



# Homework2 Color

胡成成 2101210578

## Question

根据自己的兴趣，在三道题中选做一道：

1. 矫正图像中的偏色
2. 替换对象颜色
3. 着色

## Answer

- 选择第一题：矫正图像中的偏色
- 实现完美反射与自动白平衡算法：

```
#!/usr/bin/env python
# -*- coding: UTF-8 -*-

import cv2
import numpy as np

def white_balance(img):
    # 读取图像
    r, g, b = cv2.split(img)
    r_avg = cv2.mean(r)[0]
    g_avg = cv2.mean(g)[0]
    b_avg = cv2.mean(b)[0]
    # 求各个通道所占增益
    k = (r_avg + g_avg + b_avg) / 3
    kr = k / r_avg
    kg = k / g_avg
    kb = k / b_avg
    r = cv2.addWeighted(src1=r, alpha=kr, src2=0, beta=0, gamma=0)
    g = cv2.addWeighted(src1=g, alpha=kg, src2=0, beta=0, gamma=0)
```

```

b = cv2.addWeighted(src1=b, alpha=kb, src2=0, beta=0, gamma=0)
balance_img = cv2.merge([b, g, r])
return balance_img

```

```

def perfect_reflection(img_input):
    img = img_input.copy()
    b, g, r = cv2.split(img)
    m, n, t = img.shape
    sum_ = np.zeros(b.shape)
    for i in range(m):
        for j in range(n):
            sum_[i][j] = int(b[i][j]) + int(g[i][j]) + int(r[i][j])
    hists, bins = np.histogram(sum_.flatten(), 766, [0, 766])
    Y = 765
    num, key = 0, 0
    ratio = 0.1
    while Y >= 0:
        num += hists[Y]
        if num > m * n * ratio / 100:
            key = Y
            break
        Y = Y - 1

    sum_b, sum_g, sum_r = 0, 0, 0
    time = 0
    for i in range(m):
        for j in range(n):
            if sum_[i][j] >= key:
                sum_b += b[i][j]
                sum_g += g[i][j]
                sum_r += r[i][j]
                time = time + 1

    avg_b = sum_b / time
    avg_g = sum_g / time
    avg_r = sum_r / time

    maxvalue = float(np.max(img))
    # maxvalue = 255
    for i in range(m):
        for j in range(n):
            b = int(img[i][j][0]) * maxvalue / int(avg_b)
            g = int(img[i][j][1]) * maxvalue / int(avg_g)
            r = int(img[i][j][2]) * maxvalue / int(avg_r)
            if b > 255:
                b = 255
            if b < 0:
                b = 0
            if g > 255:
                g = 255
            if g < 0:
                g = 0
            if r > 255:

```

```

        r = 255
    if r < 0:
        r = 0
    img[i][j][0] = b
    img[i][j][1] = g
    img[i][j][2] = r

    return img

img_bgr = cv2.imread("./images/blue.jpg", 1)

cv2.imshow("raw", img_bgr)

img_bgr0 = white_balance(img_bgr)
img_bgr1 = perfect_reflection(img_bgr)

cv2.imshow("white balance", img_bgr0)
cv2.imshow("perfect reflection", img_bgr1)

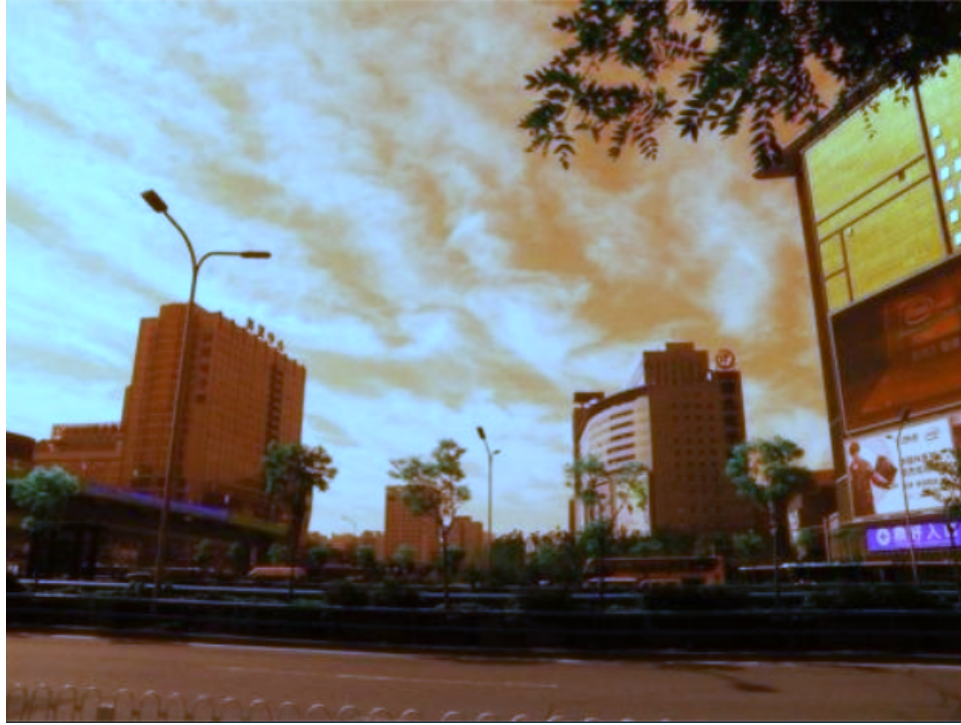
cv2.waitKey(0)

```

- 输入图像：



- 自动白平衡输出：



- 完美反射输出：



## 问题：

- 所给的图像可能太偏蓝，不满足三色均衡的前提条件，导致自动白平衡后的效果并没有那么好。