Enhancing the Enlargement of Images
Tara Naughton
Computer Systems Lab 2009-2010

Abstract

Methods typically used to enlarge images either produce images too jagged or too blurred. The intent of this project is to develop a method for enlarging images that retains the sharpness of edges while still keeping an image that looks smooth and high quality.

Background and Introduction

In image processing, two different methods of image enlargement are most commonly used: pixel replication - which simply repeats each pixel value for the amount of the scale factor - and interpolation - which constructs new data points between two pixels that work as a gradient connecting one pixel to another in the enlarged image. Unfortunately, both methods tend to produce less than desirable results; images resized with the pixel replication method often look very jagged and overly pixelated, while on the other hand, images resized with the interpolation method come out too blurry and with undefined edges. This project aims to find an algorithm that produces high quality enlarged images that can both preserve sharpness and avoid producing an overly pixelated image.

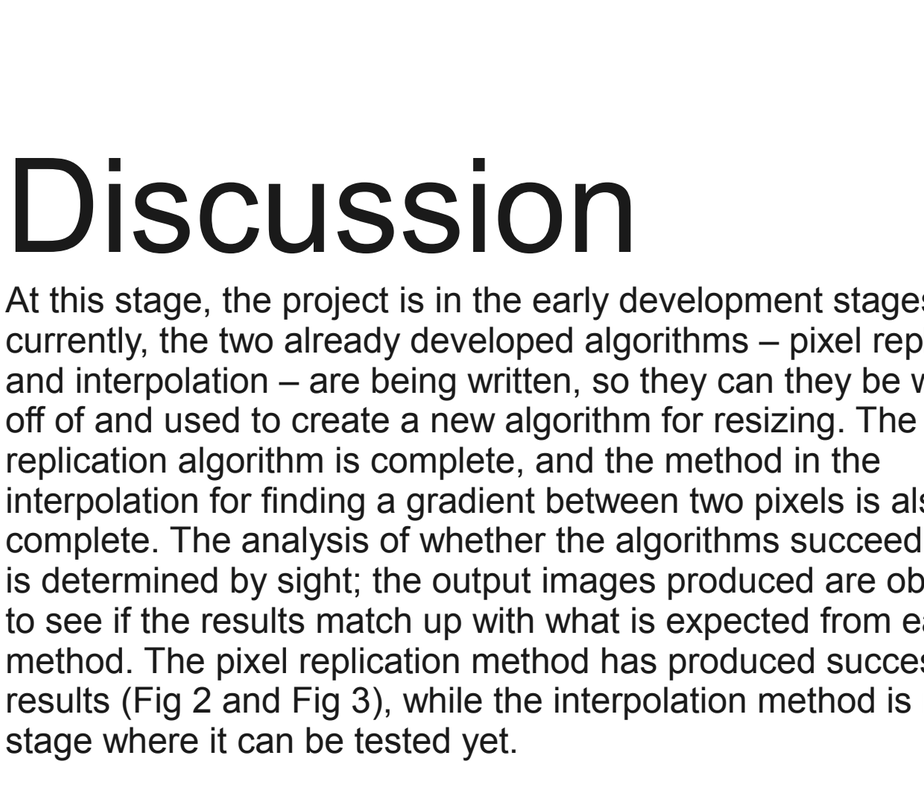

Fig 1. Pixel replication vs. interpolation

Fig 2. Original, unmodified image

Fig 3. Image enlarged by pixel replication method

Discussion

At this stage, the project is in the early development stages; currently, the two already developed algorithms – pixel replication and interpolation – are being written, so they can they be worked off of and used to create a new algorithm for resizing. The pixel replication algorithm is complete, and the method in the interpolation for finding a gradient between two pixels is also complete. The analysis of whether the algorithms succeed or fail is determined by sight; the output images produced are observed to see if the results match up with what is expected from each method. The pixel replication method has produced successful results (Fig 2 and Fig 3), while the interpolation method is not at a stage where it can be tested yet.

Results and Conclusion

When the project is complete, it should be able to produce high quality images with sharp edges, smooth transitions between intensities of colors, and without unwanted pixelation. Image quality, however, is not something where you can reach a definitive stopping point, and work on the algorithm should be able to continue until the end of the designated time for the project, and potentially even become a starting point for future researchers to build off of and continue to improve.