實習六
影像色彩的轉換與分析

課程大綱

- **實習00: Colab 環境**
- **實習06:影像色彩的轉換與分析**

AI

實習 00
Colab 環境

Colab Env.

Colab Env.

Before we start...

```python
#mount drive
from google.colab import drive
drive.mount('/content/drive')
```

```python
# import libraries
import sys
import os
import cv2
import numpy as np
from matplotlib import pyplot as plt
from google.colab.patches import cv2_imshow
```

實習 06
影像色彩的轉換與分析

Function

- 色彩模型轉換

    - OpenCV的cv2. cvtColor ()

    - https://reurl.cc/2gpD5v

    - https://reurl.cc/GrWoMW

- Gamma校正

    - Numpy的np.power ()

    - OpenCV的cv2.LUT()

    - https://docs.opencv.org/3.4/d2/de8/group__core__array.html#gab55b8d062b7f5587720ede032d34156f

TASK

- **對影像進行色彩模型轉換並將其模型通道分離**
  - **RGB色彩模型分離**
  - **HSV色彩模型分離**
  - **YCrCb色彩模型分離**
- **色彩影像增強**
  - **使用伽瑪校正(Gamma Correction)**

實驗影像: lenna_RGB.bmp

https://reurl.cc/DXjZEj


```python
1   #mount drive
2   from google.colab import drive
3   drive.mount('/content/drive')

4   # import libraries
5   import sys
6   import os
7   import cv2
8   import numpy as np
9   from matplotlib import pyplot as plt
10  from google.colab.patches import cv2_imshow

11  folder = r'/content/drive/MyDrive/images'
12  path_img = os.path.join(folder,'lenna_RGB.bmp')
13  img = cv2.imread(path_img)
14  # Afterwards, a check is executed, if the image was loaded correctly.
15  if img is None:
16      sys.exit("Could not read the image.")
17  cv2_imshow(img)
18  img_gray = cv2.cvtColor(img,cv2.COLOR_BGR2GRAY)
```
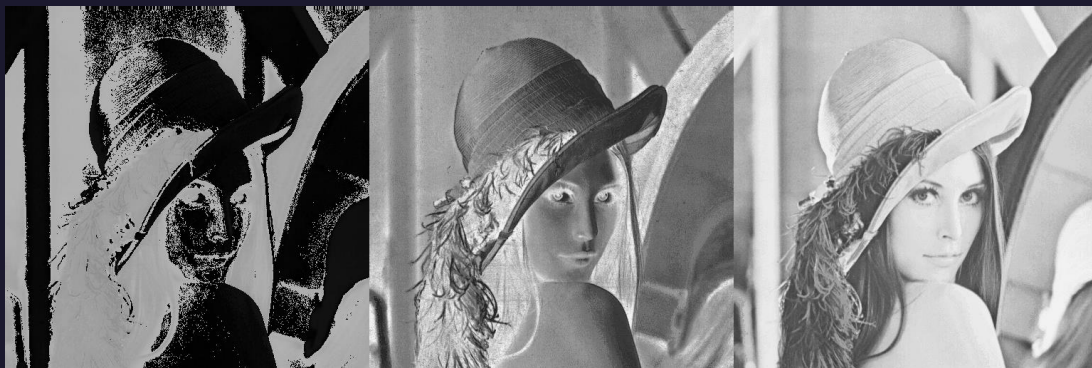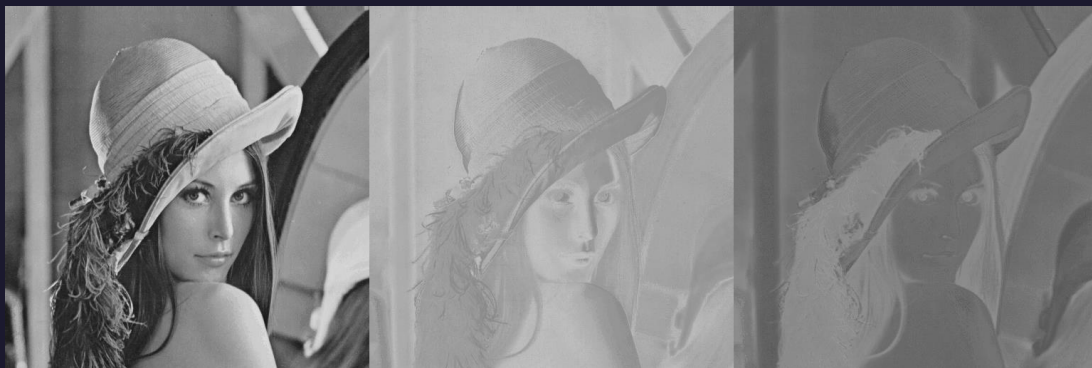
```python
20   def separating_channel(img):
21     (c1,c2,c3) = cv2.split(img)
22     return np.hstack((c1,c2,c3))


23   # conversions to hsv
24   img_hsv = cv2.cvtColor(img, cv2.COLOR_BGR2HSV)
25   # conversion to YCrCb
26   img_ycrcb = cv2.cvtColor(img,cv2.COLOR_BGR2YCrCb)


27   # sparating_channel
28   img_rgb_separating = separating_channel(img)
29   img_hsv_separating = separating_channel(img_hsv)
30   img_ycrcv_separating = separating_channel(img_ycrcb)


31   cv2_imshow(img_rgb_separating)
32   cv2_imshow(img_hsv_separating)
33   cv2_imshow(img_ycrcv_separating)
```

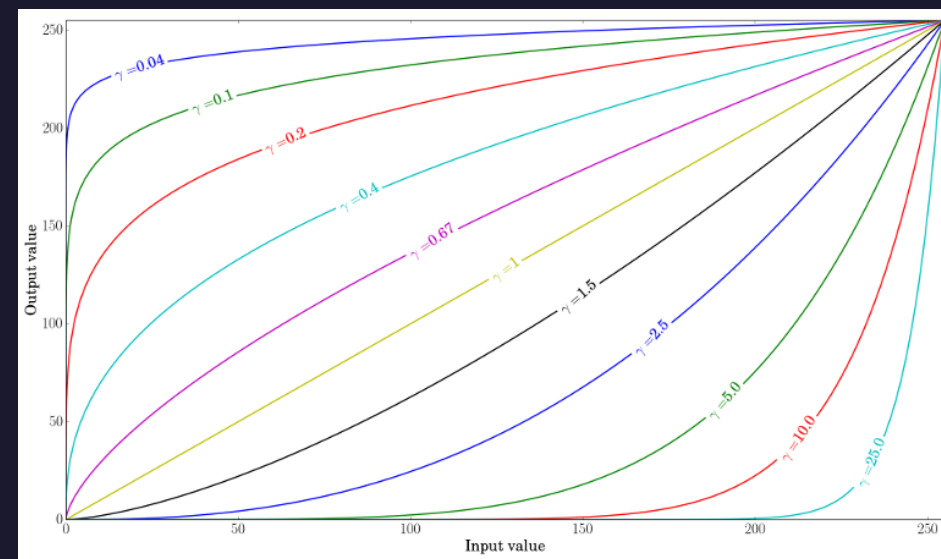γ< 1，原來的暗區會更亮，直方圖會向右移動，反之則相反γ> 1.

src

gamma=0.5

src

gamma=2

```python
def adjust_gamma(image,gamma=1.0):
    lookUpTable = np.empty((1,256), np.uint8)
    for i in range(256):
        lookUpTable[0,i] = np.clip(pow(i / 255.0, gamma) * 255.0, 0, 255)
    res = cv2.LUT(image, lookUpTable)
    return res


cv2_imshow(adjust_gamma(img,gamma=0.5))


cv2_imshow(adjust_gamma(img,gamma=2))
```

$$O = \left(\frac{I}{255}\right)^{\gamma} \times 255$$
非線性變換來校正圖像的亮度

Thanks for listening

Thank You

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Contact me