Digital Image Processing (2016)

Homework 2

[color manipulation]

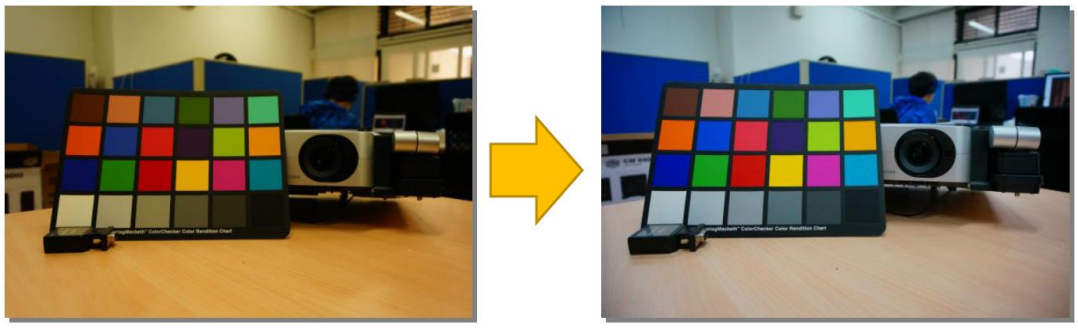
Deadline:2016.10.27

Notice1: In this work, you are allowed to use matlab, but image processing toolbox are banned to use. Also, for those who want to use C/C++, you can use openCV only for reading and writing the image.

Notice2: There will be no demo this time, we will evaluate your homework by your output image and report.

1.white balance(60%)

Using C++ or C or matlab to do the white balance to the input image, making the color value of the color chunks on the color checker be as close to the real color value (see hints) as possible.



[Input] input1.bmp
[Output] wb.bmp

Report: Do some discuss and state how do you adjust the color
File: imgWB

2.color transformation (40%)

Now let's have some fun. Try anything you can to modify the image to make it be like a gloomy autumn day, for example: make the sky darker, adjust the color of the grass …etc
(Reference color style: style1,style2)

This topic will not have a standard result.
We will judge the result by whether it have a naturally look (for example: do the grass change to the similar hue / do the color of the mountain look naturally/are there any strange edge or color pattern) and how much you can do to maintain the hue of the building, we will do our best to avoid too much subjective evaluation.

[Input] input2.bmp
[Output] trans.bmp

Report: Do some discuss and state how do you transform the color you want.
File: imgTRANS

(Picture from PEXELS with CC0 license, Free for personal and commercial use)
(https://www.pexels.com/photo/green-grass-near-white-concrete-house-132895/)

- **Report are restricted in no more than 5 pages in total.**

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Homework Rules and Grading Policy

Homework will be graded by:

1. Correctness.
2. Algorithm description
3. Discussion

Upload:

[FTP] 140.113.238.220
[Port] 634
[Username] DIP2016
[Password] DIP2016
[File Name] hw2_StudentId.zip (ex. hw2_1234567.zip)
hw2_StudentId_v2.zip

Remind:

1. Your C or C++ or matlab code with comments
2. Your report in the format of .pdf
3. ReadMe.txt file which describes how to run your program
4. Hand in a hard-copy of your report in the class on the due date
5. Deadline

   If you have a late submission by 1 to 7 days, you will only get 70% of the score.

   We DO NOT accept any late submission after 7 days after the deadline.

Hints

1. Try to study **histogram** first, it may help you in some way.
2. Try to study sRGB, and mind the difference between nonlinear RGB and linear RGB.
3. Color information of the color checker

Index	Description	Munsell Notation	CIE xyY'	Manufacturer's sRGB color values[7]
Row 1: Natural colors				
1	Dark skin	3 YR 3.7/3.2	0.400 0.350 10.1	#735244
2	Light skin	2.2 YR 6.47/4.1	0.377 0.345 35.8	#c29682
3	Blue sky	4.3 PB 4.95/5.5	0.247 0.251 19.3	#627a9d
4	Foliage	6.7 GY 4.2/4.1	0.337 0.422 13.3	#576c43
5	Blue flower	9.7 PB 5.47/6.7	0.265 0.240 24.3	#8580b1
6	Bluish green	2.5 BG 7/6	0.261 0.343 43.1	#67bdaa
Row 2: Miscellaneous colors				
7	Orange	5 YR 6/11	0.506 0.407 30.1	#d67e2c
8	Purplish blue	7.5 PB 4/10.7	0.211 0.175 12.0	#505ba6
9	Moderate red	2.5 R 5/10	0.453 0.306 19.8	#c15a63
10	Purple	5 P 3/7	0.285 0.202 6.6	#5e3c6c
11	Yellow green	5 GY 7.1/9.1	0.380 0.489 44.3	#9dbc40
12	Orange Yellow	10 YR 7/10.5	0.473 0.438 43.1	#e0a32e
Row 3: Primary and secondary colors				
13	Blue	7.5 PB 2.9/12.7	0.187 0.129 6.1	#383d96
14	Green	0.25 G 5.4/9.6	0.305 0.478 23.4	#469449
15	Red	5 R 4/12	0.539 0.313 12.0	#af363c
16	Yellow	5 Y 8/11.1	0.448 0.470 59.1	#e7c71f
17	Magenta	2.5 RP 5/12	0.364 0.233 19.8	#bb5695
18	Cyan	5 B 5/8	0.196 0.252 19.8	#0885a1
Row 4: Grayscale colors				
19	White	N 9.5/	0.310 0.316 90.0	#f3f3f2
20	Neutral 8	N 8/	0.310 0.316 59.1	#c8c8c8
21	Neutral 6.5	N 6.5/	0.310 0.316 36.2	#a0a0a0
22	Neutral 5	N 5/	0.310 0.316 19.8	#7a7a79
23	Neutral 3.5	N 3.5/	0.310 0.316 9.0	#555555
24	Black	N 2/	0.310 0.316 3.1	#343434