

Enhancing the Enlargement of Images

TJHSST Senior Research Project Proposal

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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.

1 Introduction and Background

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.

2 Goal

To develop an algorithm for enlarging images that preserves the sharpness and retains as much quality as possible from the original image.

3 Procedure

The code for the project will be written in Python. The algorithm will take a black-and-white .pgm image as input, call on an edge detection method and interpolation method that will be written separately and then called upon in a separate part of the code, and produce a .pgm image that is a resized version of the original. The interpolation method resizes non-edges adequately, so it is only necessary to single out the edges and resize them independently in order to preserve the sharpness of the image. To test the program, images produced by the algorithm will be compared to the same resized image of the same scale produced by the two traditional methods (pixel replication and interpolation) and overall image quality will be evaluated.

4 Scope

By the end of the time allotted for the project, the program should be able to resize images successfully and retain as much of the original quality as possible. First quarter should mostly be spent on creating the basic methods that will be used in the project (such as edge detection and interpolation), while the rest of the time will be spent on developing a method that efficiently uses both algorithms to create the most high quality image possible. The program will initially begin scaling black-and-white .pgm images, but if time permits, the program should be extended to process other image formats and color images as well.

5 Expected Results

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.