School of Data and Computer Science, Sun Yat-sen University

DIP - EXP 4

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Abstract

Implementation of 3 experiments:

- I - Band-reject Filter on Periodic Noises.
- II - Face Identification through YCbCr.
- III - Histogram Equalization upon RGB image.

1 Technical discussion

- I - Band-reject Filter on Periodic Noises.

  In this experience, I design a 2-d ButterWorth Band-reject filter to remove periodic noises from this test image:

  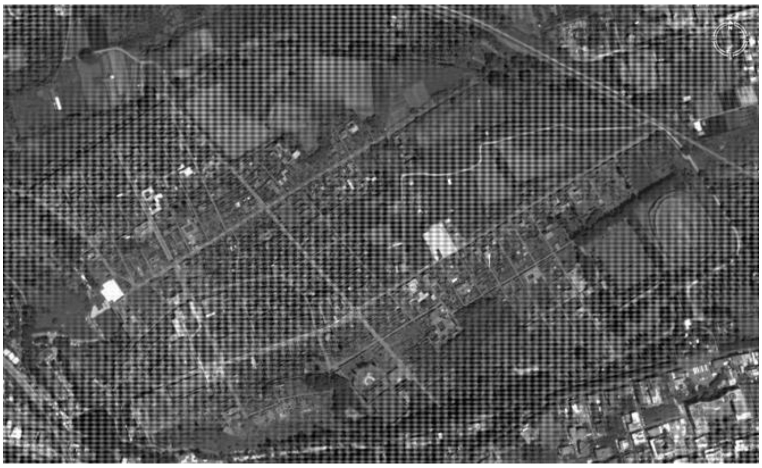

  Figure 1: Test Case For Exp 4.1

  Apparently, this image is added with much periodic noise, so let's see what the filter would do to remove the noise.
  The result is enclosed below.

- II - Face Identification through YCbCr.

  In order to tell human face from his clothes and background and avoid the redundancy of the color space, I decided to work within YCbCr color space.

- III - Histogram Equalization upon RGB image.

  Since RGB images have three color channels, I tried two method to generate the equalized result:

  1. Do histeq() separately on each channel, and use cat() function to catenate them.
  2. Do rgb2hsv() and do histeq() on V channel, and then turn back with hv2rgb().

2 Discussion

- I - Band-reject Filter on Periodic Noises

  When adjusting the parameters σ/D_0 and W, I find that maybe I shall design different values for different test image, for my test case, I set $\sigma/D_0 = 100$ and $W = 10$, It provided fairly a good result.

- II - Face Identification through YCbCr.

  As discussed on class, the main problem I met is similar to others. How to tell human face from tiny accessories or buttons and so on? From the Internet, I found a matlab function bwareaopen() useful: To automatically find and delete connected components with limited size or area.
  That is to say, I can easily judge whether an area is human face or not.
  Another problem is, when testing with HD images or images with large sizes, the red frame with only 1 pixel width is hard to notice, so I tried to tag human faces with a 6-pixel-wide red frame.

3 Results

- I - Band-reject Filter on Periodic Noises.

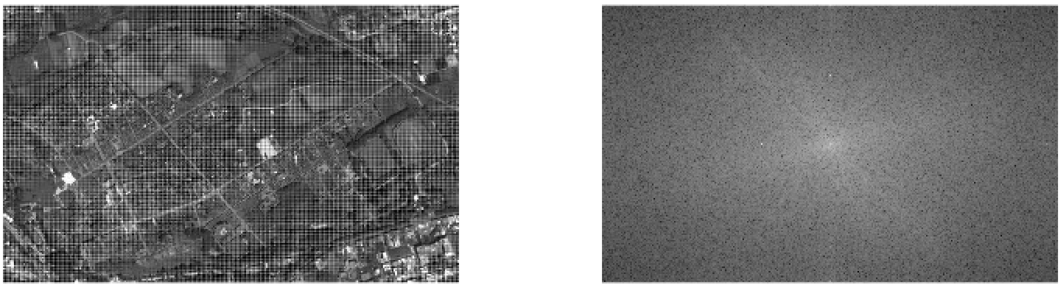

Figure 2: Original Image

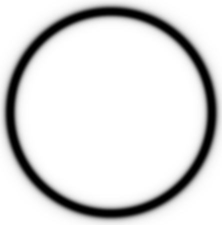

Figure 3: 2-d ButterWorth Filter($\sigma = 100, W = 10$)

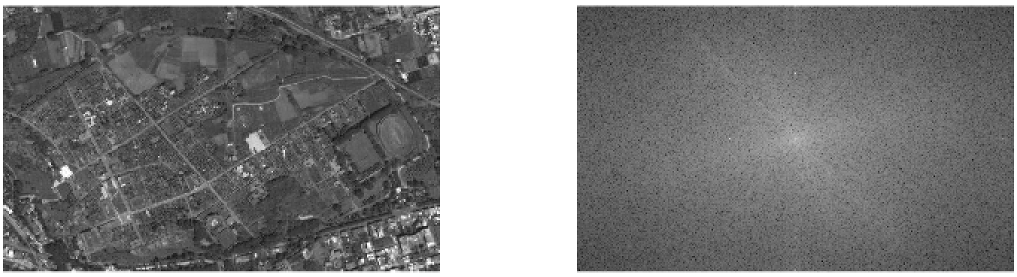

Figure 4: Results

- II - Face Identification through YCbCr.

Figure 5: Case 1

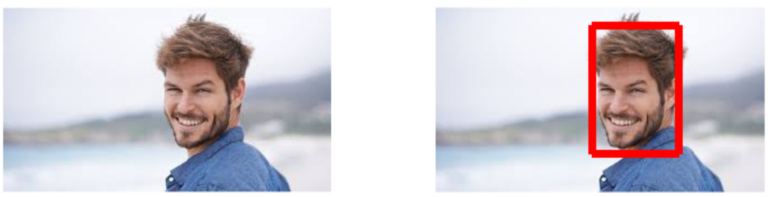

Figure 6: Case 2

Figure 7: Case 3

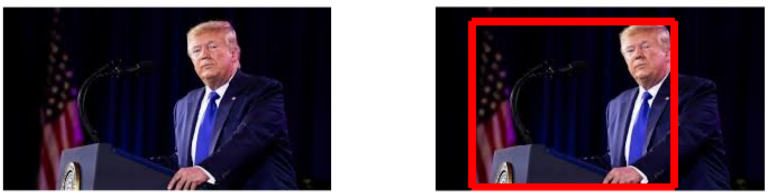

Figure 8: Case 4

Figure 9: Case 5

Figure 10: Case 6

- III - Histogram Equalization upon RGB image.
  - Method 1

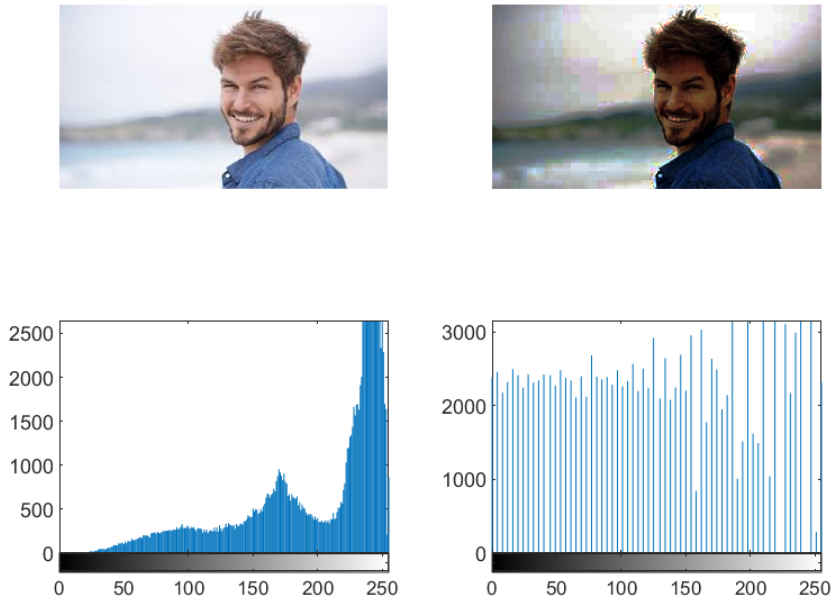

Figure 11: Case 1

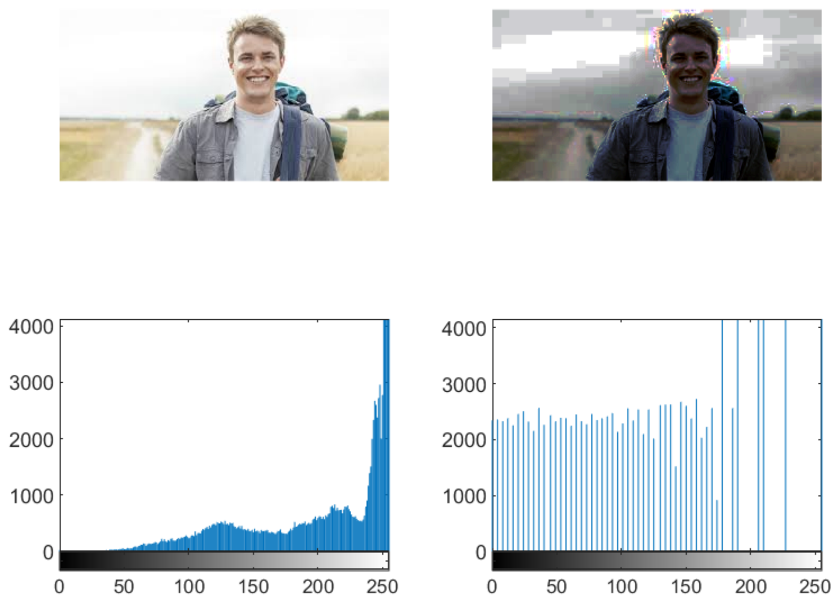

Figure 12: Case 2

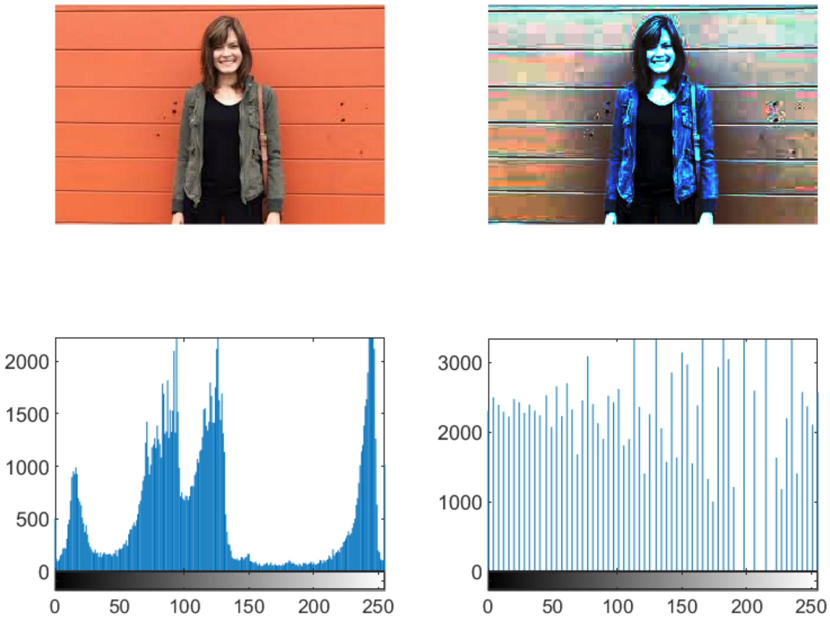

Figure 13: Case 3

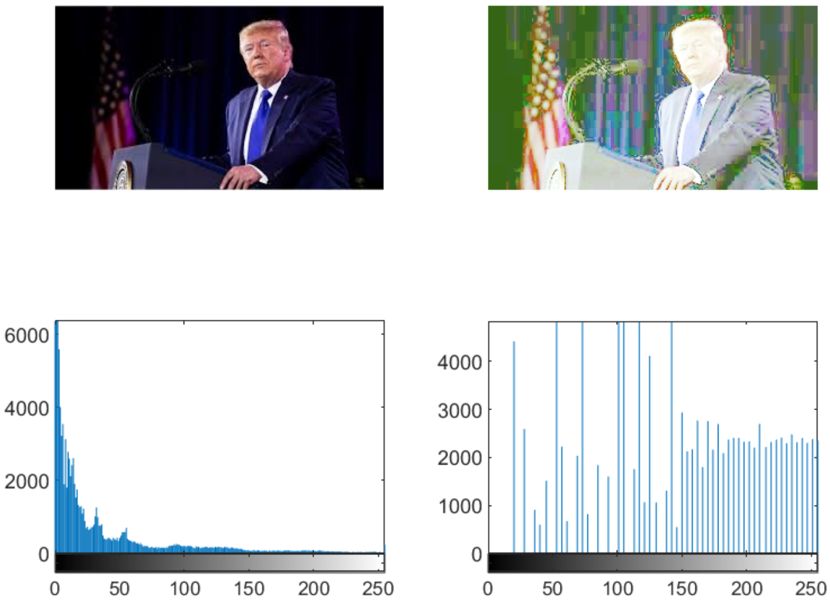

Figure 14: Case 4

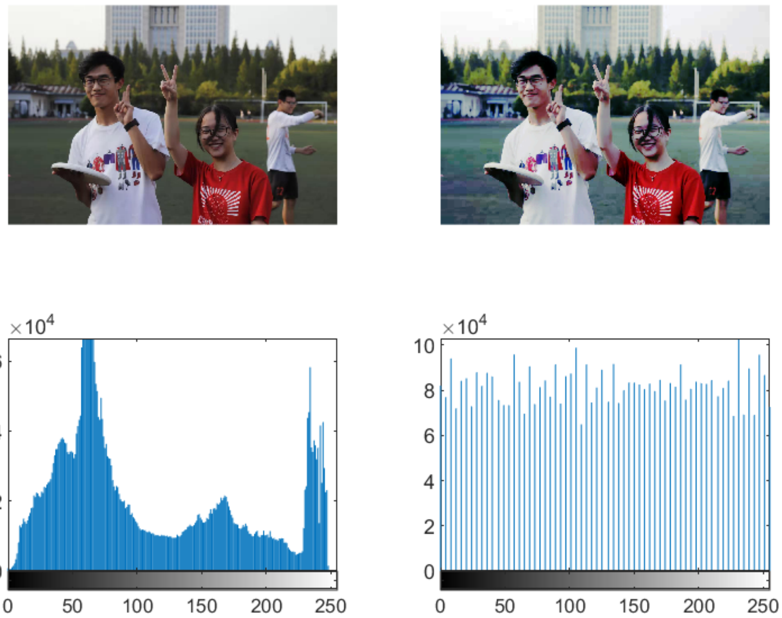

Figure 15: Case 5

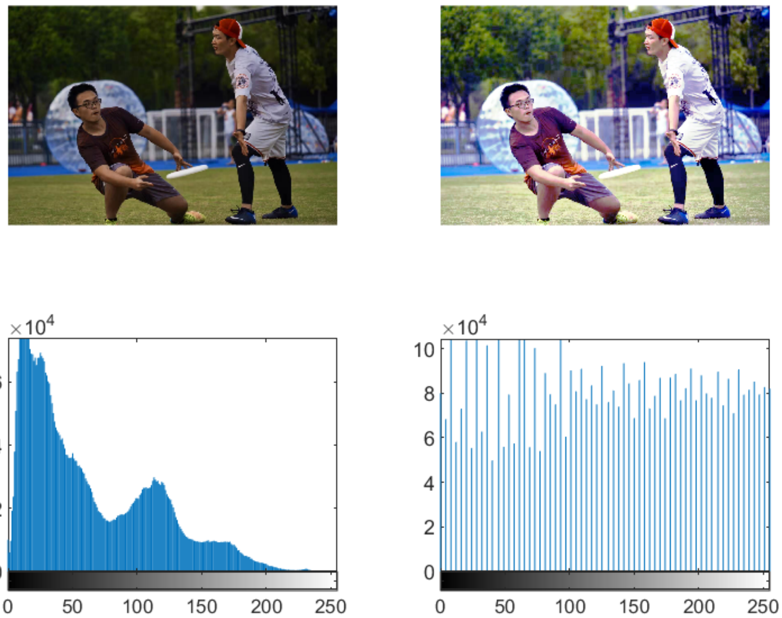

Figure 16: Case 6

– Method 2

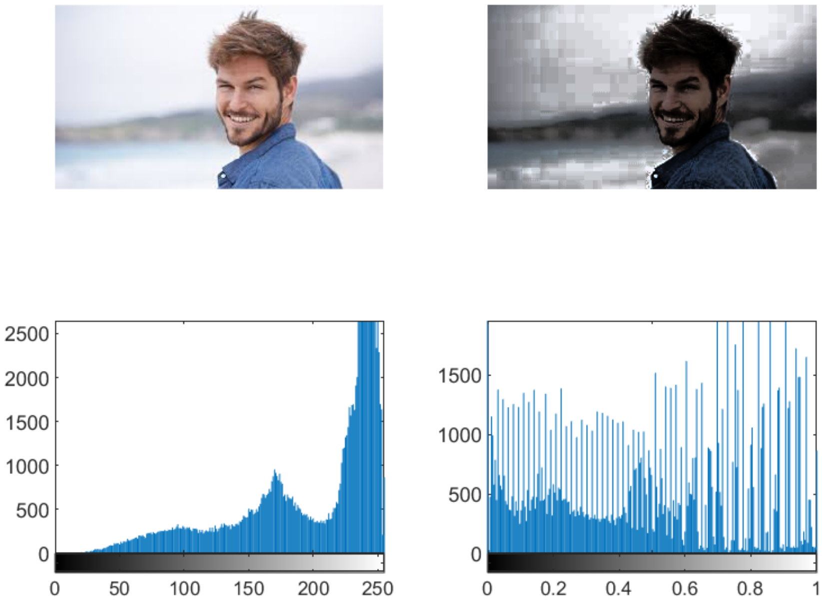

Figure 17: Case 1

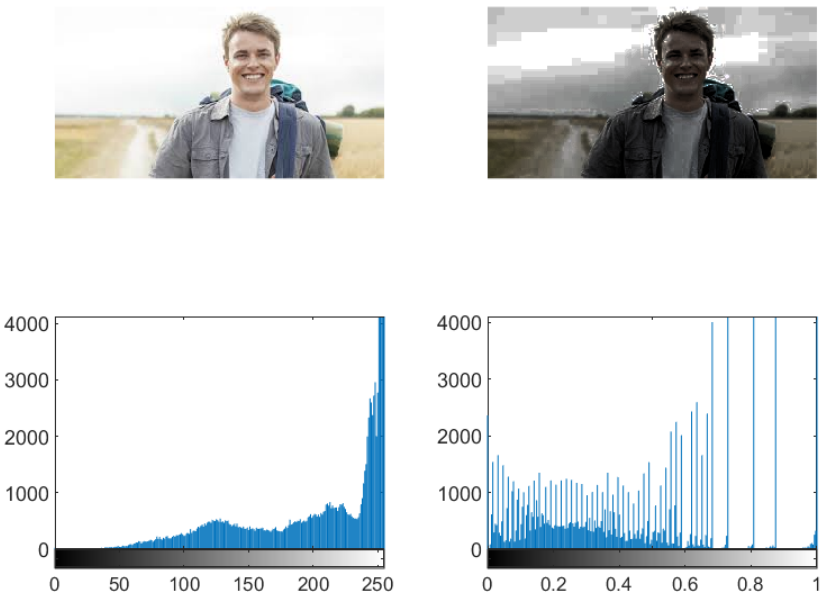

Figure 18: Case 2

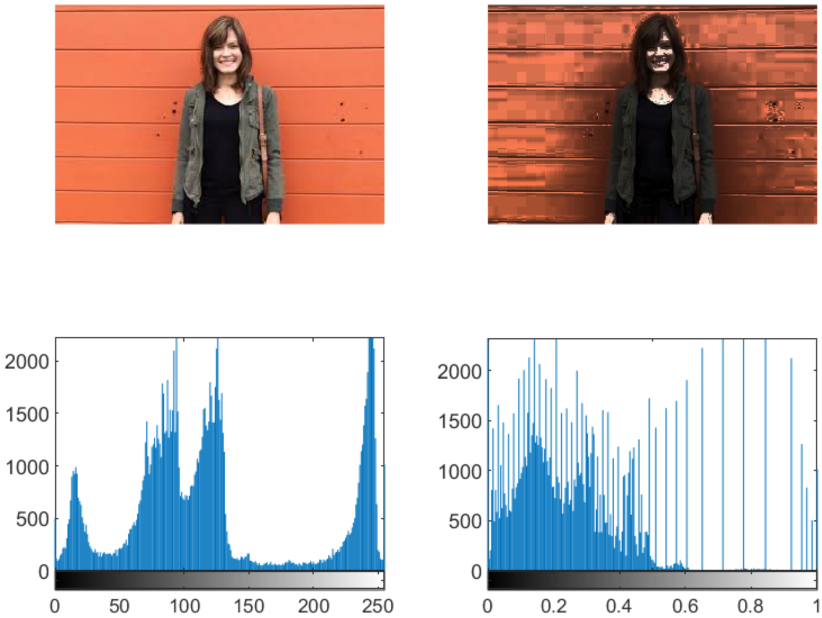

Figure 19: Case 3

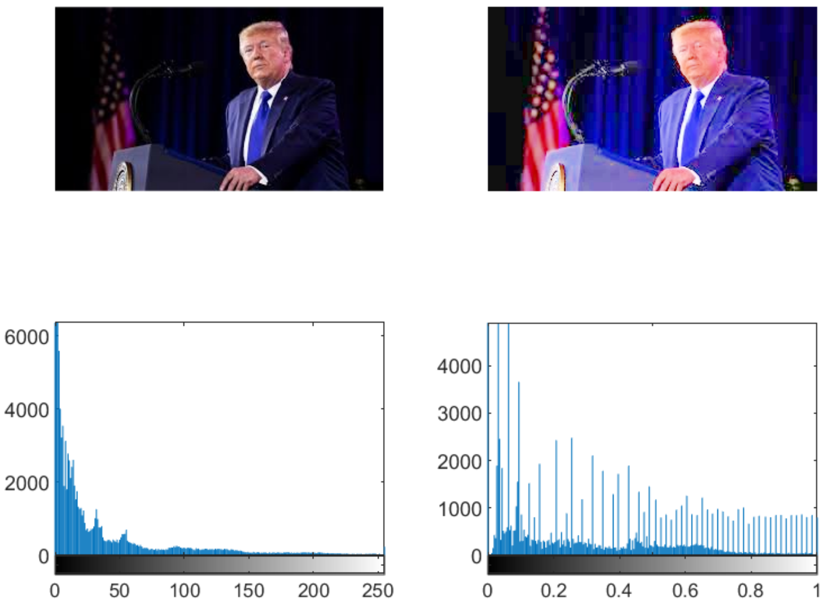

Figure 20: Case 4

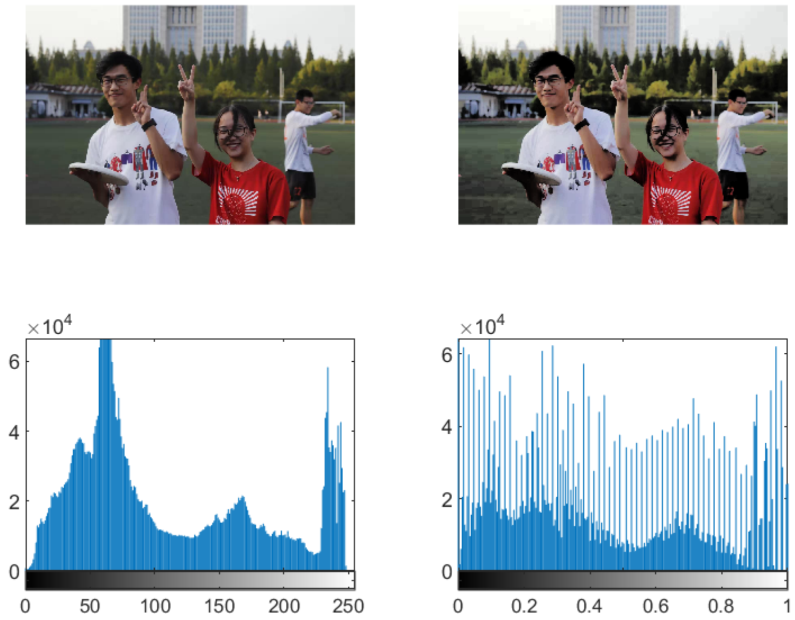

Figure 21: Case 5

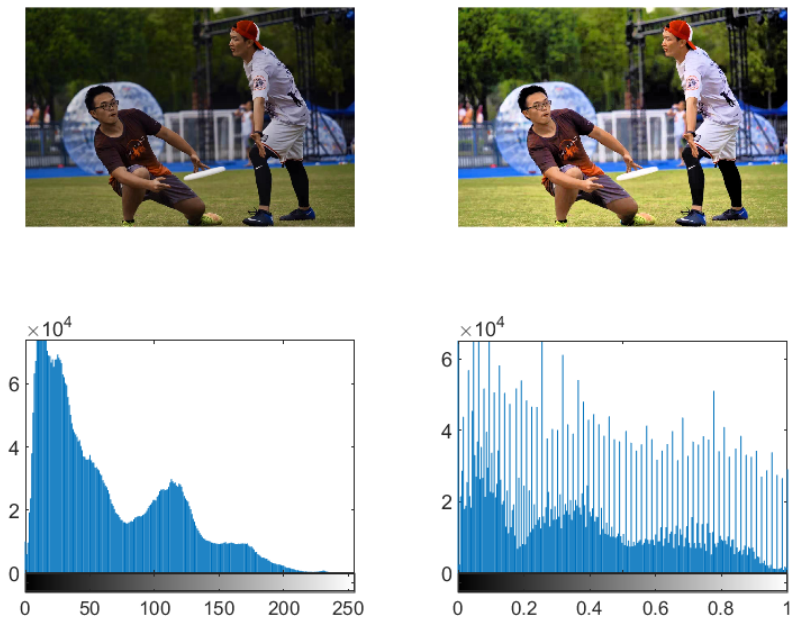

Figure 22: Case 6

4 Appendix

Source Code is enclosed with this report, in the 'src' directory, please be kind to refer to them, thanks!