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利用色彩分割影像

目標任務

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透過不同的色彩模型來對影像進行影像分割，並且同時藉由不同策略來對影像擷取具有特定顏色的區域。

(1) HSV色彩分割

- **分割出黃色花朵**
- **$30^o \leqq$ Hue $\leqq 70^o$**
- **30% $\leqq$ Saturation $\leqq$ 100%**
- **30% $\leqq$ Value $\leqq$ 100%**

(2) RGB色度鍵(Chroma Key)分割

- **分割出綠色區域**
- **Threshold：100**

HSV影像分割

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- 對影像中找出特定顏色的遮罩:
  - ✓ *cv2.inRange(src, lowerb, upperb)*
- 影像交集用:
  - ✓ *cv2.bitwise_and(src1, src2 [, mask])*

OpenCV將原Hue值角度除以2，並且使用0~180儲存

```python
def Percentage2Intensity(thres_hsv):
    thres_hsv[0] = thres_hsv[0]
    thres_hsv[1] = thres_hsv[1] // 100 * 255
    thres_hsv[2] = thres_hsv[2] // 100 * 255
    return thres_hsv
```

```python
def HSVColorSegmentation(**kwargs):
    src, LowerHSV, UpperHSV = kwargs['src'], kwargs['LowerHSV'], kwargs['UpperHSV']
    image = src.copy()
    image_hsv = cv2.cvtColor(image, cv2.COLOR_RGB2HSV)
    LowerHSV = Percentage2Intensity(LowerHSV)
    UpperHSV = Percentage2Intensity(UpperHSV)
    mask = cv2.inRange(image_hsv, lowerb=LowerHSV, upperb=UpperHSV)
    seg = cv2.bitwise_and(image, image, mask=mask)
    return seg
```

BGR影像分割

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- **色鍵度計算公式(綠幕用)**
  - ✓ $Chroma = (B + R) / 2 - G$

背景是什麼，就減什麼

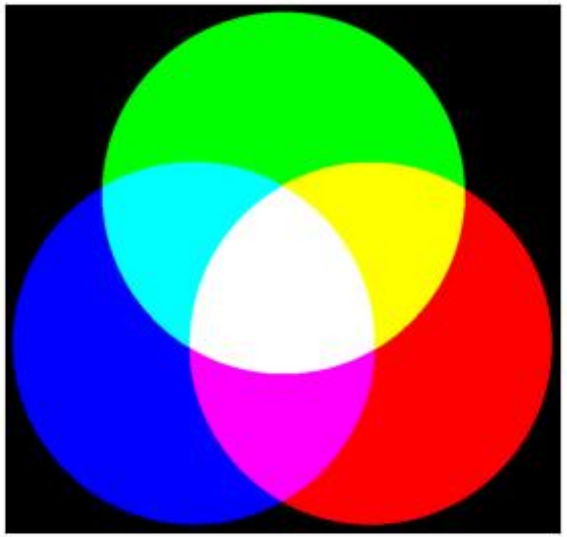
```
def BGRColorSegmentation(**kwargs):
    src, thresh = kwargs['src'], kwargs['thresh']
    seg = src.copy()
    for h in range(src.shape[0]):
        for w in range(src.shape[1]):
            R, G, B = src[h, w, :]
            chroma = (int(  ) + int(  )) / 2 - int(  )
            if chroma < thresh and chroma != 0:
                seg[h, w, :] = 255
            else:
                seg[h, w, :] = 0
    return seg
```

主程式

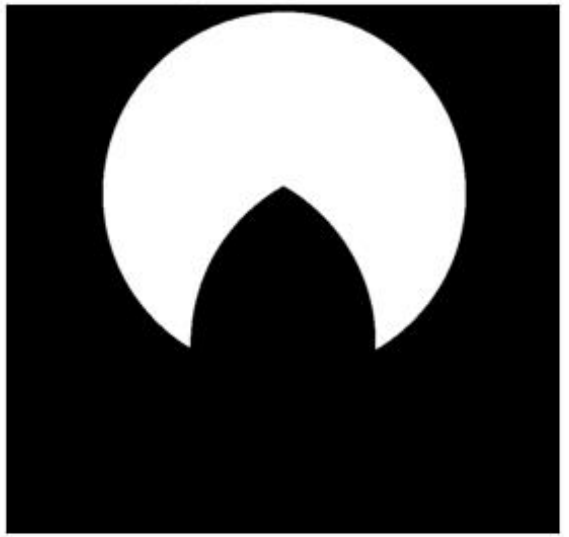

```
import cv2
import numpy as np
from matplotlib import pyplot as plt

ChartPath = './RGB_Chart.bmp'
ChartImage = cv2.imread(ChartPath)
ChartImage = cv2.cvtColor(ChartImage, cv2.COLOR_BGR2RGB)
BGRSeg = BGRColorSegmentation(src=ChartImage, thresh=[redacted])

FlowerPath = './Flower.bmp'
FlowerImage = cv2.imread(FlowerPath)
FlowerImage = cv2.cvtColor(FlowerImage, cv2.COLOR_BGR2RGB)
LowerHSV = np.array([redacted])
UpperHSV = np.array([redacted])
HSVSeg = HSVColorSegmentation(src=FlowerImage, LowerHSV=LowerHSV, UpperHSV=UpperHSV)

images = [ChartImage, BGRSeg, FlowerImage, HSVSeg]
titles = ['CHART', 'BGR_SEGMENTATION', 'FLOWER', 'HSV_SEGMENTATION']

plt.figure()
for i in range(len(images)):
    plt.subplot(2, 2, i+1), plt.imshow(images[i])
    plt.title(titles[i])
    plt.xticks([]), plt.yticks([])
plt.show()
```

實作結果

CHART



BGR_SEGMENTATION



FLOWER

HSV_SEGMENTATION

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Thanks for listening