

HACETTEPE UNIVERSITY

BBM 415: FUNDAMENTALS OF IMAGE PROCESSING  
LABORATORY

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## Color Transfer Between Images

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## **1 Problem**

Color manipulation in photographs is one of the most fundamental task for the image editing tools such as Adobe Photoshop, Gimp, Instagram, etc. However, it is complicated job to give desired color tones in strongly correlated color spaces such as RGB. More precisely, if we want to change the appearance of a pixels color in a coherent way, we must modify all color channels in tandem. For this reason, new color spaces are developed to minimize the correlation between channels for natural scenes such as lab color space of Ruderman[1]

In this assignment, goal is to reach transfer colors from an image to another one.

## 2 Part I

### 2.1 Algorithm

Firstly, we imported our source and target images. Then converted them to *lab* color space. Then we computed their means and standard deviations. For target image, we subtracted means for each channel from its original values. Then we scaled target image according to the standard deviations of both target and source. Then added the means of the source image to target image.

## 3 Results

### 3.1 1



Figure 1: Input Images - Source / Target.



Figure 2: Result Image

Result is as expected.

### 3.2 2

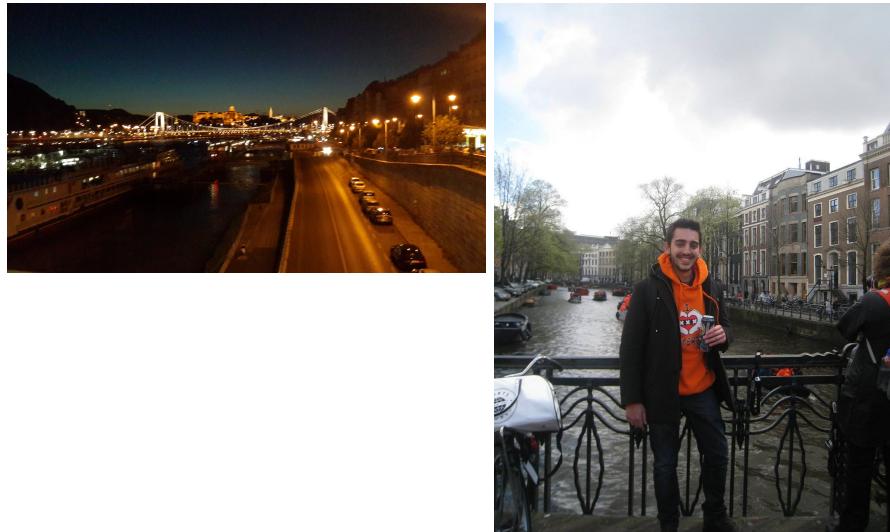


Figure 3: Input Images - Source / Target.

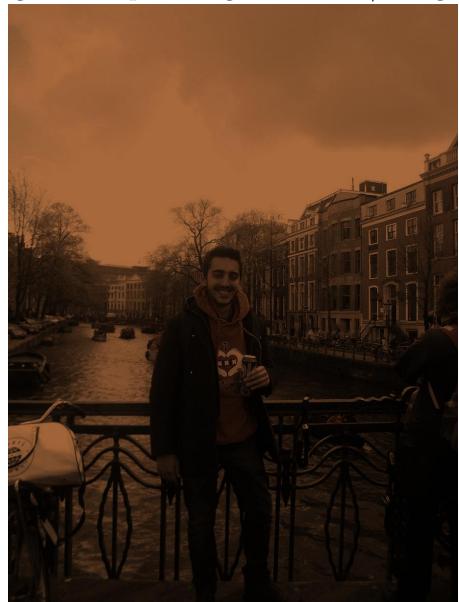


Figure 4: Result Image

I wanted to try it with night image, as expected it turned to colored image in to darkish yellow color. Yellow is because of the lights.

### 3.3 3

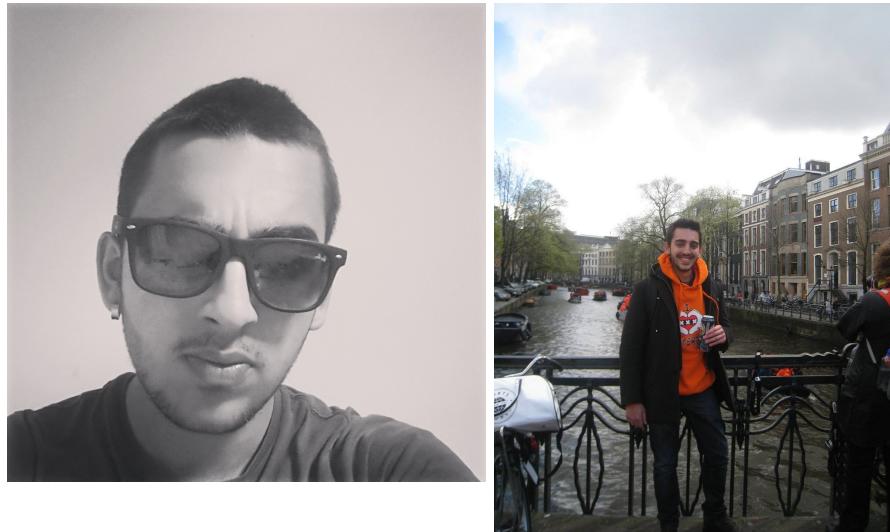


Figure 5: Input Images - Source / Target.



Figure 6: Result Image

This time, I experimented to transfer colors from black and white image to a colored one. Results are interesting. I guess because of white and black image, all of the color values went really high and it created vivid color schema.

## 4 Part 2

### 4.1 Algorithm

Calculations are exactly the same with first part. Only difference is first we divide both images in to regions and send couple to transfer that are most similar.

## 5 Results

### 5.1 1



Figure 7: Input Images - Source / Target.



Figure 8: Result Image.

$x = 1, y = 1$  Region is the whole image, like part1.

## 5.2 2



Figure 9: Input Images - Source / Target.



Figure 10: Result Image

$x = 25, y = 25$  Result is quite poor. Color differentiation is too much.

### 5.3 3



Figure 11: Input Images - Source / Target.



Figure 12: Result Image

$x = 500, y = 1$  Better than second image, yet worse than first image. I begin to think that regional partitioning is not effective.

## 5.4 3



Figure 13: Input Images - Source / Target.



Figure 14: Result Image

$x = 500, y = 5$  Again not a good result.I tried so many combination but mostly they were worse. This option could be good if regional is too small, but then it would take to much computational time.

## References

- [1] D.L. Ruderman, T.W. Cronin, and C.C. Chiao, Statistics of Cone Responses to Natural Images: Implications for Visual Coding, *J. Optical Soc. of America*, vol. 15, no. 8, 1998, pp. 2036-2045.