Grayscale processing

The process of converting a color image into a grayscale image is the grayscale processing of the image.

The color of each pixel in a color image is determined by the three components of R, G, and B, and each component can take values 0-255, so that a pixel can have a range of more than 16 million (256*256*256=1677256) colors.

A grayscale image is a special color image with the same three components of R, G, and B, and the range of variation of one pixel is 256. Therefore, in digital image processing, images of various formats are generally converted into grayscale images to reduce the amount of calculation for subsequent images.

The description of a grayscale image, like a color image, still reflects the distribution and characteristics of the overall and local chromaticity and highlight levels of the entire image.

Image grayscale processing.

Grayscale processing is the process of converting a color image into a grayscale image. Color images are divided into three components: R, G, and B, which respectively display various colors such as red, green, and blue.

Grayscale is the process of making the R, G, and B components of the color equal.

Pixels with large grayscale values are brighter (the maximum pixel value is 255, which is white), and vice versa, they are darker (the lowest pixel value is 0, which is black).

The core idea of image grayscale is R = G = B, this value is also called grayscale value.

Image grayscale algorithm

1) Maximum value method: Make the converted R, G, B values equal to the largest of the three values before conversion, that is: R=G=B=max(R, G, B). The grayscale image converted by this method is very bright.

2) Average value method: The converted R, G, B values are the average of the converted R, G, B. That is: R=G=B=(R+G+B)/3. The grayscale image produced by this method is relatively soft.

3) Weighted average value method: According to a certain weight, the values of R, G, B are weighted averaged, that is: the weights of R, G, B are respectively, and different values are taken to form different grayscale images. Since the human eye is most sensitive to green, followed by red, and the least sensitive to blue, a grayscale image that is easier to recognize will be obtained. **Generally, the obtained grayscale image has the best effect.

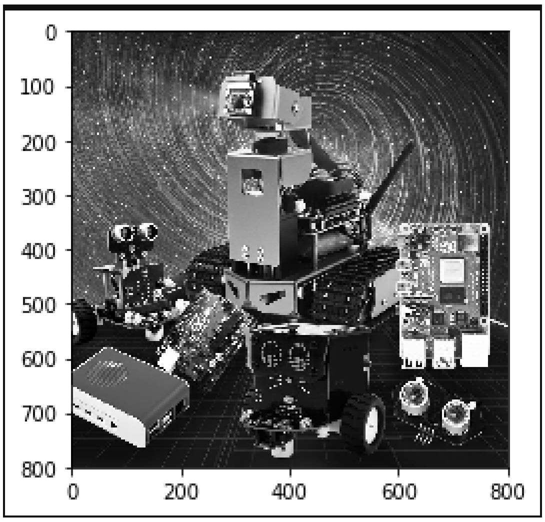
There are four methods to achieve grayscale in the following code:

Code path:

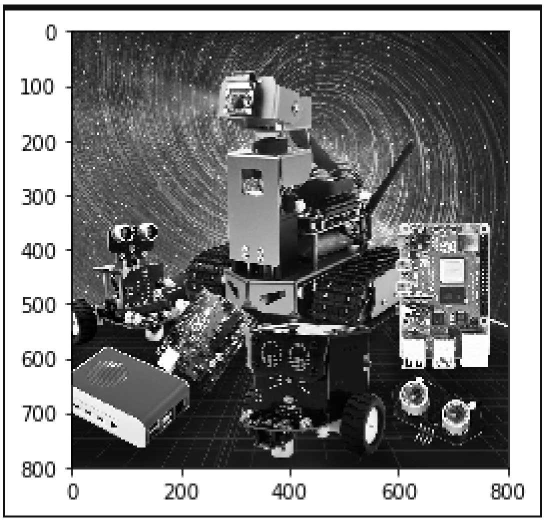
```
~/dofbot_ws/src/dofbot_opencv/scripts/3.draw_picture/01_gray.ipynb
```

```
#Method 1: imread
#Note: Sometimes the image will not appear on the first run, but will appear on the second run
import cv2
import   matplotlib.pyplot as plt
```

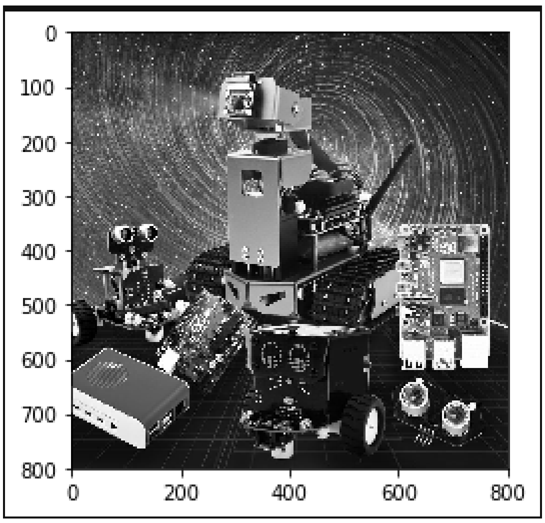
```
img0 = cv2.imread('yahboom.jpg',0)
img1 = cv2.imread('yahboom.jpg',1)
#   print(img0.shape)
#   print(img1.shape)
#   cv2.imshow('src',img0)
#   cv2.waitKey(0)

#The original image
#   img_bgr2rgb1 = cv2.cvtColor(img1, cv2.COLOR_BGR2RGB)
#   plt.imshow(img_bgr2rgb1)

#Gray Image
img_bgr2rgb0   = cv2.cvtColor(img0, cv2.COLOR_BGR2RGB)
    plt.imshow(img_bgr2rgb0)
    plt.show()
```



```
#Method 2: cvtColor
#Note: Sometimes the image will not appear on the first run, but will appear on
the second run

import cv2
import matplotlib.pyplot   as plt

img = cv2.imread('image0.jpg',1)
dst = cv2.cvtColor(img,cv2.COLOR_BGR2GRAY)#   Color space conversion 1 data 2 BGR
gray
#cv2.imshow('dst',dst)
#cv2.waitKey(0)

#The original image
# img_bgr2rgb1   = cv2.cvtColor(img, cv2.COLOR_BGR2RGB)
# plt.imshow(img_bgr2rgb1)

#Gray Image
img_bgr2rgb0   = cv2.cvtColor(dst, cv2.COLOR_BGR2RGB)
    plt.imshow(img_bgr2rgb0)
    plt.show()
```




```
#Method 3: Average method

import cv2
import   numpy as np
import   matplotlib.pyplot as plt
img =   cv2.imread('yahboom.jpg',1)
imgInfo =   img.shape
height =   imgInfo[0]
width =   imgInfo[1]
# RGB R=G=B   = gray  (R+G+B)/3
dst =   np.zeros((height,width,3),np.uint8)
for i in   range(0,height):
    for j in range(0,width):
        (b,g,r) = img[i,j]
        gray = (int(b)+int(g)+int(r))/3
        dst[i,j] = np.uint8(gray)
#cv2.imshow('dst',dst)
#cv2.waitKey(0)
#The original image
#   img_bgr2rgb1 = cv2.cvtColor(img, cv2.COLOR_BGR2RGB)
#   plt.imshow(img_bgr2rgb1)

#Gray Image
img_bgr2rgb0   = cv2.cvtColor(dst, cv2.COLOR_BGR2RGB)
plt.imshow(img_bgr2rgb0)
    plt.show()
```



```
#Method 4: Weighted average method
# gray =   r*0.299+g*0.587+b*0.114
import cv2
import   numpy as np
img =   cv2.imread('yahboom.jpg',1)
imgInfo =   img.shape
height =   imgInfo[0]
width = imgInfo[1]
dst =   np.zeros((height,width,3),np.uint8)
for i in   range(0,height):
    for j in range(0,width):
        (b,g,r) = img[i,j]
        b = int(b)
        g = int(g)
        r = int(r)
        gray = r*0.299+g*0.587+b*0.114
        dst[i,j] = np.uint8(gray)
#cv2.imshow('dst',dst)
#cv2.waitKey(0)

#The original image
#   img_bgr2rgb1 = cv2.cvtColor(img, cv2.COLOR_BGR2RGB)
#   plt.imshow(img_bgr2rgb1)

#Gray Image
img_bgr2rgb0   = cv2.cvtColor(dst, cv2.COLOR_BGR2RGB)
plt.imshow(img_bgr2rgb0)

    plt.show()
```