

# Programming Assignment 2

Due May 20 at 11:59PM

## 1 Background

<http://www.youtube.com/watch?v=vIFCV2spKtg>  
[http://en.wikipedia.org/wiki/Seam\\_carving](http://en.wikipedia.org/wiki/Seam_carving)

## 2 Assignment

Watch the youtube video above to get the idea of seam carving.

This assignment may be done in any programming language of your choice. Given a file of floating point comma separated values(CSV), Find the minimum cost seam for your given data set. Additionally, report the trace that your values have used for your seam. You must calculate the seam yourself. Do not use any packages or libraries that give you the answer.

Each of you will be given an assigned data set(See Dataset Assignment.pdf). Once you have preformed the seam carving and generated the trace back for your data set. Email ccurt002@ucr.edu with the answers for your data set to receive credit. **Any code submission from students that have not emailed me the answers for their data set will receive a zero. NO EXCEPTIONS.**

### 2.1 Output

Your output must be in following format:

First line will contain the total cost of the seam.

Lines 2 through N+1 will contain the row, column, and the Cost[row][column]

### 2.2 Example Output

This is taken from input0small. The "[ ]" are optional

```
Min Seam: 1631.9111717595251
[9, 2, 4.768774146902411]
[8, 2, 7.262774991898646]
[7, 1, 429.20979967862644]
[6, 0, 199.03142285595493]
[5, 0, 292.91135369064716]
[4, 0, 301.3952709224828]
[3, 0, 15.567554630348202]
[2, 0, 36.87260399314229]
[1, 0, 29.169508984787708]
[0, 0, 315.72210786473465]
```

## 3 Requirements

I will post test files and a list to indicate the test files assignments. Each student will have 3 files, small, medium, and large to run their algorithm on. Once completed, **you will email ccurt002@ucr.edu** the 3 trace files that are formatted as described in section 2.1 2.2

You will turn in:

1. All program files you used. (e.g. .py, .h, .cpp, ...)

2. Your trace file for each test from seam carving
3. A README.txt on how to build and run your program.

Your algorithm **MUST** compile and run. Any programs that do not run as described in the README.txt will receive a zero.

## 4 Extra Credit

You must finish and get checked off(emailing ccurt002@ucr.edu the trace files) before performing the extra credit.

For extra credit: Add the ability to process images. You may use any freely available image libraries online to help you get the pixel information.

### 4.1 Cost Function

Use this cost function to calculate the minimum seam.

```
def _distance(rgb1, rgb2):
    return sum((a-b)**2 for a,b in zip(rgb1, rgb2))

def energy(row, col, height, width):
    result = 0
    pixel = get_pixel(row, col)
    for c in (col-1, col+1):
        if 0 <= c < width:
            result += _distance(pixel, get_pixel(row, c))
    for r in (row-1, row+1):
        if 0 <= r < height:
            result += _distance(pixel, get_pixel(r, col))
    if col in (0, width):
        result *= 2
    return result
```

### 4.2 Requirements

Perform seam carving on an image as input. As before, return the minimum cost seam and the trace used to create it. As an additional requirement, create an image expansion function that would indicate the placement and value of a seam. The seam would be used to expand the image by a single pixel width and has the least impact on the image. You do not need to worry about "important" features on the image(such as a face).