section illustrates the results of the algorithms. The parameters.txt file was run with the iptool program to produce the following images.



Baboon.pgm and baboon_output1.pgm

ROI 1: add 50 ROI2: binarize 100 ROI3: decreaseBrightness 100 30

Ocean.pgm and baboon_output1.pgm

ROI 1: add 150 ROI2: binarize 160 ROI3: add 50

Manatee.pgm and manatee_output.pgm

ROI 1: binarize 160 ROI2: 100 30

The overlap function allows the ROIs to appear on top of the source image.

4. Discussion of results

The output images display the source image with the modified ROIs overlayed. This is purposeful for visualizing the effects of the functions on the image directly. The overlapping of ROIs also shows that the images can be modified multiple times with different filters.

5. Conclusion

This assignment was most helpful in understanding preprocessing and augmentation. While preprocessing is mostly done to the entire data set and makes the data insensitive to factors. In augmentation, new images are produced from existing one and it allows for the implementation of more conditions.