HACETTEPE UNIVERSITY

BBM 415-IMAGE PROCESSING LABORATORY

ASSIGNMENT 1

REPORT

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PART1: DITHERING

Dithering is distribute errors among pixels. Any rounding errors are distributed to other pixels. Specifically to the pixels below and to the right: 7/16 of the error to the pixel to the right, 3/16 of the error to the pixel to the lower left, 5/16 of the error to the pixel below, 1/16 of the error to the pixel to the lower right.

METHOD

In this experiment I made sure that the sum of the ratios was 1, paying attention to the pixel position.

Firstly, I use a nested for loop to navigate each row and each column. I follow these steps: oldpixel = pixel[x][y] , newpixel = find quantized value(oldpixel), pixel[x][y] = newpixel , quant error = oldpixel - newpixel .

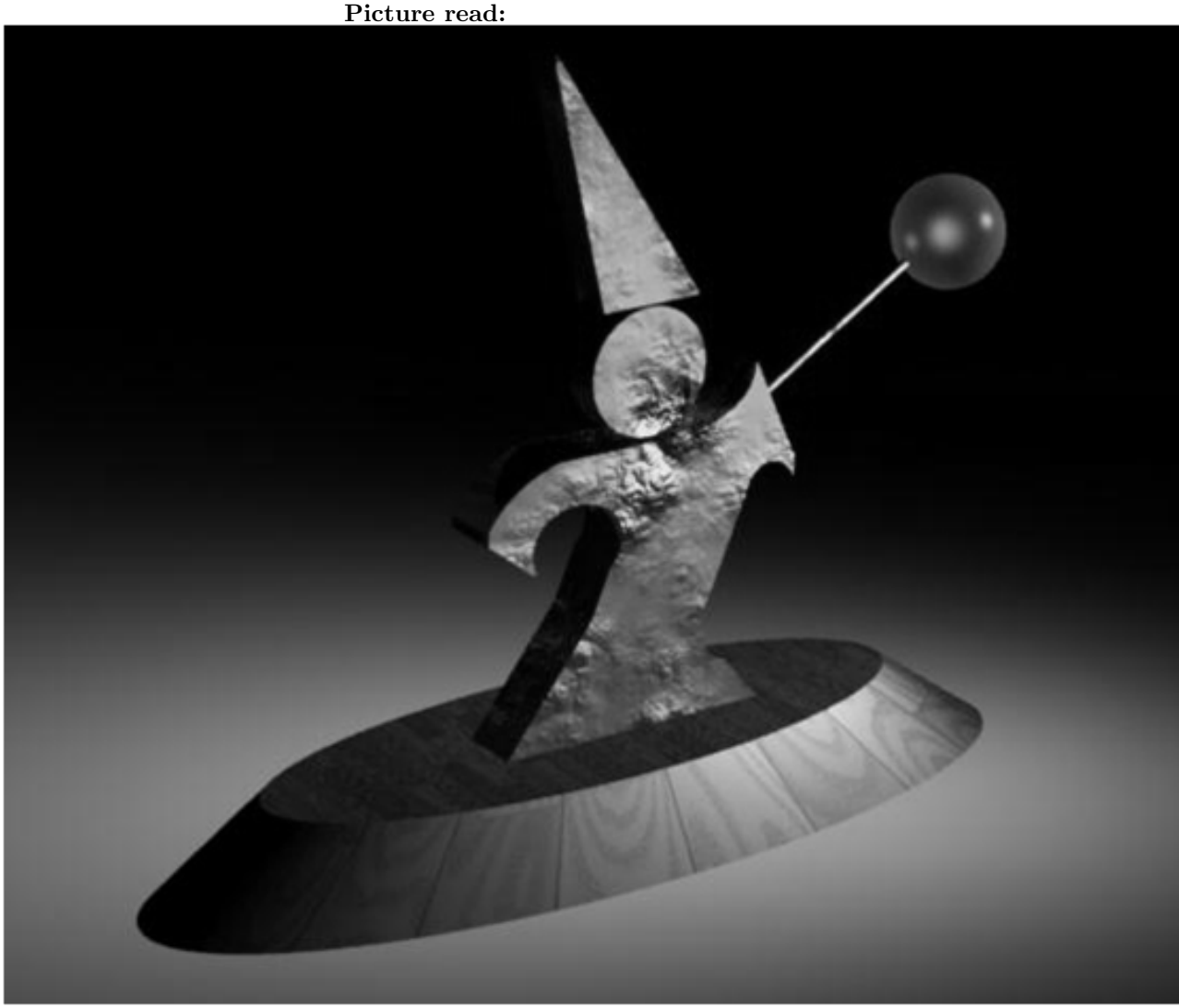
Then ,if x=1, ie on the top line, I look at y's position. If y is the last column, I just distribute the quant error down and lower left. I made sure that the sum of the ratios was 1. If y is the first column, I just distribute the quant error down and lower right and right. And sum of their ratios was 1. If y is not the last or first column, I distribute the error normally.

If x not equal to 1, ie not on the top line,and if x is the last row, and if y is not the last row, I just distribute the quant error right.

If x not equal to 1, ie not on the top line,and if x is not the last row, I look at y's position. If y is the first column, I just distribute the quant error down and lower right and right. If y is the last column, I just distribute the quant error down and lower left. If y is not the last or first column, I distribute the error normally.

EXPERIMENT

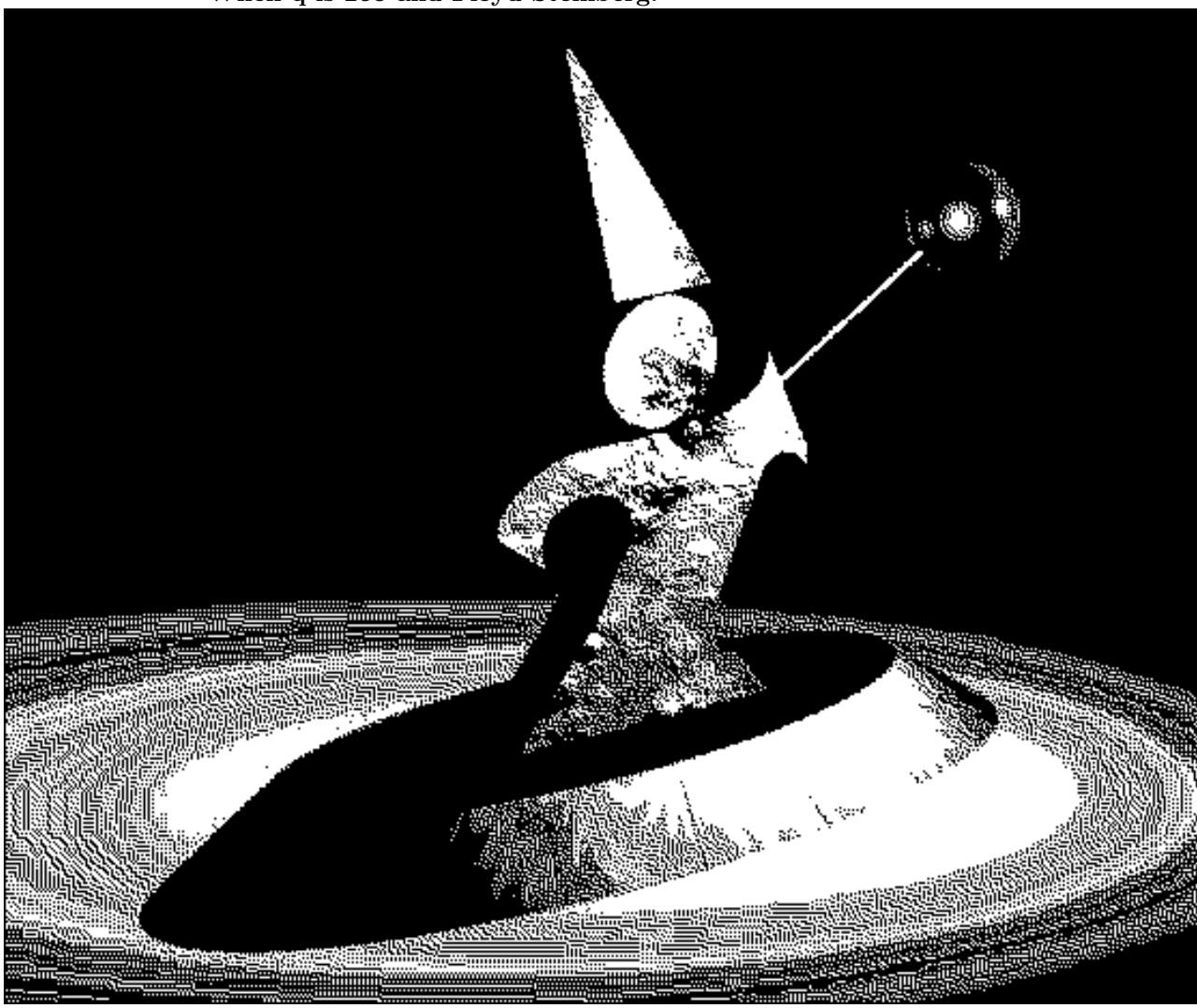
Picture read:



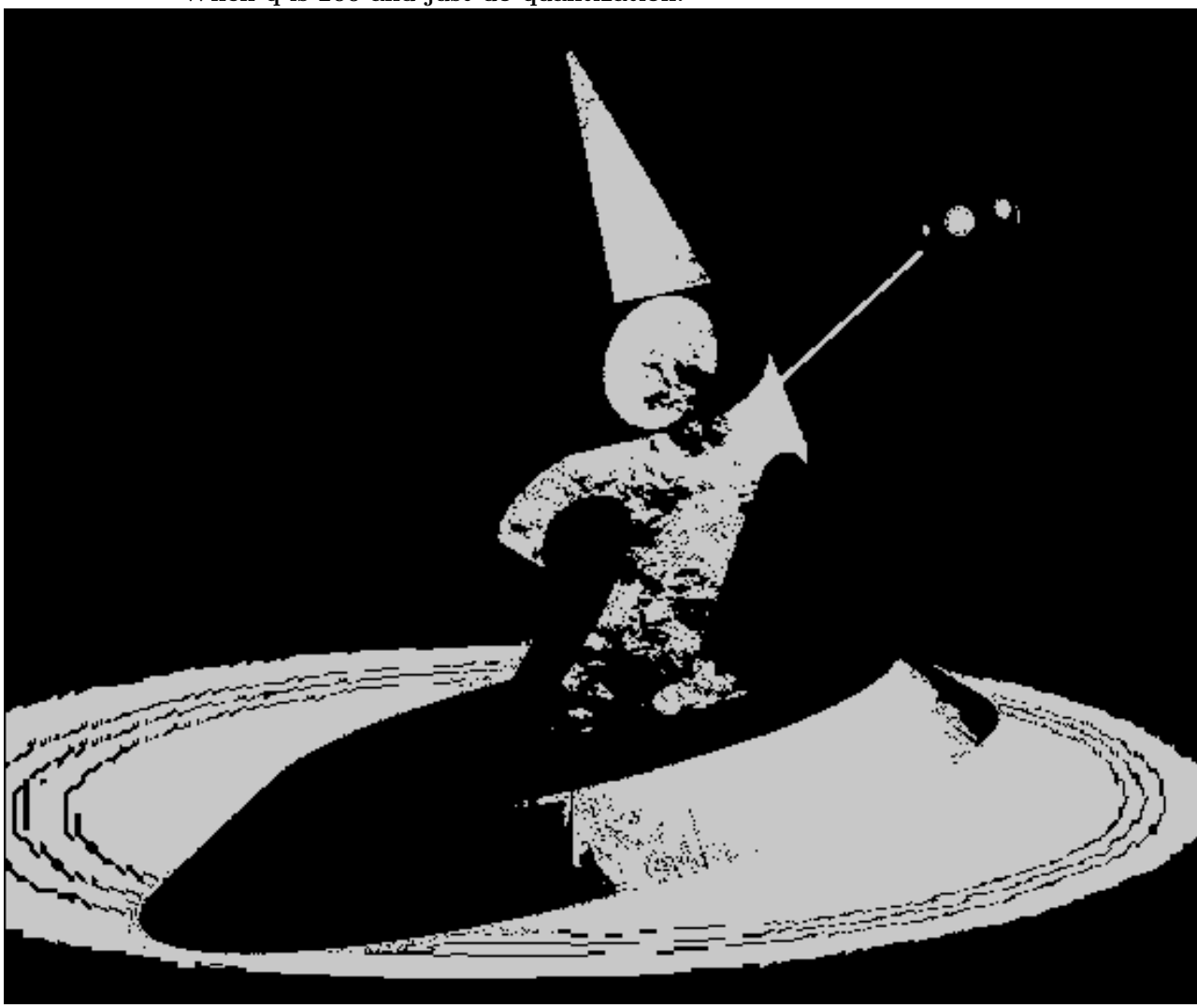
And RESULTS:

When q is 255 and just do quantization:

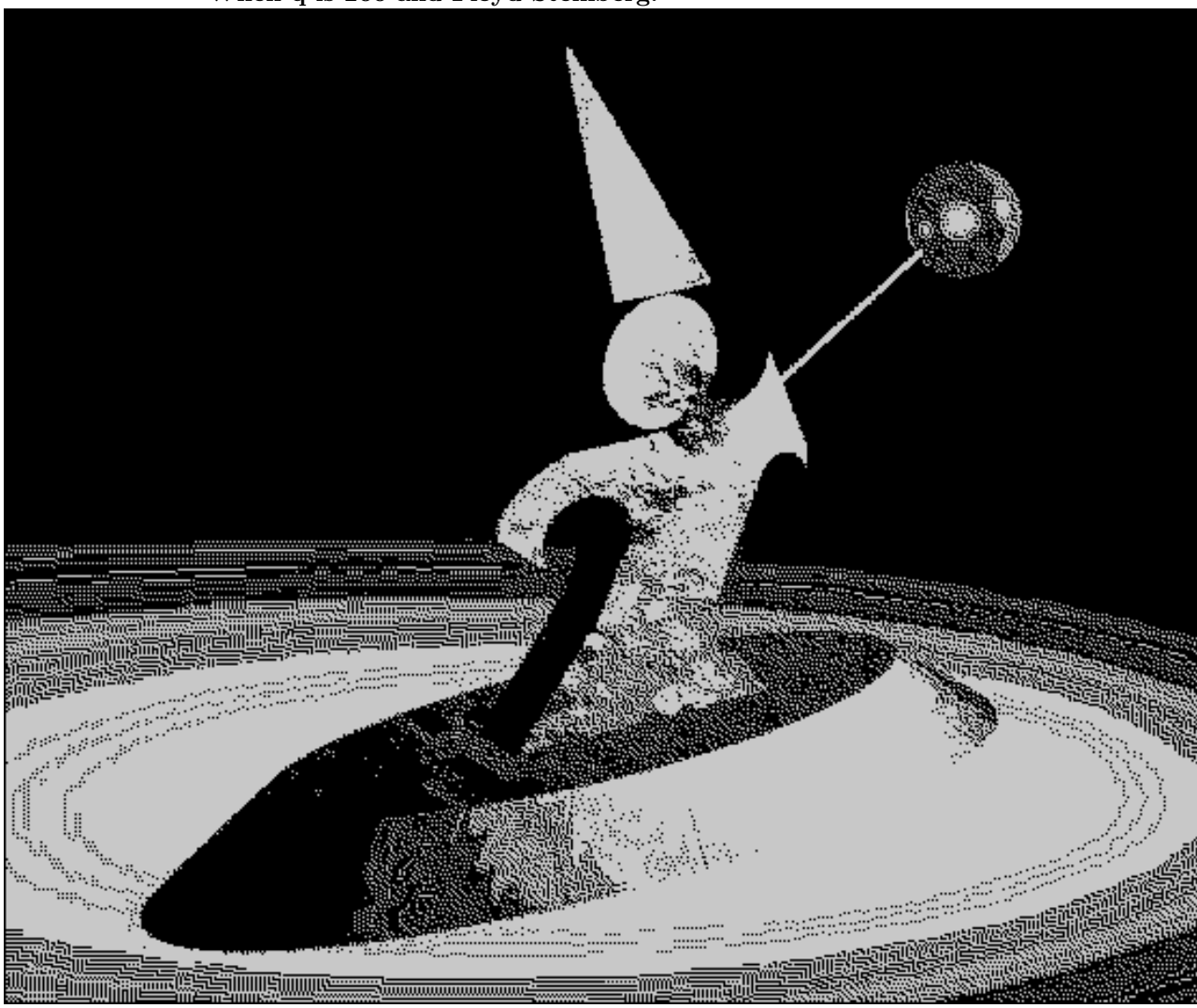
When q is 255 and Floyd Steinberg:



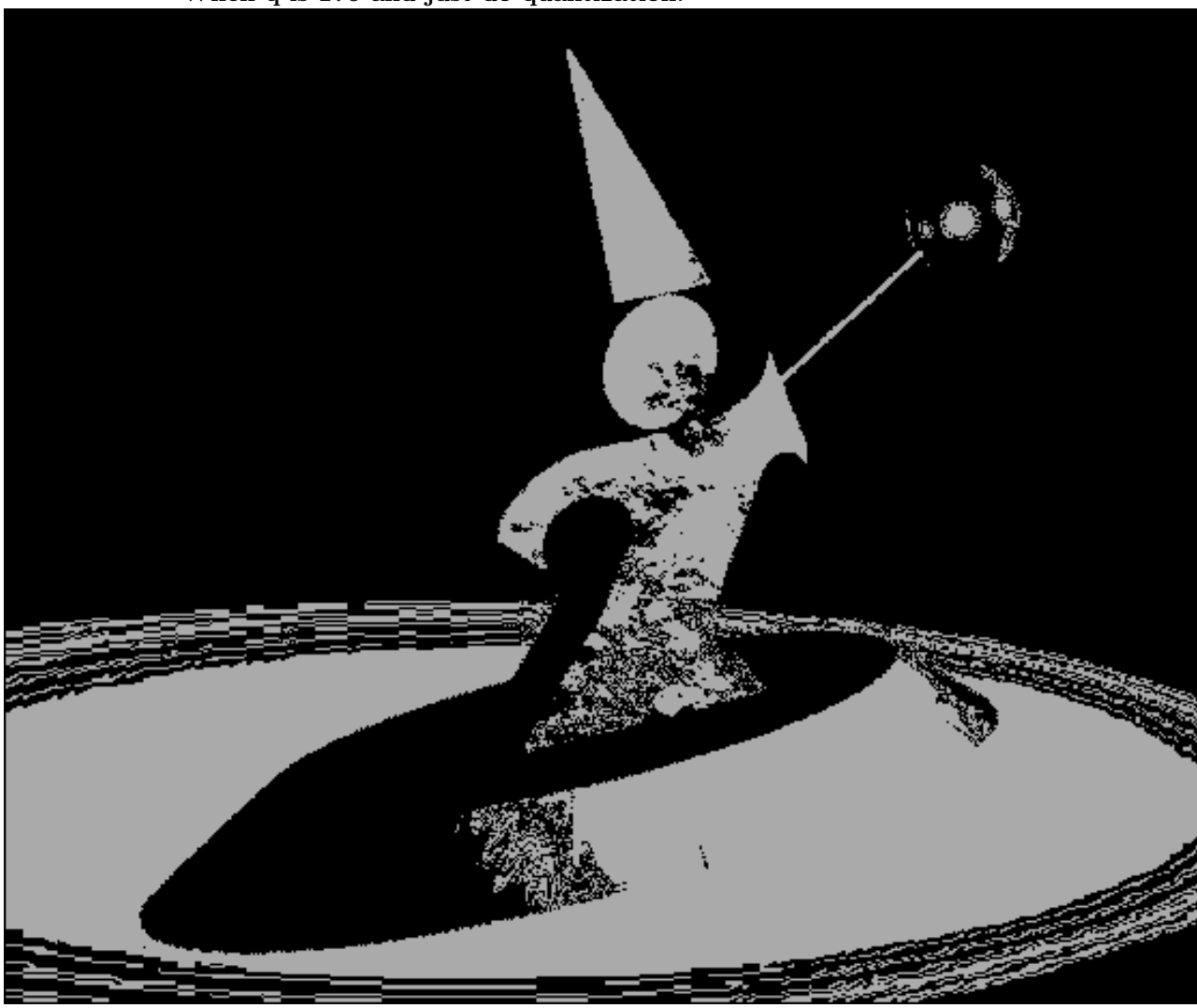
When q is 200 and just do quantization:



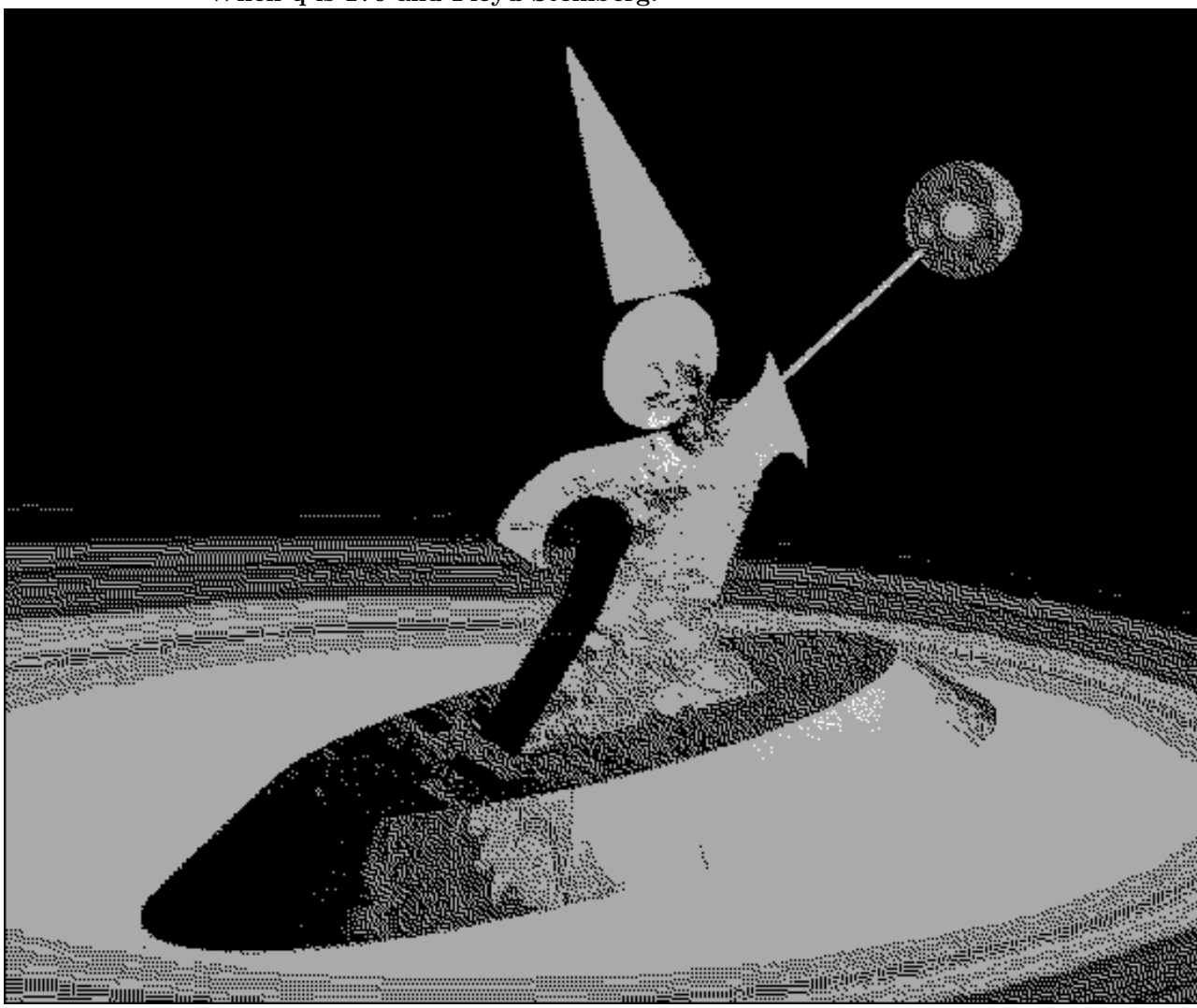
When q is 200 and Floyd Steinberg:



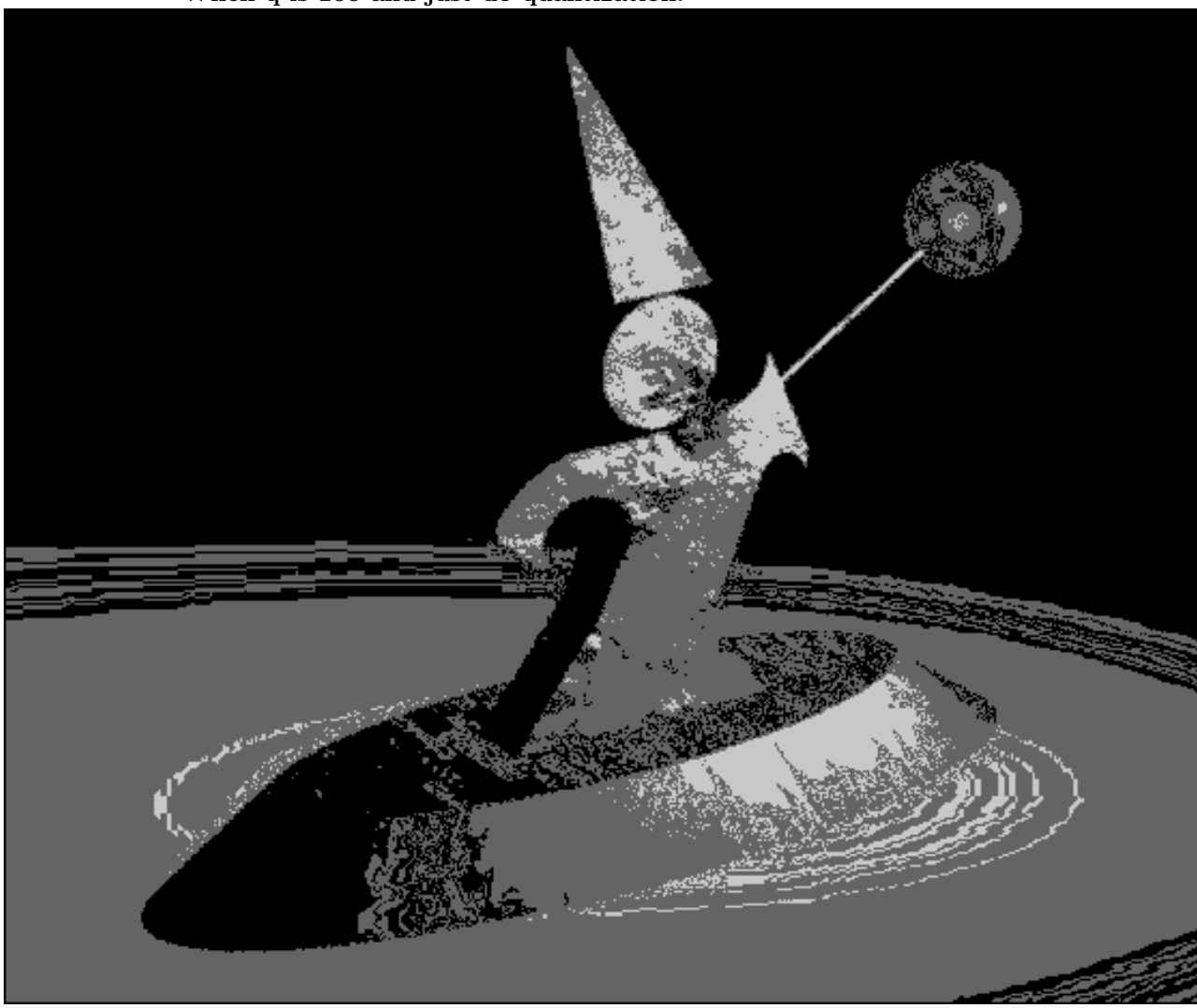
When q is 170 and just do quantization:



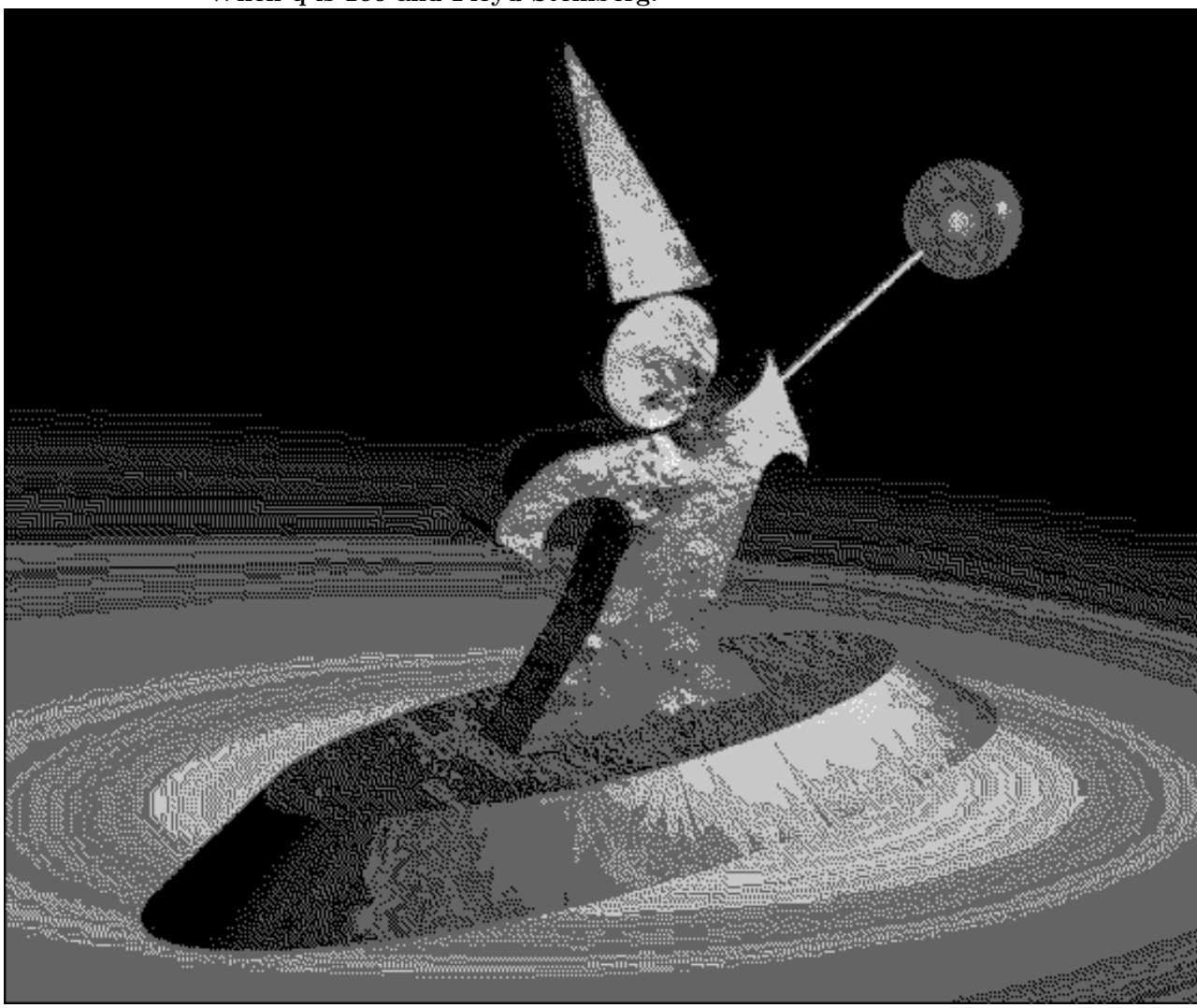
When q is 170 and Floyd Steinberg:



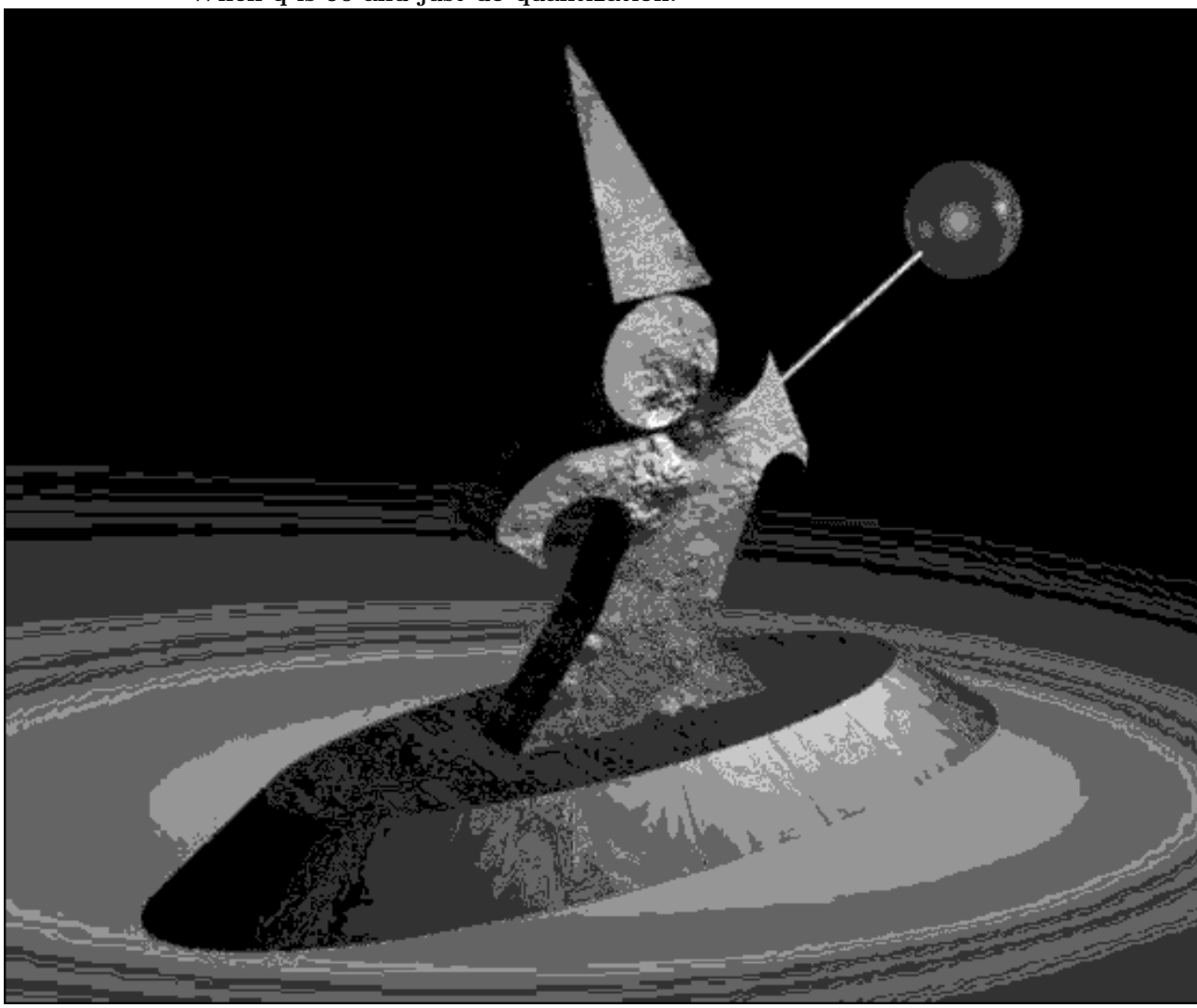
When q is 100 and just do quantization:



When q is 100 and Floyd Steinberg:



When q is 50 and just do quantization:



When q is 50 and Floyd Steinberg:

When q is 10 and just do quantization:

When q is 10 and Floyd Steinberg:

INTERPRETATION:

As you can see, the color becomes gray as the value of q decreases. The reason of this, round(I./q)*q . This is because round processing is applied. For example, If I is between 125 and 250 and q is 250, round(I/250) = 1. and 1*250 = 250 . There will be too much of that value here. Or if q is 20, if I is 125, round(125/20) is 6 and 6*20 is 120. If I is 200 round(200/20) is 10 and 10*20=200. If q is smaller values are differ.For this reason both in the Floyd

Steinberg and normally quantization , results become gray. But in Floyd Steinberg,if q is smaller, as the number of errors changes, the error distributes more. As q grows, it is distributed closer.

As you can see, in the quantized images, edge information is weak. But in the dithered images, edge information is strong, images are more pronounced.

The given method achieves to prevent quantization error with round function.The round function allows us to get the error by enlarging and shrinking the values.

The disadvantage of this algorithm is that the color returns to normal as q decreases but the error is distributed over a large area and the noise is generated.

PART2: COLOR TRANSFER

METHOD

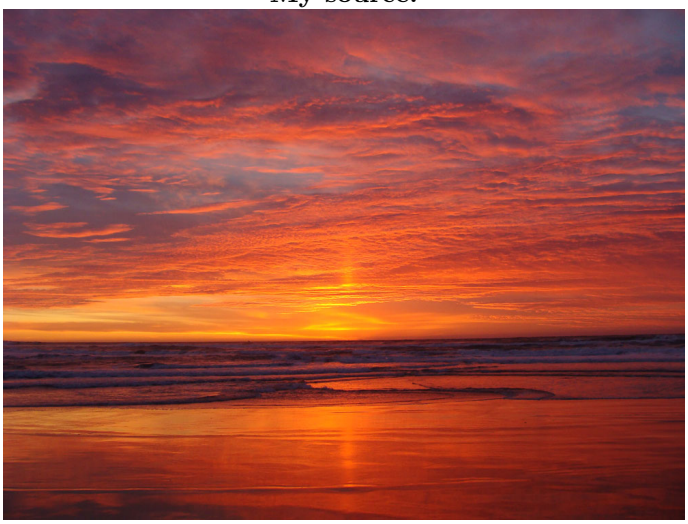
In this experiment , I convert RGB source and target images to LMS cone space. Then, I convert data to logarithmic space for both source and target images. I convert to lab space. I compute the means and standard deviations of the images for lab channels.

I subtract the mean of source image from the source image. I scale the data points by the standard deviations. And I add the target's mean to the scaled data points . I convert lab to LMS. I go back to linear space. I convert LMS to RGB.

EXPERIMENT

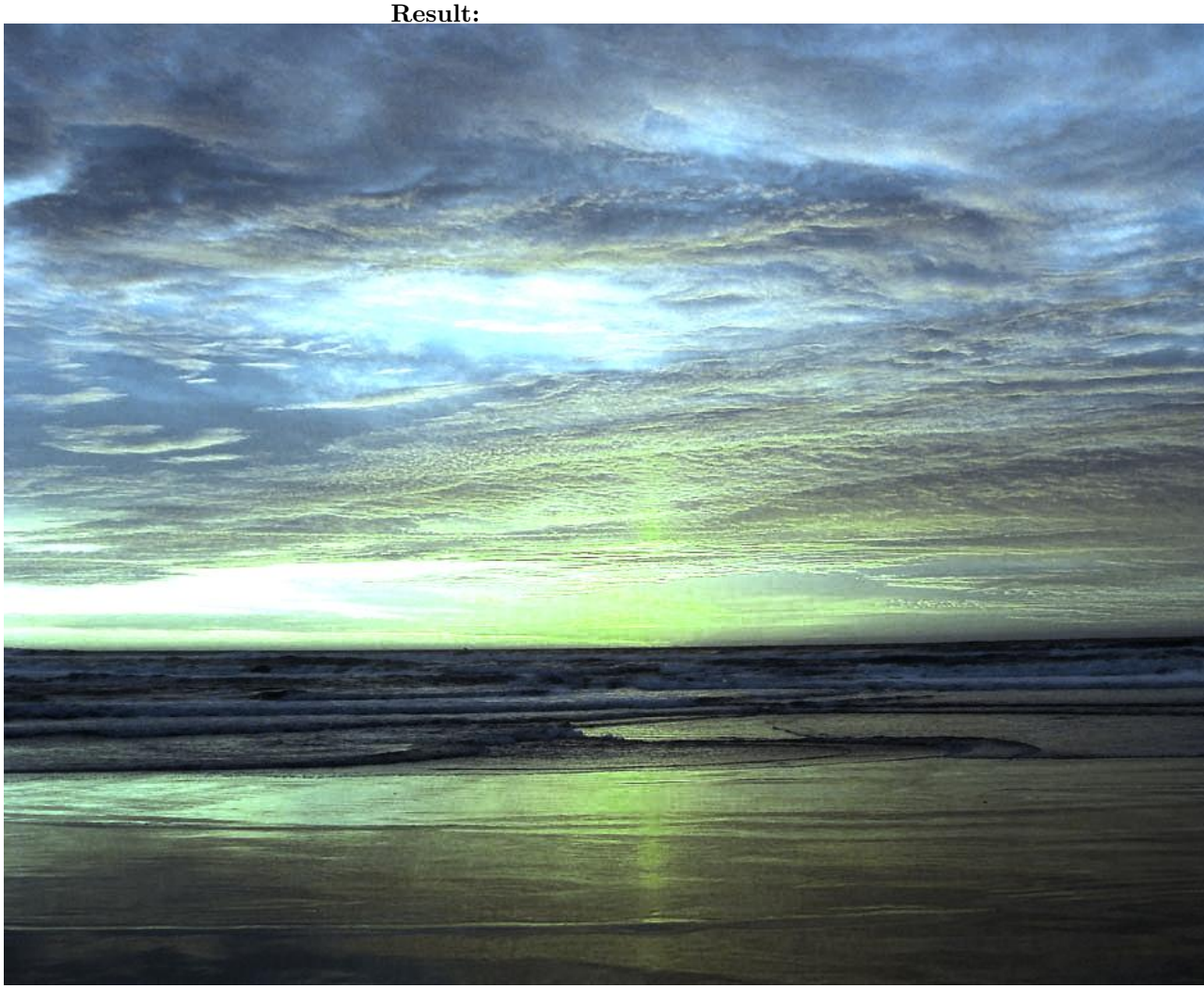
GOOD RESULTS

My source:



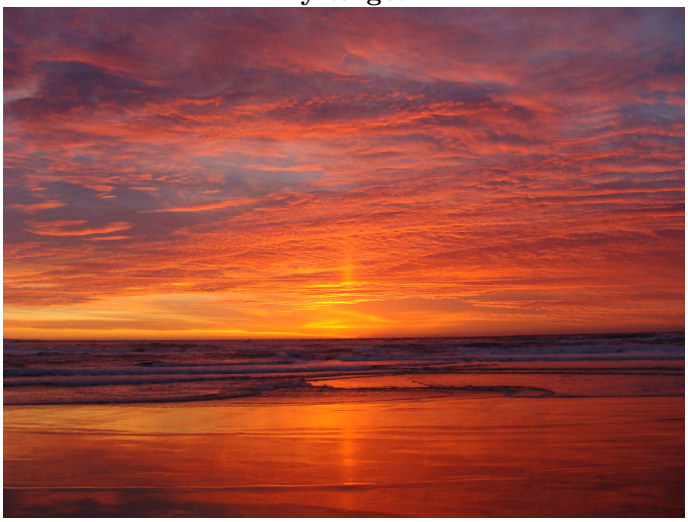
My target:

Result:

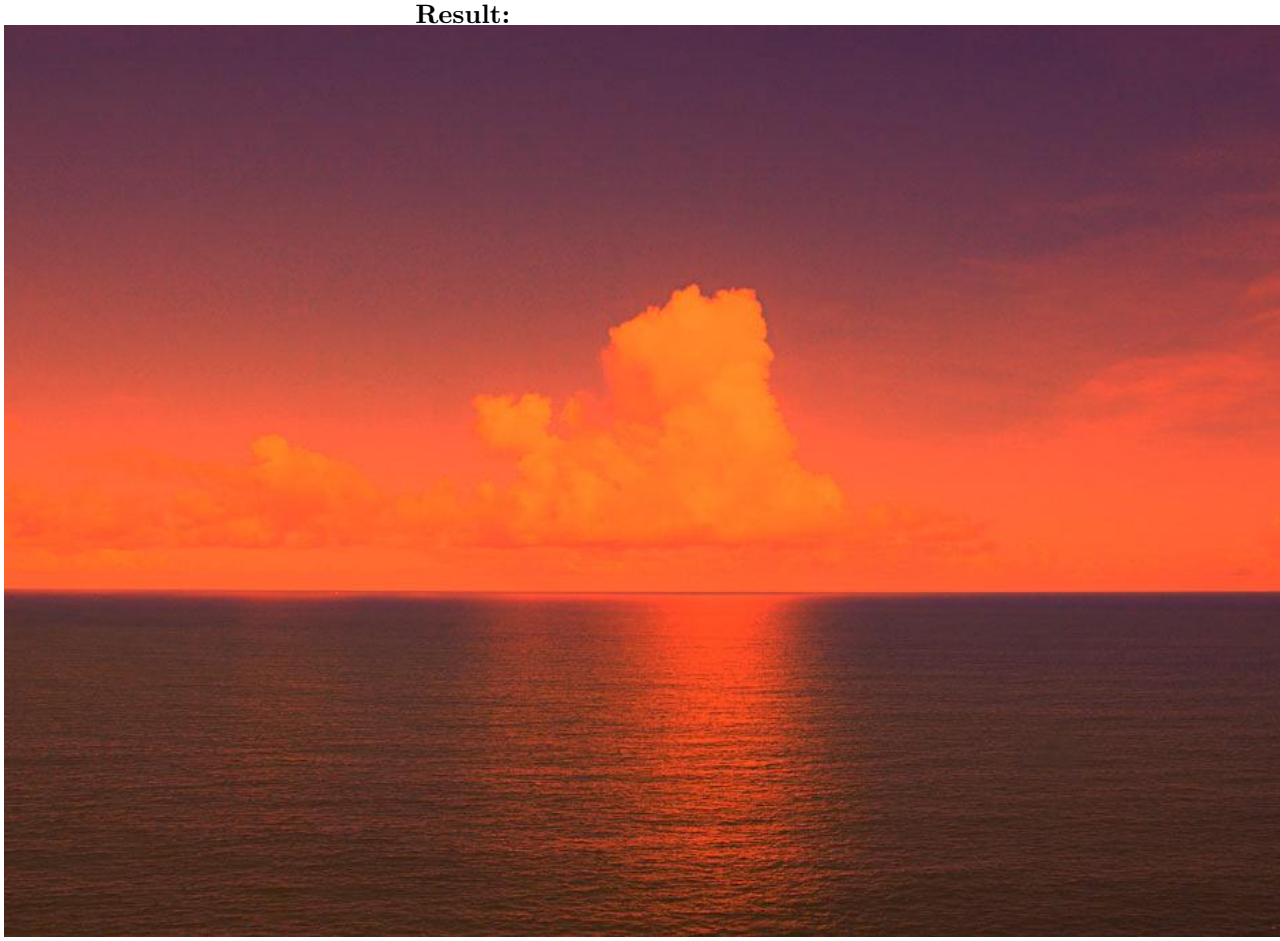


My source:

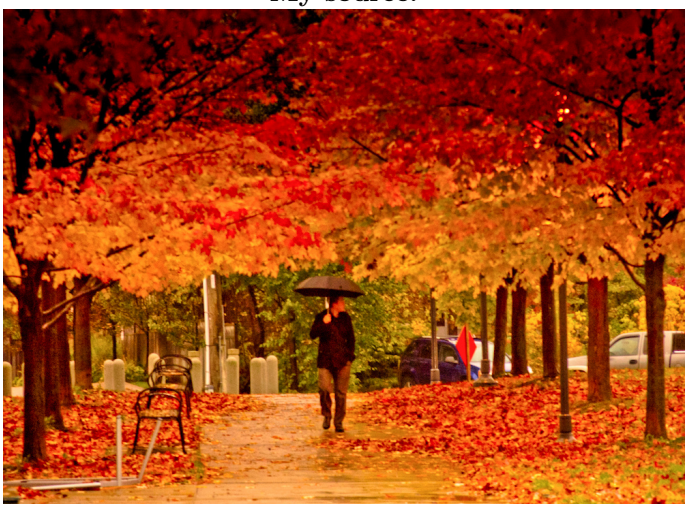
My target:



Result:

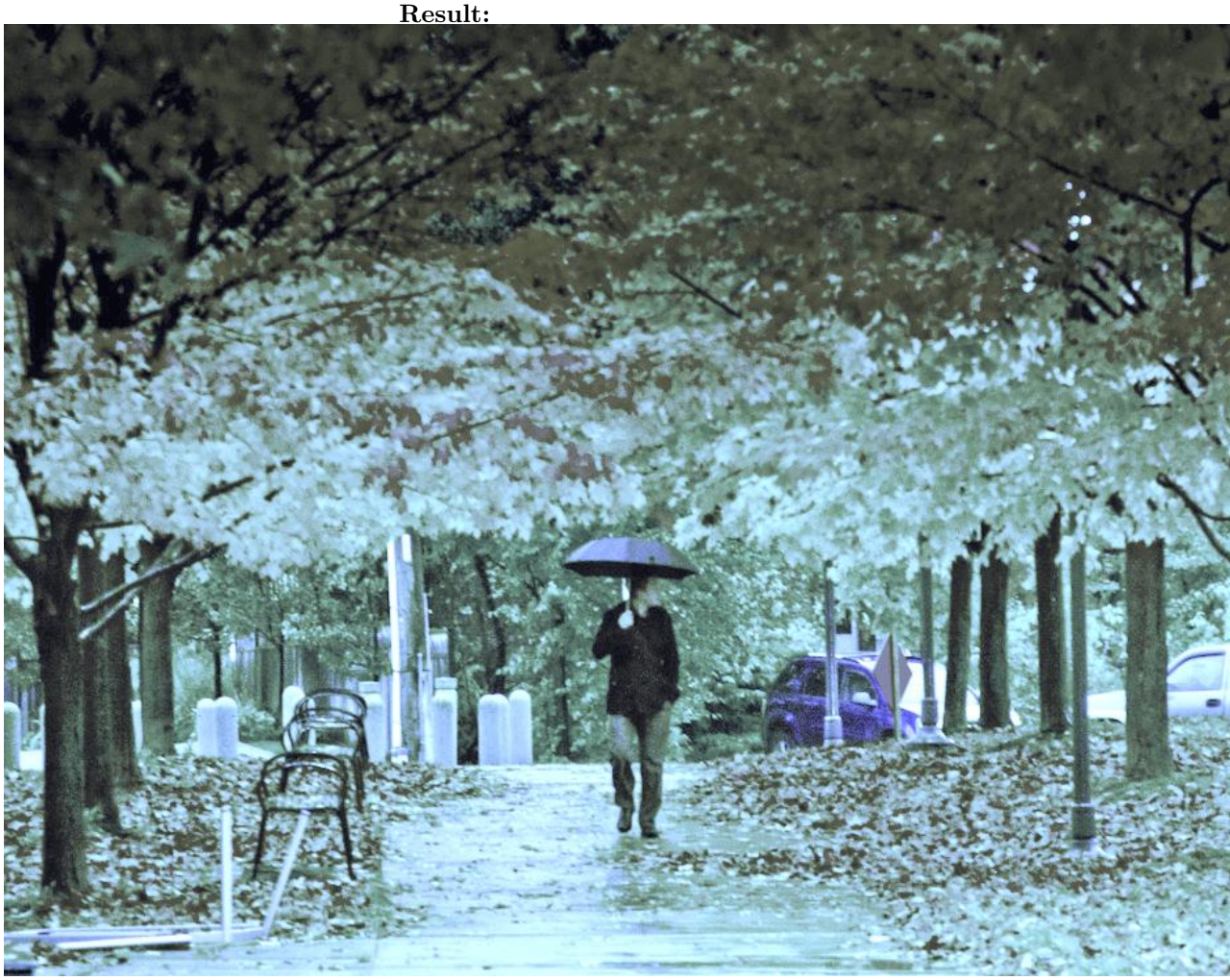


My source:

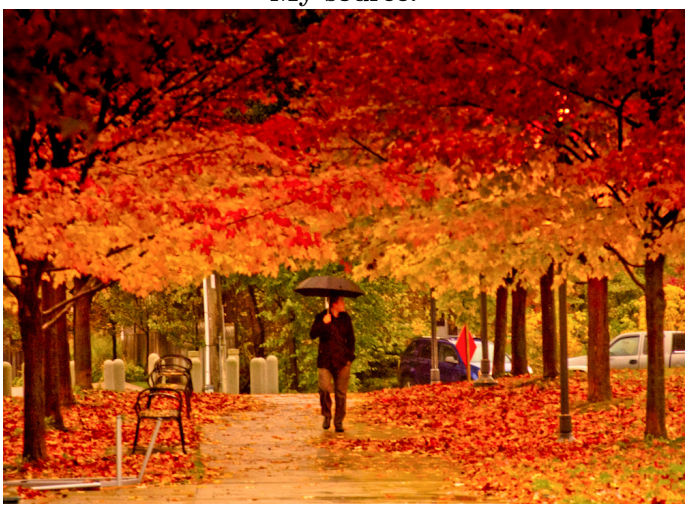


My target:

Result:

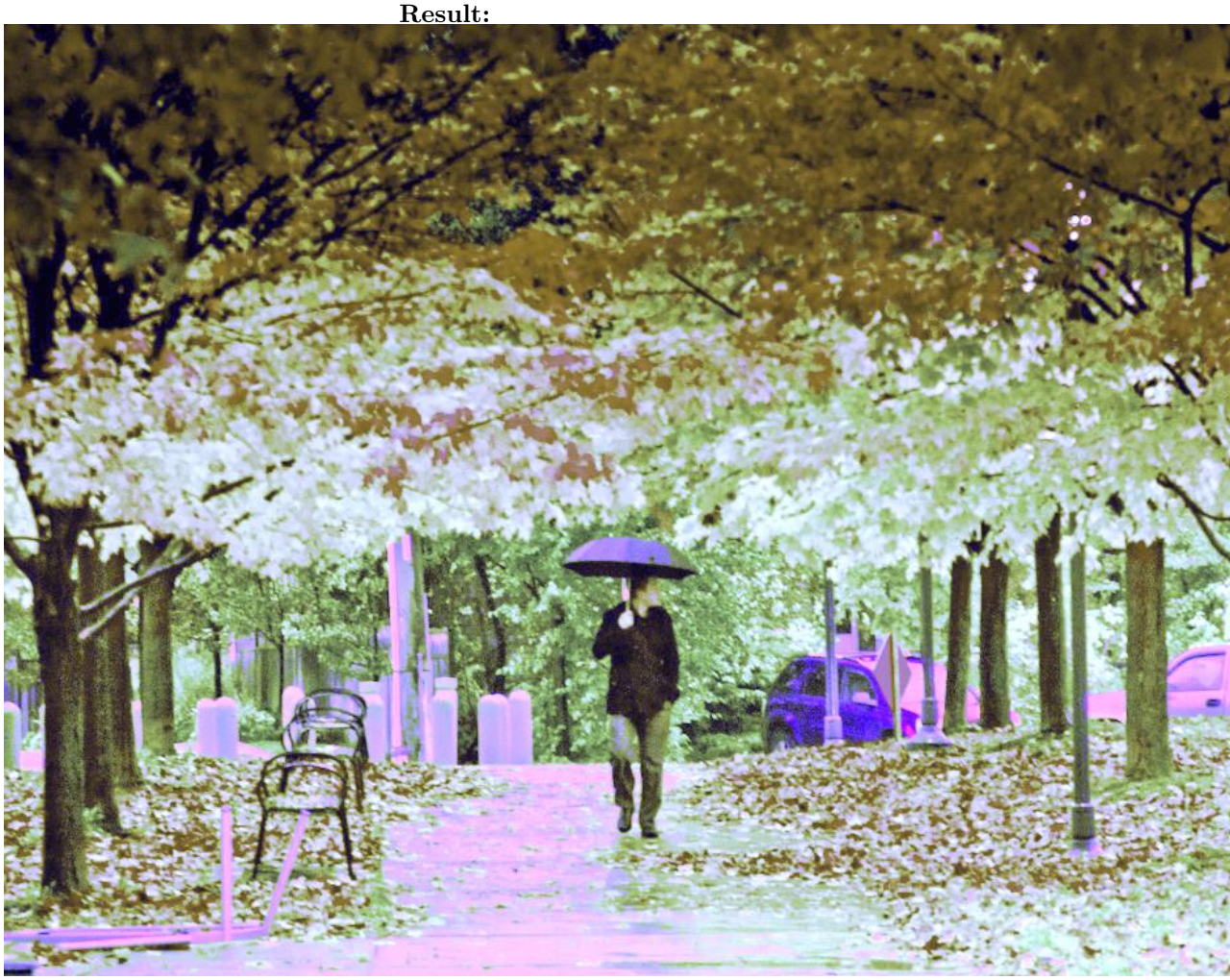


My source:



My target:

Result:



My source:

My target:

Result:

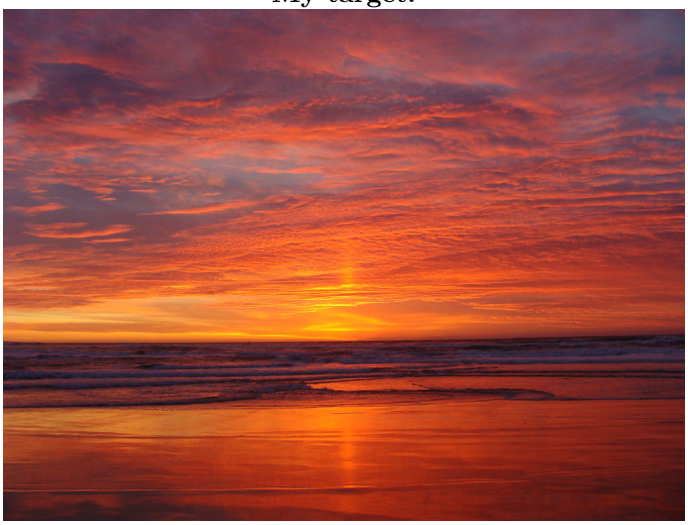
My source:

My target:

Result:

My source:

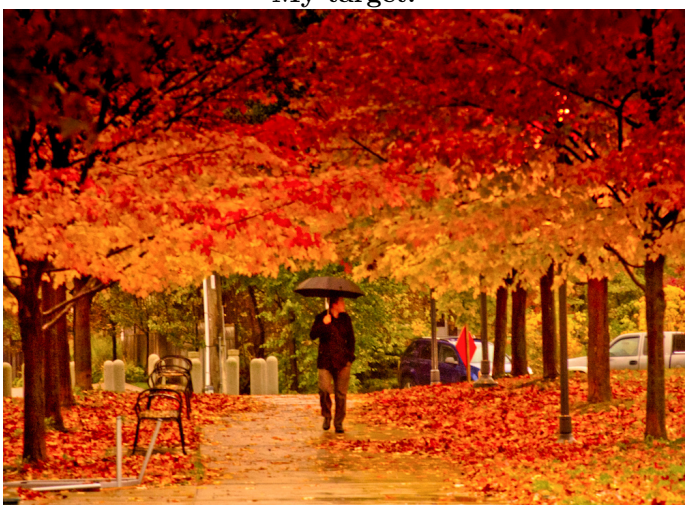
My target:



Result:

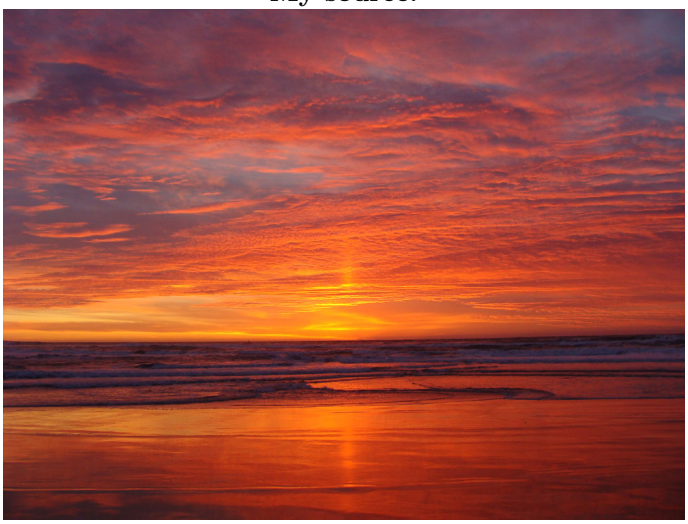
My source:

My target:



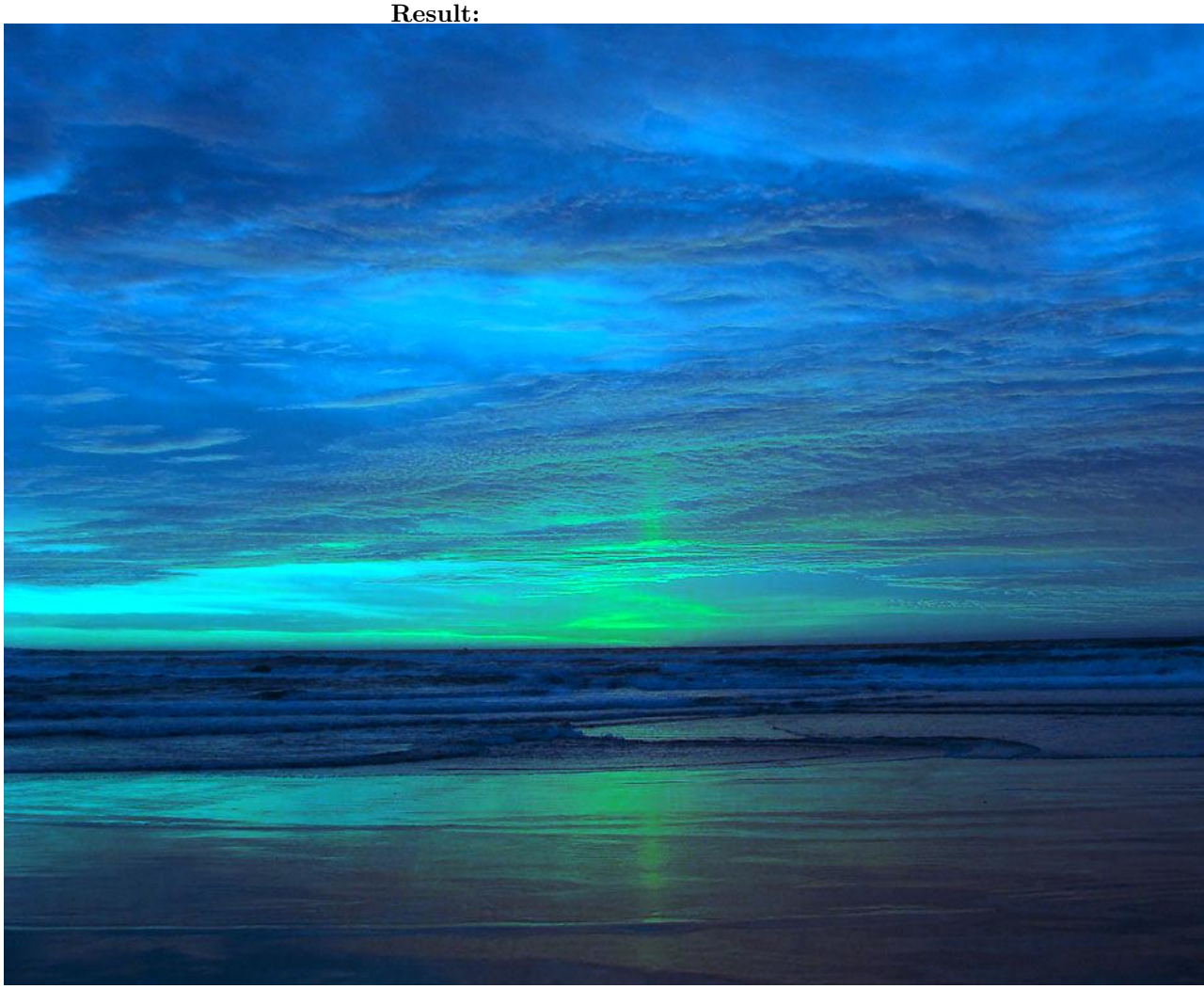
Result:

My source:

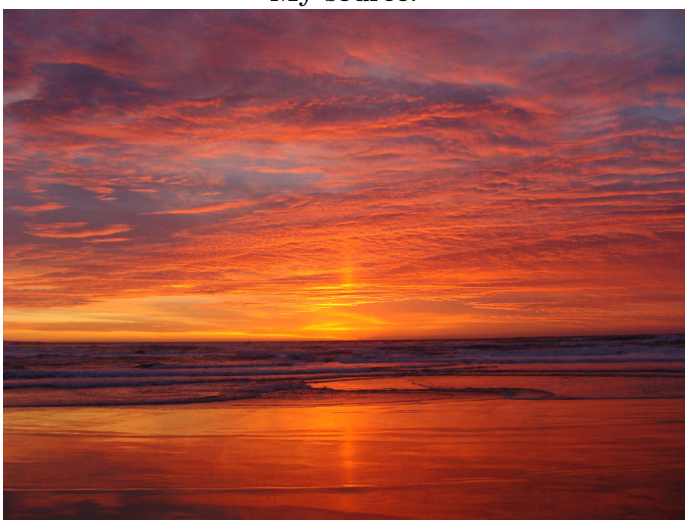


My target:

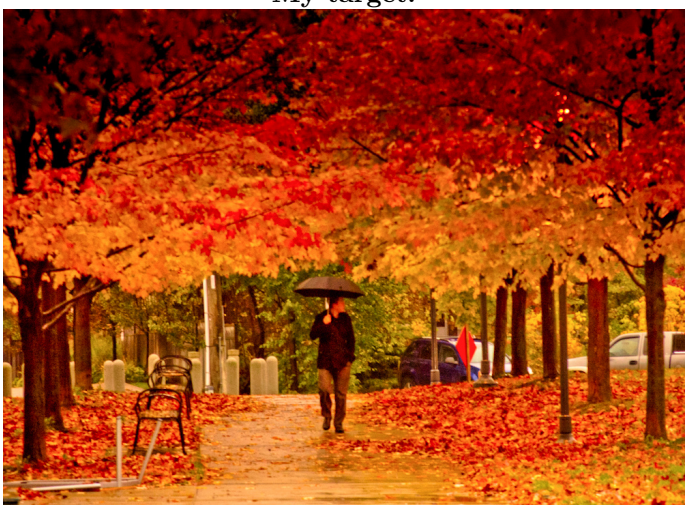
Result:



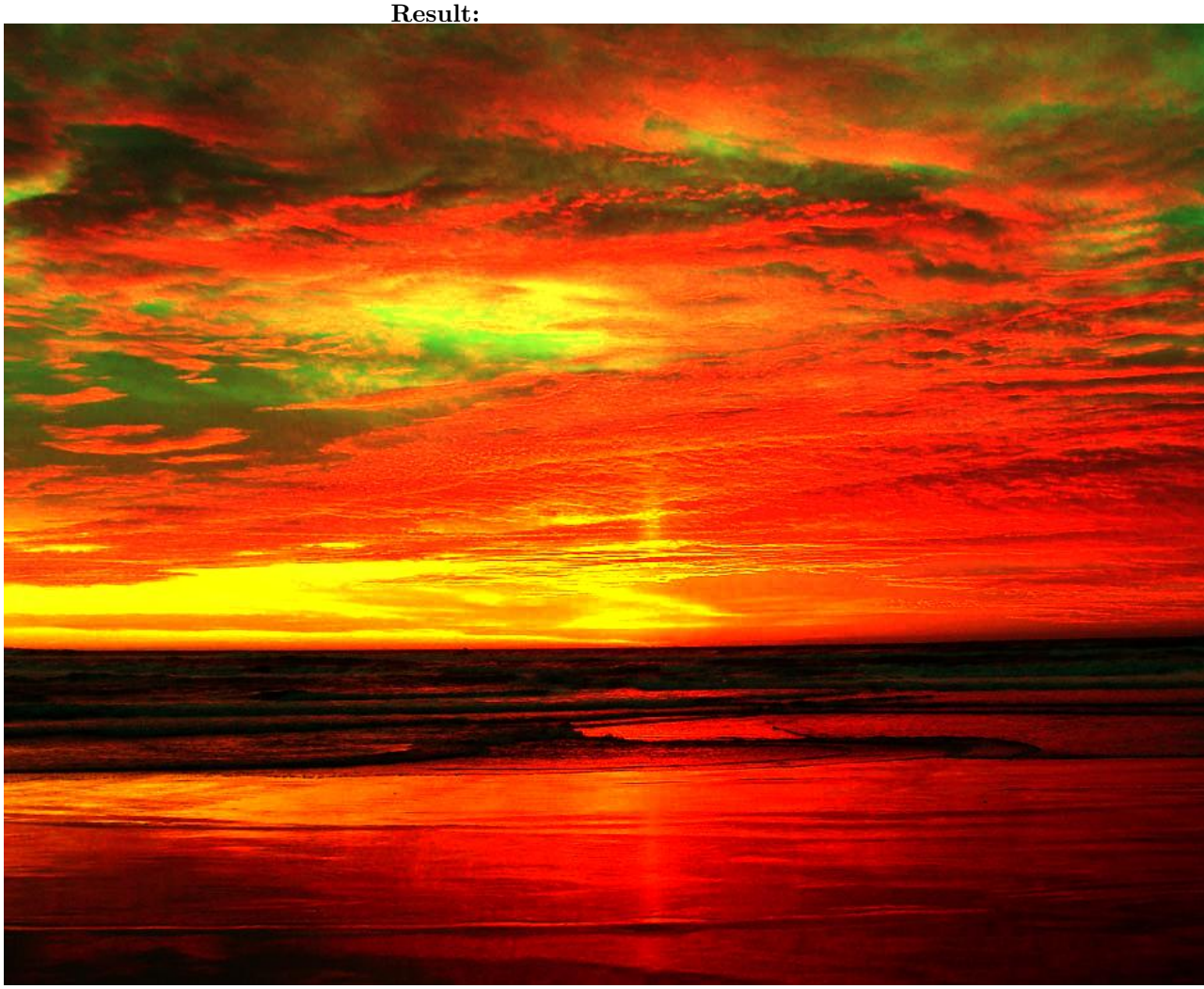
My source:



My target:



Result:

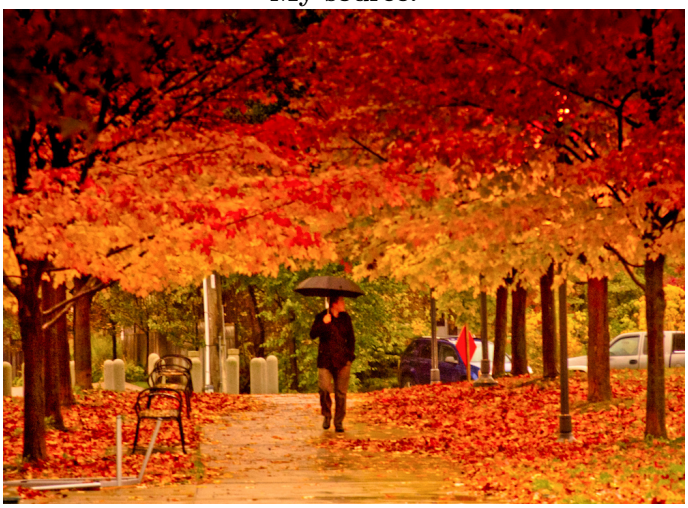


My source:

My target:

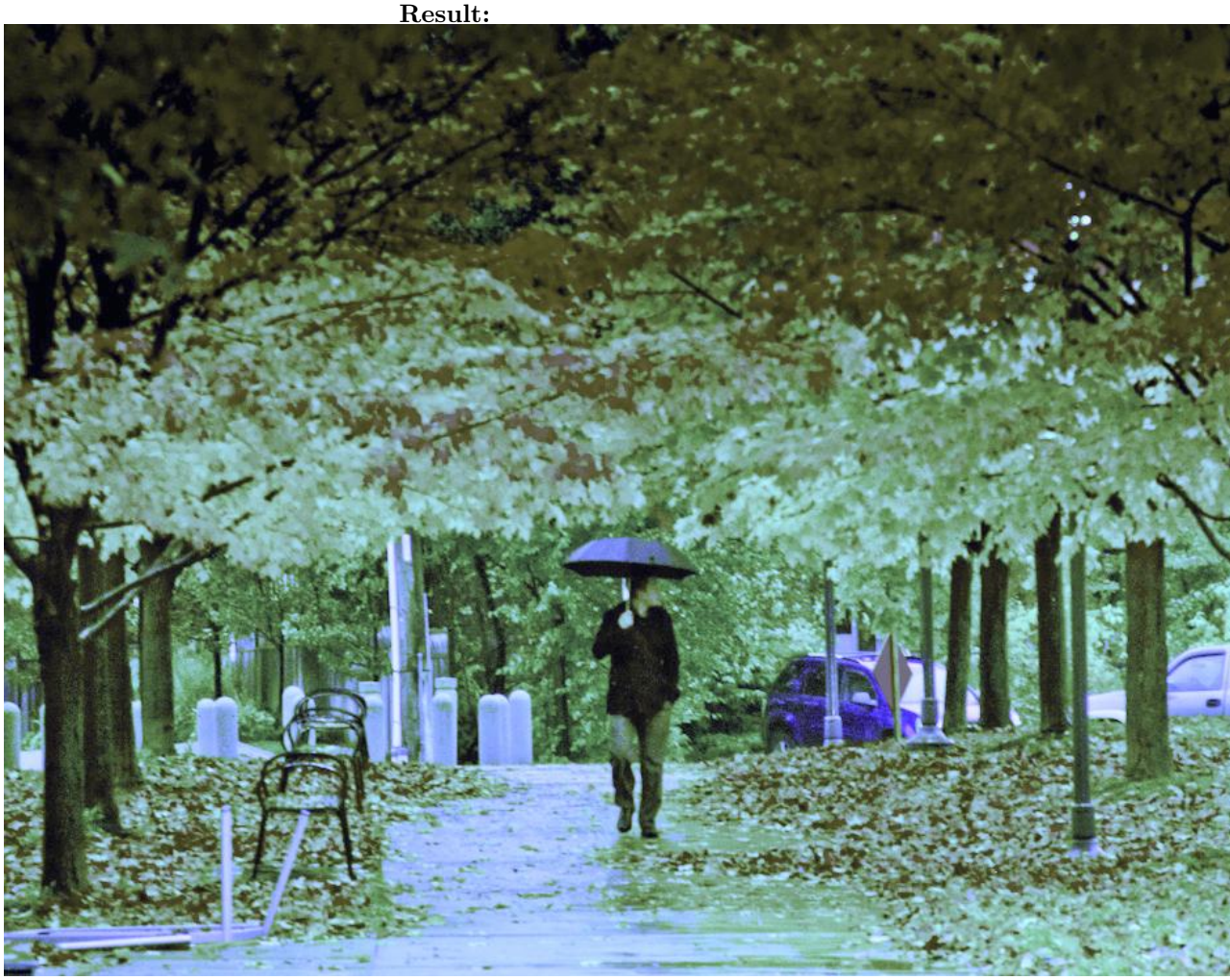
Result:

My source:

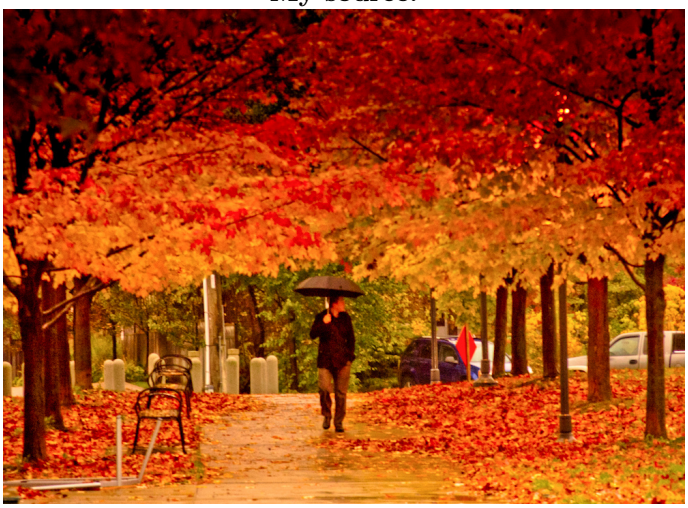


My target:

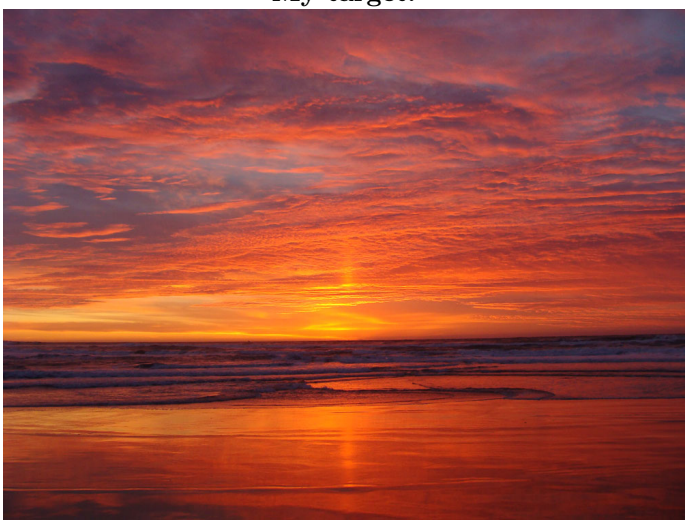
Result:



My source:

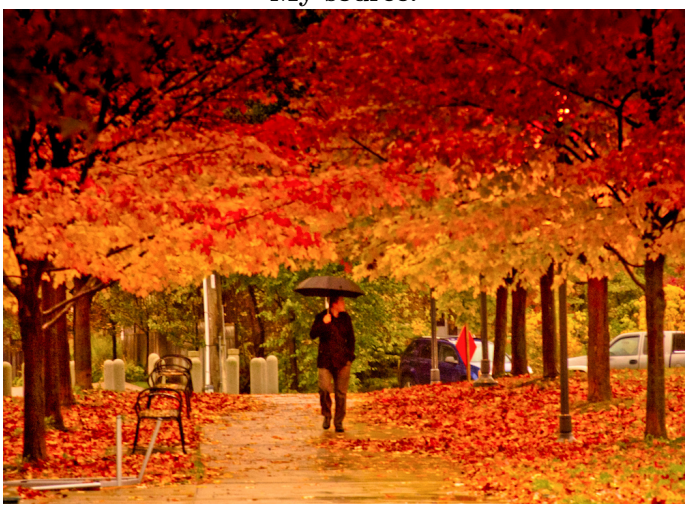


My target:



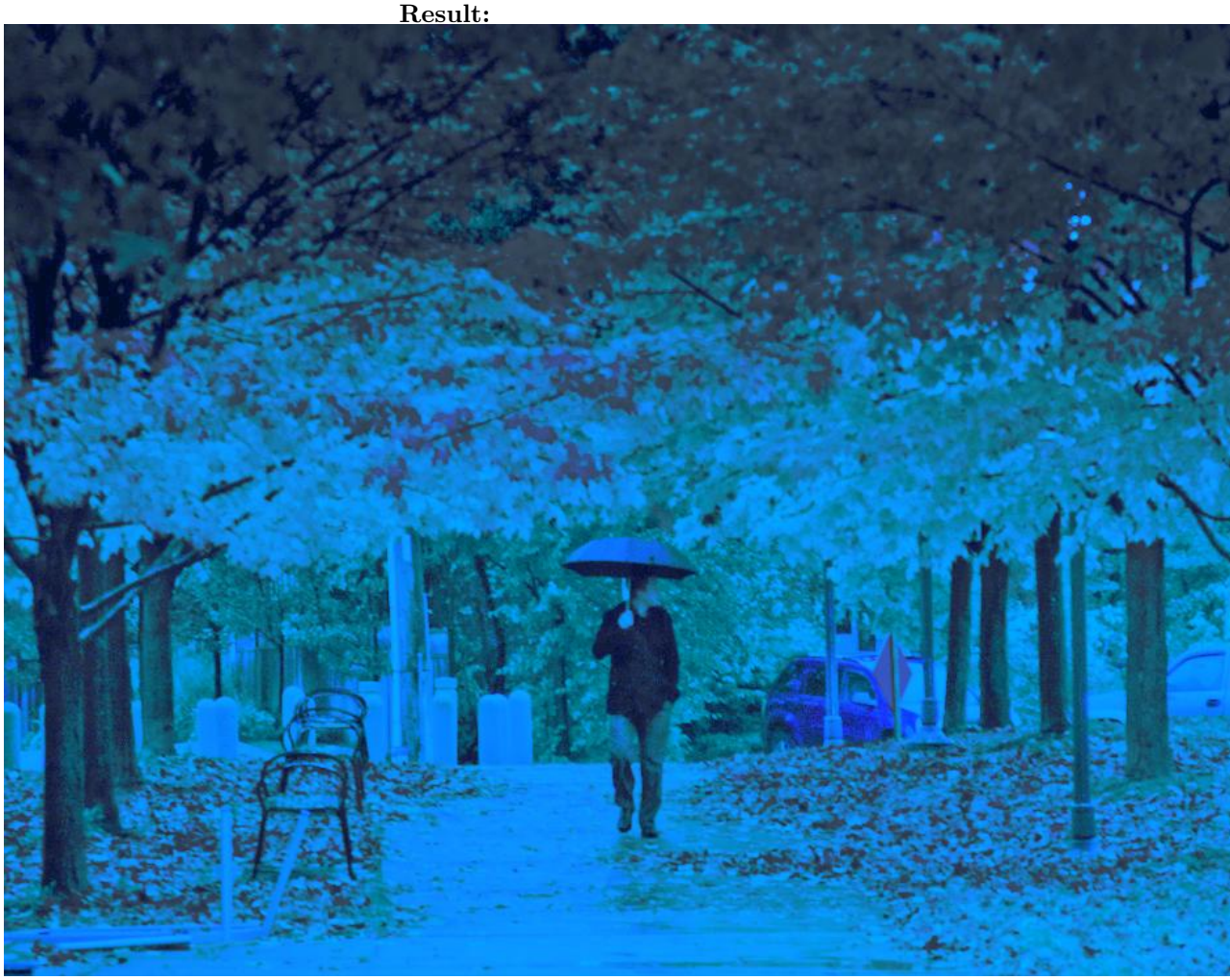
Result:

My source:



My target:

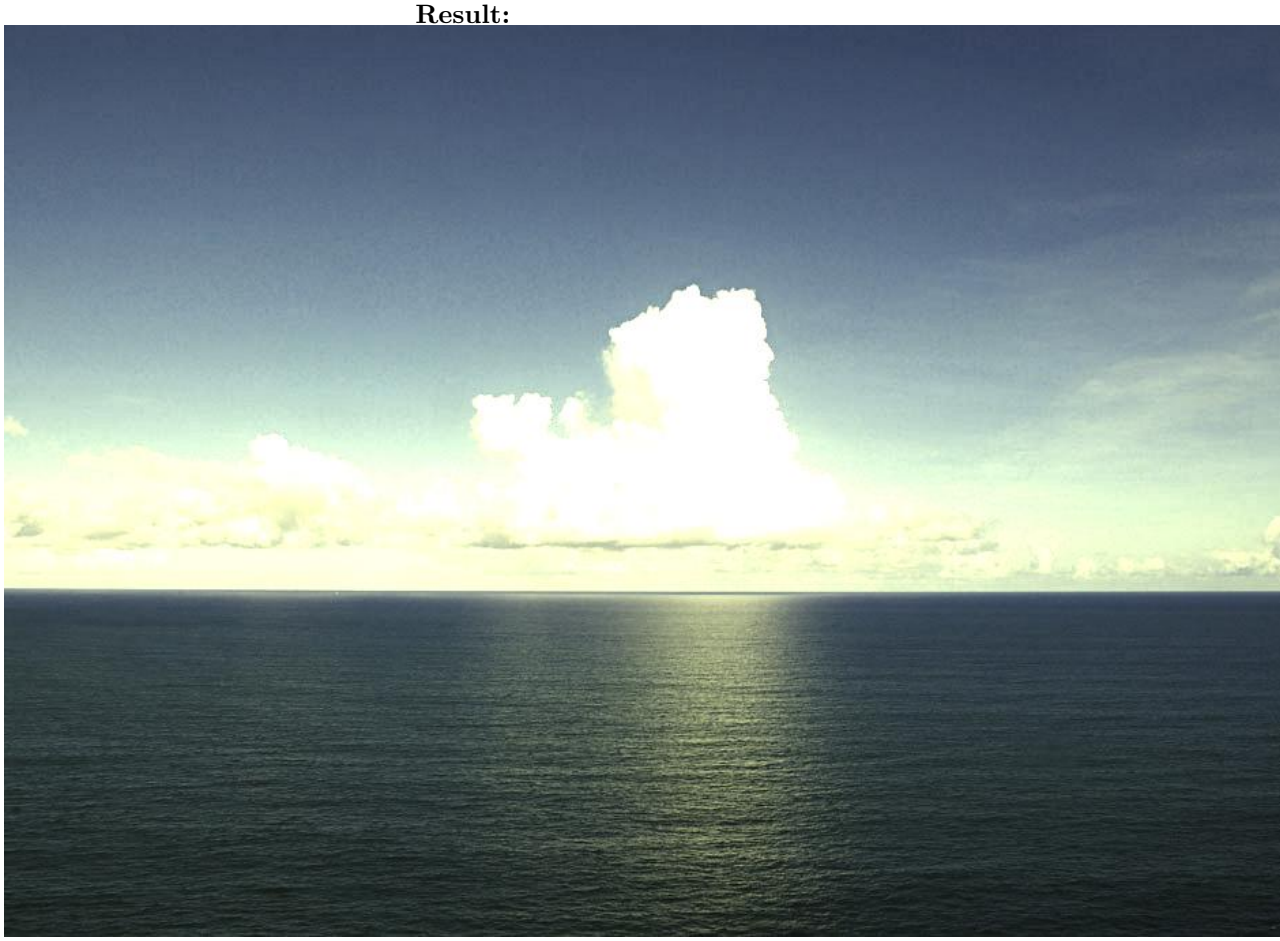
Result:



My source:

My target:

Result:



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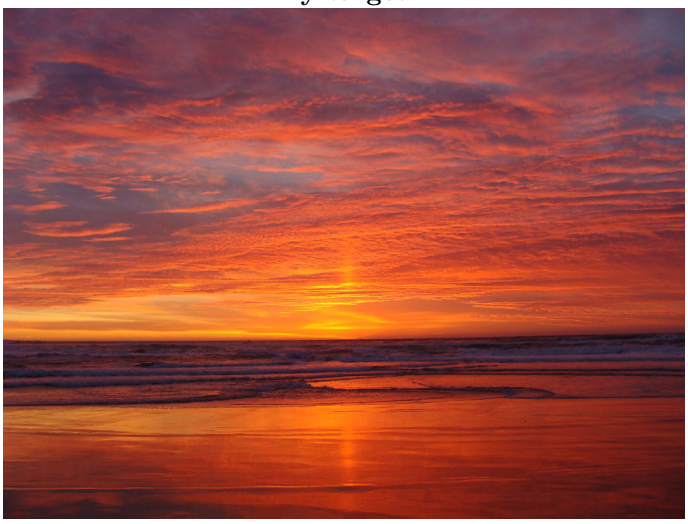
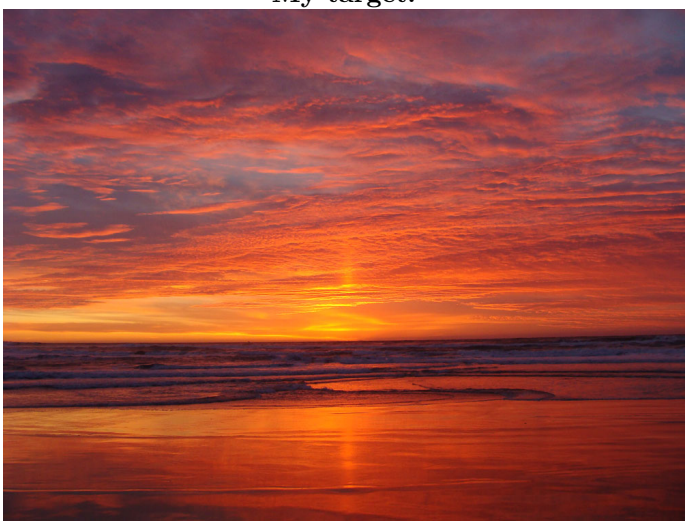


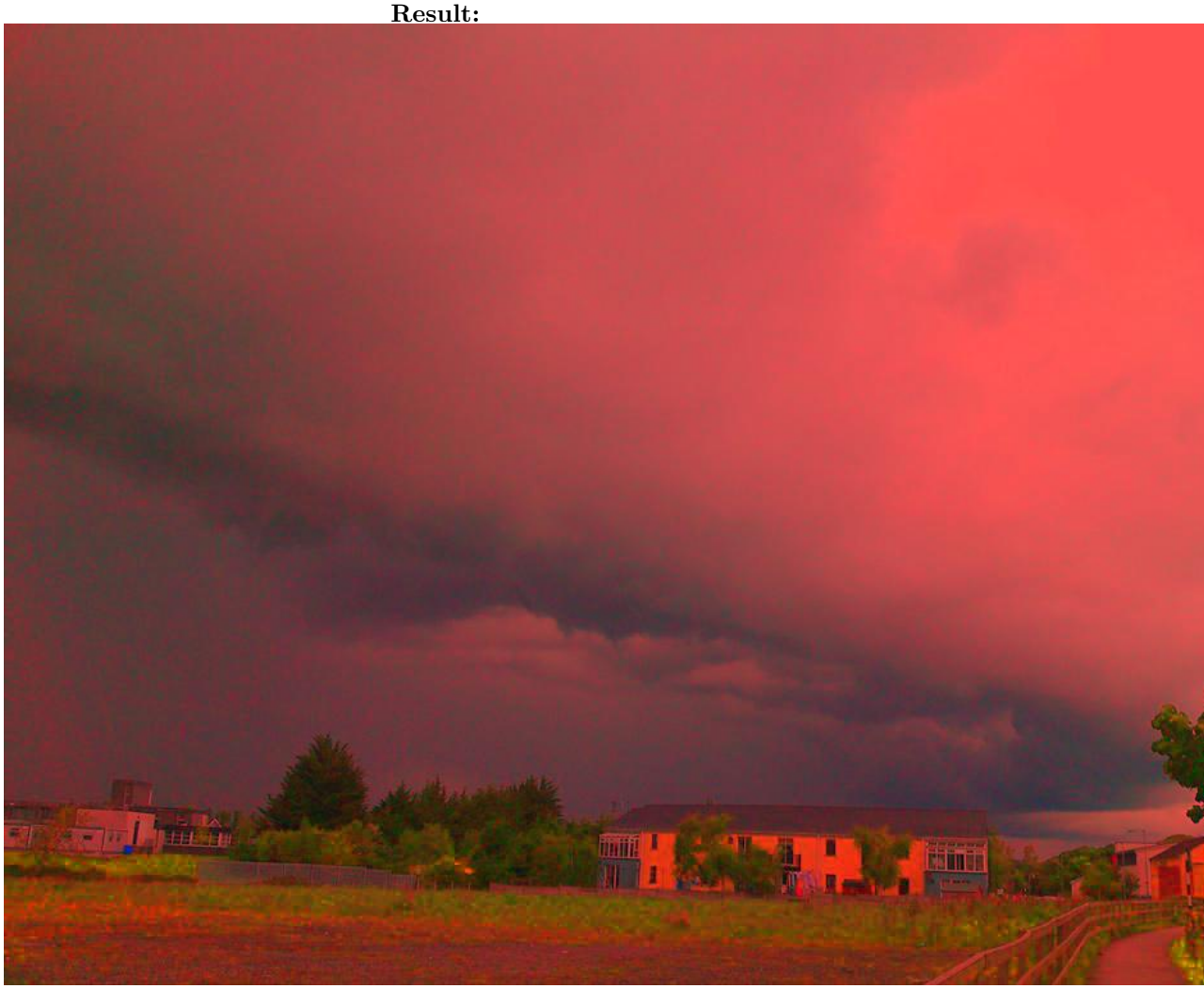
Result:

My source:

My target:

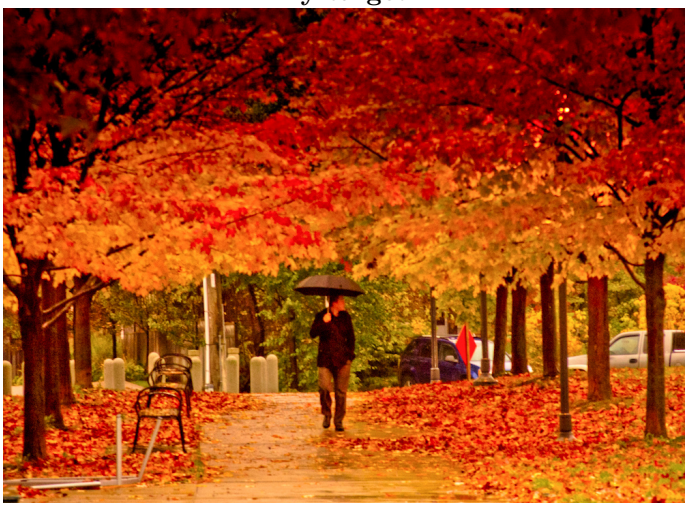


Result:



My source:

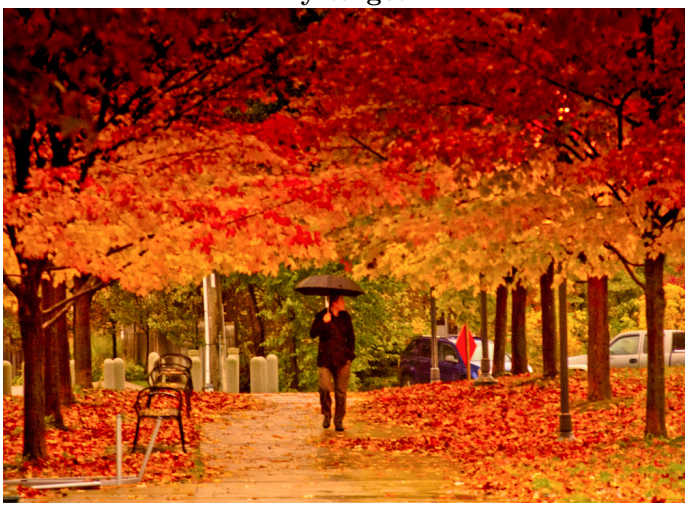
My target:



Result:

My source:

My target:



Result:

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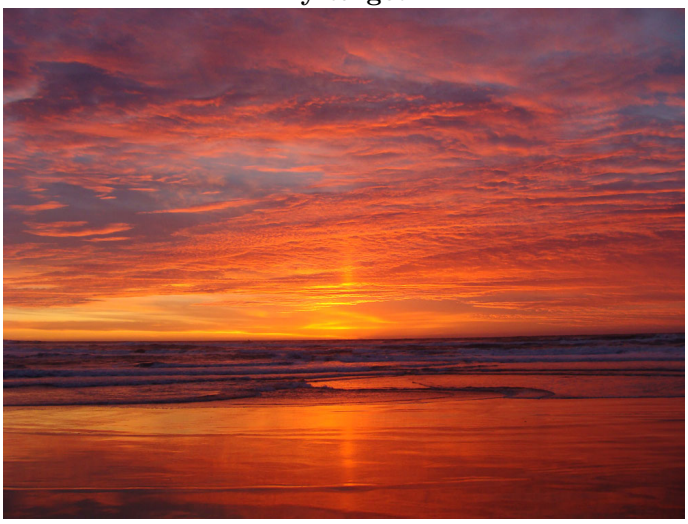

Result:

My source:

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BAD RESULTS

My source:

My target:

Result:

My source:

My target:

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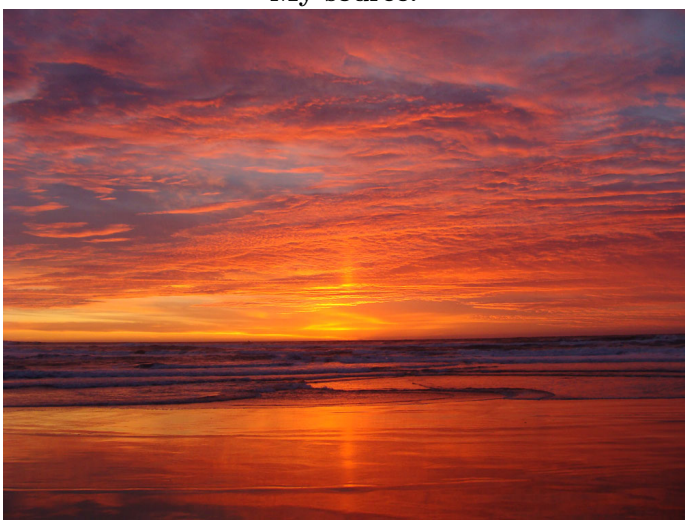
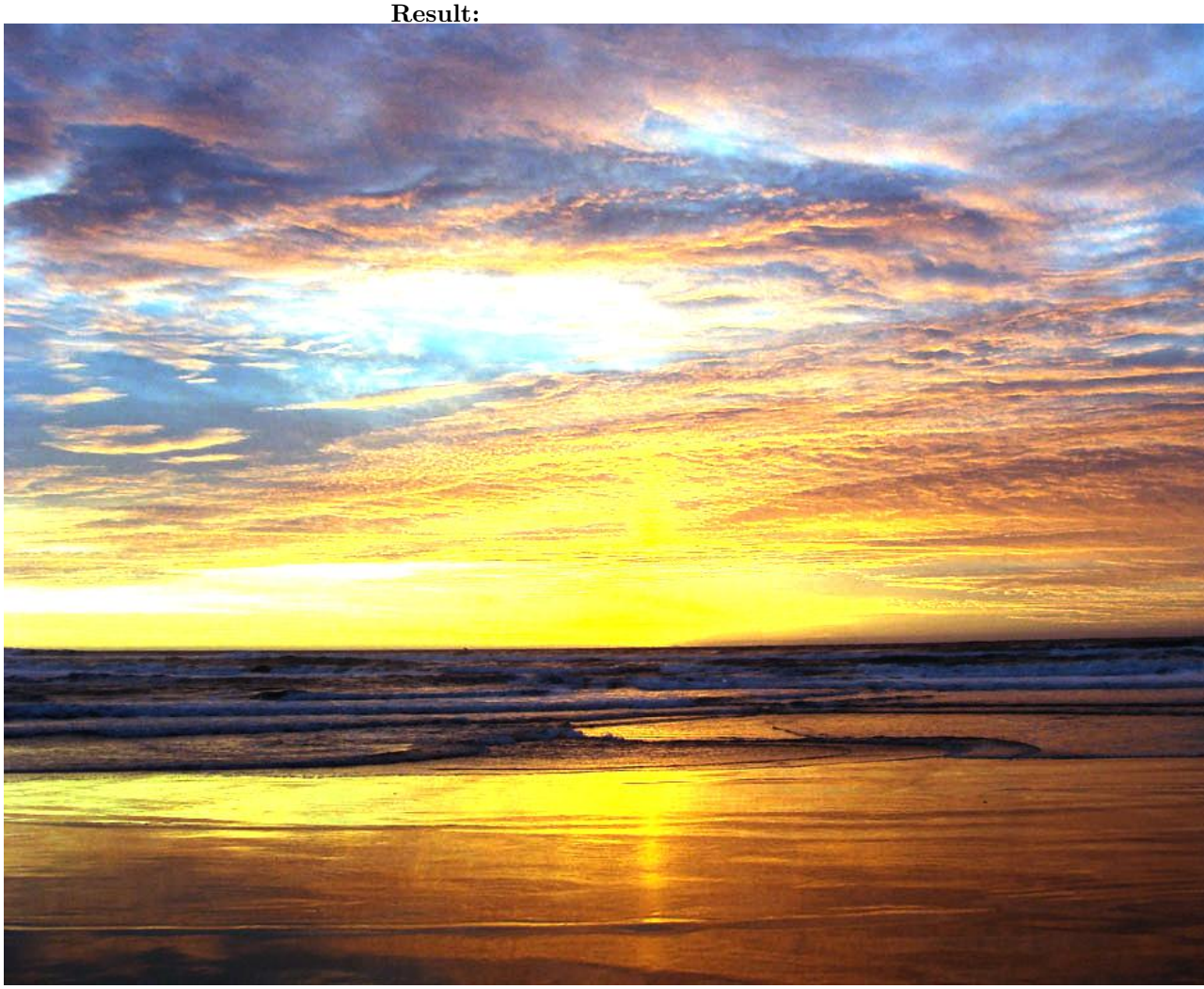
Result:

My source:



My target:

Result:



INTERPRETATION :

As we have seen above, we convert RGB to lab. Because, in RGB space, if the blue channel is large, most pixels will have large values for the red and green channel. If we want to change the appearance of a pixel's color in coherent way, we must modify all color channels. This complicates any color modification process. What we want is an orthogonal color space without correlations between the axes which lets up apply different operations in different color channels with some confidence that undesirable cross channel artifacts won't occur. And this color space is logarithmic which means to a first approximation that uniform changes in channel intensity tend to be detectable.

As we have seen above, when scotland house picture is used as target,results are bad.