

TJHSST Computer Systems Lab Senior  
Research Project  
Dynamic Image Resizing  
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**Abstract**

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.

## **1 Introduction - Elaboration on the problem statement, purpose, and project scope**

### **1.1 Scope of Study**

The goal is to make an user interface for resizing an image, without losing the dimensions of the important aspects of the image. The final version should be able to expand and contract the image in both directions. Also I would like to include a tool that would allow the user to take out unwanted segments of the image.

## **1.2 Expected results**

The ideal program for this project would be able to modify an image, without a human being able to tell that it was modified in any way. The resulting image should look entirely realistic in every respect.

I hope to learn different methods of edge detection through my reasearch. I will also be looking for ideas for algorithms to find a path of pixels with the lowest total change in intensity, as this is the most important part of the program and will ultimatly show if the program is working.

## **1.3 Type of research**

The reasearch that I will be doing is closer to pure applied reasearch, but I will also have some understanding of the topic.

# **2 Background and review of current literature and research**

Edge detection is being reserached 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.

# **3 Procedures and Methodology**

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." 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.

## 4 Expected Results

By doing this process to many images, the results should be obvious. Being able to change an image without making it look unrealistic would be a powerful technology if implemented in the right places. Incorporating this into a web browser would be the ideal place to put it to the test.