TJHSST Computer Systems Lab Senior Reasearch Project Dynamic Image Resizing Quarter 2 Paper

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January 21, 2008

1 Abstract

The goal of this project is to be able to resize an image without distorting any important aspects of the image. Commons methods of resizing, including cropping and scaling, remove or distort some of the image and are thus undesirable. By finding the least important pixels and removing them, this dynamic resizing can be possible. These can be found by finding the change of intensity of each pixel to the next and taking away the ones with a very low change. Using this method, humans should be unable to tell if an image has been altered.

2 Introduction

Currently on the web, there is such a thing as dynamic text formatting. For instance, when you resize a web browser window, the text in it will adjust itself to fit inside the window while still being readable. There is nothing like this for images however. My goal in this project is to be able to change the dimensions of an image without losing important content, such as the dimensions of the focus of these pictures.

3   Background

Edge detection is being researched heavily in modern times. Many teams are trying to allow computers to see and identify objects. But there is also much research being conducted about images and modifying them. There is one project called PhotoSynth that is trying to take a large amount of images from the web, and from them, create a 3D model of whatever the images are of. There is also another project that is very similar to what I am trying to do, although I have some ideas for my project that they have not yet implemented.

4   Development

I will be using C for all of my programming. In order to resize the images, the program will first convert the image to grayscale by averaging the red, green and blue values for every pixel. In order to find the least important pixels (the ones that should be removed to harm the image the least), the gradient magnitude function will be placed on the image. What this function finds is the rate of change of intensity of the grayscale image (or the first derivative of it). From this gradient image, the program will find the path of pixels from one side of the image to the other that is the least important by using the cumulative sums of the gradient image. This will be determined by the smallest changes in intensity. These pixels will be removed and this process repeated until the image has the desired dimensions.

5   Results

As of now, the program is capable of shrinking the image in both the horizontal and vertical directions. With the newest method of finding the optimal pixels to remove (the cumulative sums of the gradient image) the final images are usually very realistic. It is difficult to notice that it has been modified at first glance, which is the goal of the project.