Digital Image Processing
Homework 1

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Overview

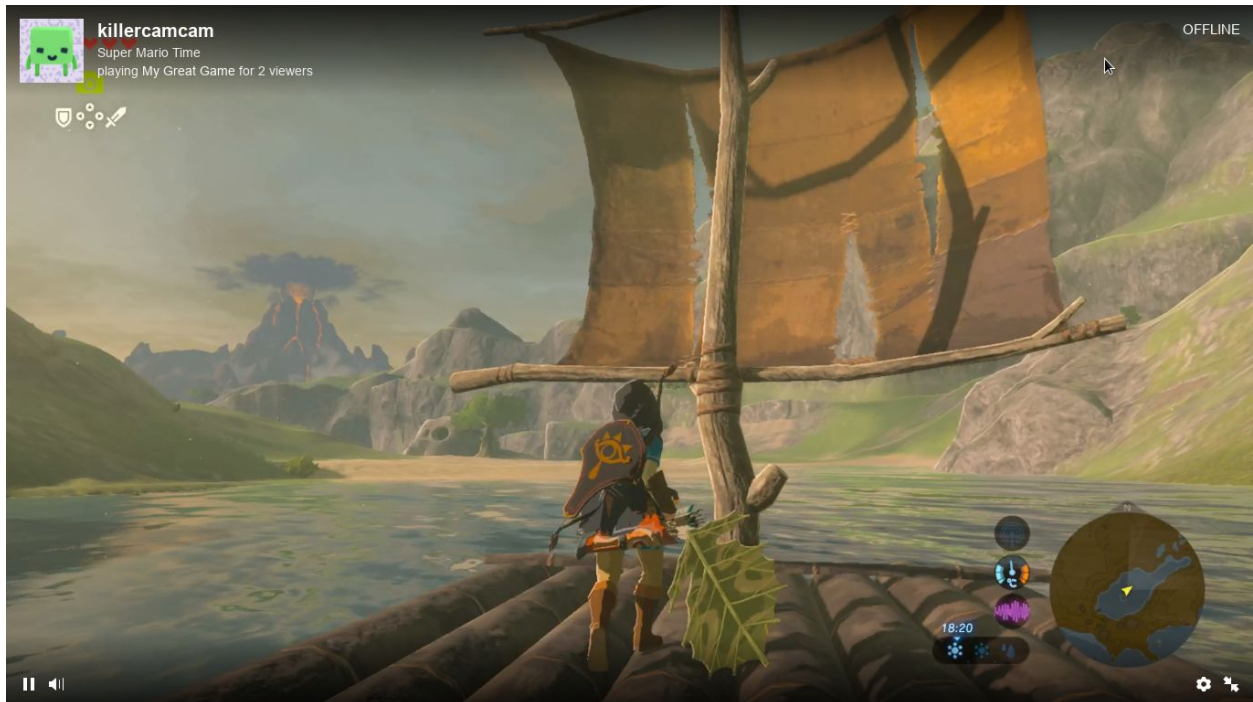There are two requirements for this assignment:
- To remove the background of a grayscale image
- To perform basic enhancement on a grayscale image

The purpose of this assignment is to understand basic image processing.

Procedure

I captured a screenshot of a friend's livestream, which I use for my source image. It is a standard RGB screenshot saved in .png format. I used the program GIMP to create a grayscale mask image to match my screenshot.

Here's the original image.

The first output image is simply a grayscale conversion of the original RGB image.

The second output image has the background removed using the mask image.

The third output image is an enhanced background with a silhouette foreground.
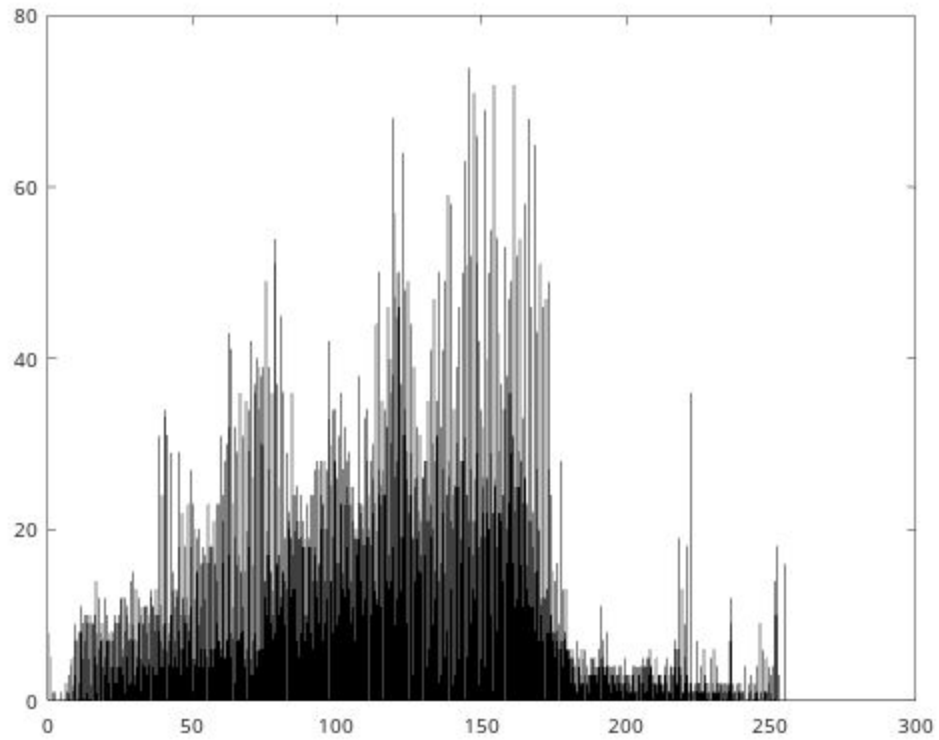

The fourth and final output image is the enhanced background with the original foreground, which I think turned out the best.

The original image seemed a bit too hazy, so performing gamma adjustment on the background really enhanced the details of the background. Using the enhanced background with the original foreground resulted in the best image.

Here is the histogram of the grayscale image:

These are the miscellaneous details of the assignment:

Name	Class	Dimension	Value	
cols	double	1x1	1366	
i	double	1x1	768	
j	double	1x1	1366	
mask	uint8	768x1366	[255, 255, …	
max_val	uint8	1x1	255	
mean_val	double	1x1	111.28	
min_val	uint8	1x1	0	
original_gray	uint8	768x1366	[36, 36, 36,…	
original_rgb	uint8	768x1366x3	…	
result	uint8	768x1366	[5, 5, 5, 5, 5…	
rows	double	1x1	768	
temp	uint8	768x1366	[5, 5, 5, 5, 5…	

Maximum value of the grayscale image: 255
Minimum value of the grayscale image: 0
Average value of the grayscale image: 111.28

<u>Conclusion</u>

Based on the procedure of this assignment, we can safely say that basic image processing like gamma adjustment really enhances the image. Also, it's worth mentioning that having a strong background and previous experience with photo editing has really helped on this assignment, and will probably help for the rest of the course. I am very good with GIMP, so it was easy for me to create the mask image and understand basic image processing.

Overall, this assignment was a good reinforcement of my already existing knowledge and experience.