國立臺灣科技大學
NATIONAL TAIWAN UNIVERSITY OF SCIENCE AND TECHNOLOGY

實習七
利用色彩分割影像

課程大綱

- 實習00: Colab 環境
- 實習07:利用色彩分割影像

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 07

利用色彩分割影像

Function

- 色彩模型轉換
  - OpenCV 的 cv2. cvtColor ()
  - https://reurl.cc/2gpD5v
  - https://reurl.cc/GrWoMW

TASK

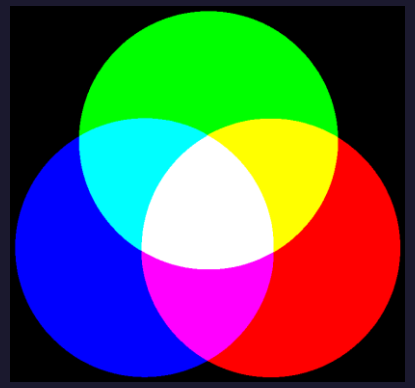
- 透過不同的色彩模型對進行影像分割(Image Segmentation)，目的為擷取(或分割)具有特定顏色的區域:
  1. HSV 色彩分割：利用色彩範圍分割出黃色花朵
  2. RGB 色彩分割：利用色度鍵 (Chroma Key) 分割出綠色區域

實驗影像: Flower.bmp

https://reurl.cc/jR91ZD

實驗影像: RGB_Chart.bmp

https://reurl.cc/gQR2yQ



```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
```

```python
folder = r'/content/drive/MyDrive/images'
path_img = os.path.join(folder,'Flower.bmp')
img = cv2.imread(path_img)
# Afterwards, a check is executed, if the image was loaded correctly.
if img is None:
    sys.exit("Could not read the image.")
cv2_imshow(img)
img_gray = cv2.cvtColor(img,cv2.COLOR_BGR2GRAY)
```

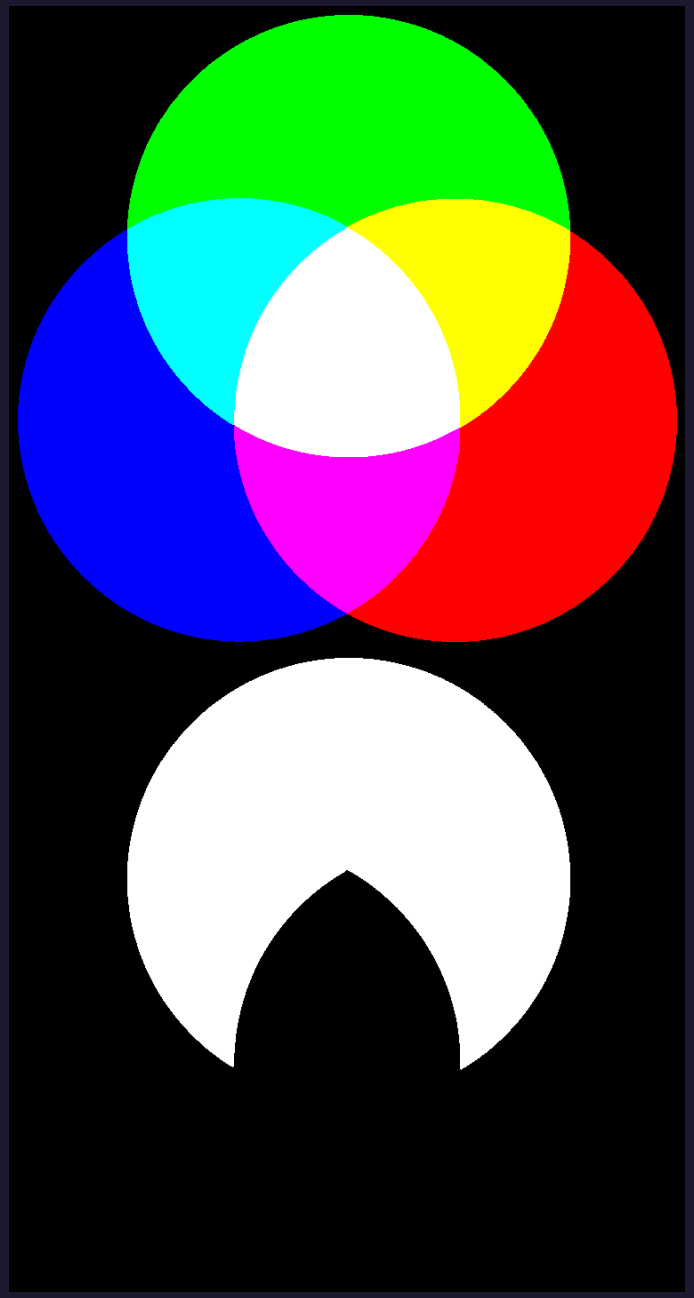
```python
folder = r'/content/drive/MyDrive/images'
path_img = os.path.join(folder,'RGB_Chart.bmp')
img = cv2.imread(path_img)
# Afterwards, a check is executed, if the image was loaded correctly.
if img is None:
    sys.exit("Could not read the image.")
cv2_imshow(img)
```

TASK : HSV 色彩分割

```python
def hsv_color_segmentation(src,h1,h2,s1,s2,v1,v2):
  dst = src.copy()
  # convers to hsv
  img_hsv = cv2.cvtColor(src,cv2.COLOR_BGR2HSV)
  # read each pixel
  for img_height in range(src.shape[0]):
    for img_width in range(src.shape[1]):
      # 乘以2原因，因為OpenCV是將Hue值除以2使用0~180儲存
      H = img_hsv[img_height,img_width,0] * 2
      # 需要先將數值正規化至[0, 1]，再以百分比表示
      S = img_hsv[img_height,img_width,1] / 255 * 100
      # 需要先將數值正規化至[0, 1]，再以百分比表示
      V = img_hsv[img_height,img_width,2] / 255 * 100
      # 若 HSV 值落在範圍內，則保留輸入的色彩值；否則輸出 0
      if not(H>=h1 and H<=h2 and S>=s1 and S<=s2 and V>=v1 and V<=v2):
        for i in range(3):
          dst[img_height,img_width,i] = 0
  return dst
```

```python
# 此範例切割 HSV 範圍為：30度 ≦ H ≦ 70度 ；30% ≦ S ≦ 100% ；30% ≦ V ≦ 100%
img_hsv_segmentation = hsv_color_segmentation(img,30,70,30,100,30,100)
cv2_imshow(img_hsv_segmentation)
```

TASK : RGB 色彩分割



```python
def rgb_color_segmentation(src,thresh):
  dst = src.copy()
  # read each pixel
  for img_height in range(src.shape[0]):
    for img_width in range(src.shape[1]):
      # color channel split
      B = int(src[img_height,img_width,0])
      G = int(src[img_height,img_width,1])
      R = int(src[img_height,img_width,2])
      # chroma formula
      chroma = (B+R)/2 - G
      # if 如果色度鍵小於thresh且不等於0，將綠色的部分分割為255(白)，其餘為0(黑)
      for i in range(3):
        if ( chroma<thresh and chroma!=0):
          dst[img_height,img_width,i]=255
        else:
          dst[img_height,img_width,i]=0
  return dst
```

```python
img_rgb_segmentation = rgb_color_segmentation(img,100)
cv2_imshow(img_rgb_segmentation)
```

NATIONAL TAIWAN UNIVERSITY OF SCIENCE AND TECHNOLOGY

Thanks for listening

Thank You

詹宏澤

Email: chanhts323@gmail.com

https://sites.google.com/view/peter-chan