

1、 Grey 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 three components: R, G, and B, and each component can take a value of 0-255, so there can be more than 16 million pixels ($256 \times 256 \times 256 = 16777216$). The range of color changes. The grayscale image is a special color image with the same three components of R, G, and B. The variation range of one pixel is 256. Therefore, in digital image processing, images in various formats are generally converted into grayscale image to make subsequent images less computationally intensive. The description of a grayscale image, like a color image, still reflects the distribution and characteristics of the overall and local chroma and highlight levels of the entire image.

Grayscale processing is the process of converting a color image into a grayscale image. The color image is divided into three components: R, G, and B, which display various colors such as red, green, and blue respectively. Grayscale is the process of making the color R, G, and B components equal. Pixels with large grayscale values are brighter (the maximum pixel value is 255, which is white), and vice versa (the lowest pixel 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 values of R, G, and B 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 method: The values of R, G, and B after conversion are the average values of R, G, and B before conversion. That is: $R=G=B=(R+G+B)/3$. This method produces softer grayscale images.
3. Weighted average method: According to a certain weight, the values of R, G, and B are weighted and averaged, that is: $R=G=B=(w_R R + w_G G + w_B B)/3$ are the weights of R, G, and B respectively, and different values are taken to form different grayscale images. Since the human eye is most sensitive to green, followed by red, and least sensitive to blue, a grayscale image that is easier to identify will be obtained. Generally, the grayscale image obtained works best.

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

The code was run on jupyterlab

```
#Method 1 imread

#Note: Sometimes the image will not be displayed for the first time, but will be
displayed for the second time.

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)

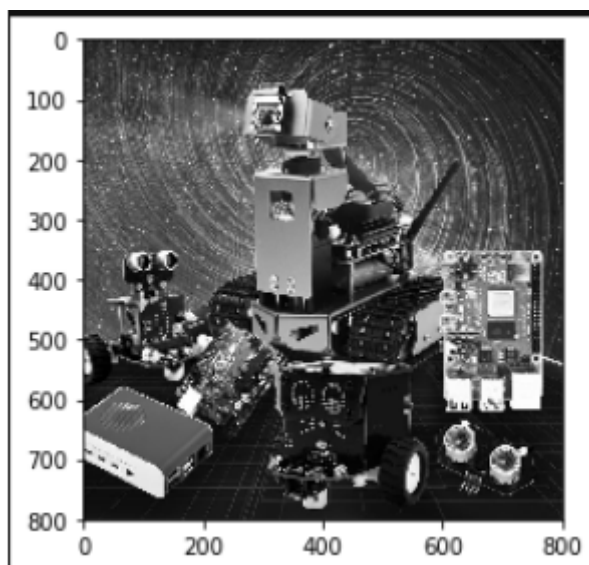

#grayimage

img_bgr2rgb0 = cv2.cvtColor(img0, cv2.COLOR_BGR2RGB)

plt.imshow(img_bgr2rgb0)

plt.show()

```



```
#Method 2 cvtColor
```

#Note: Sometimes the image will not be displayed for the first time, but will be displayed for the second time.

```
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)

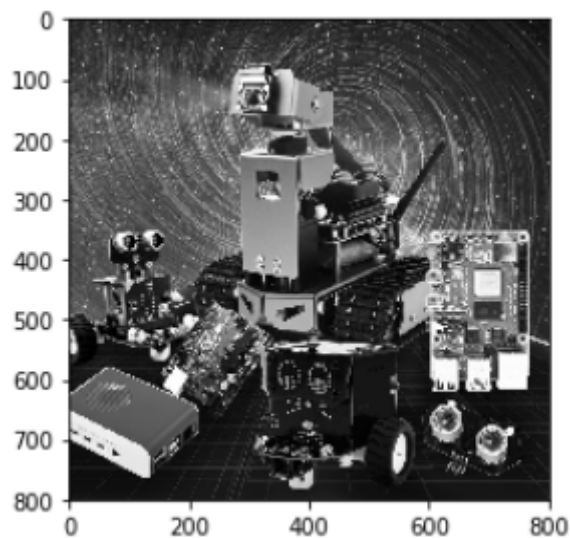
#grayimage

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)

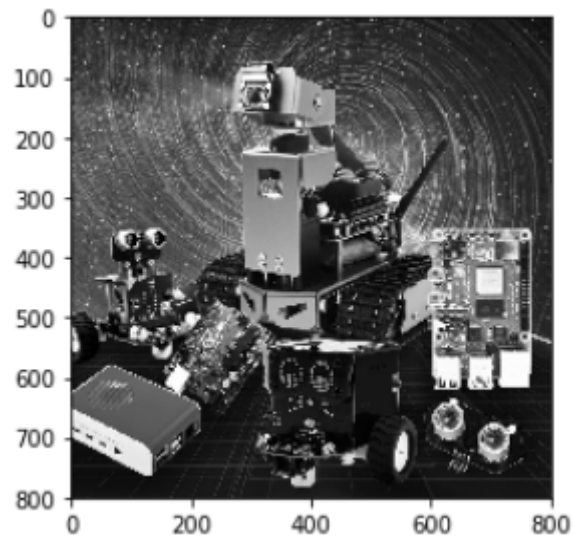

#grayimage

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)


#grayimage

img_bgr2rgb0 = cv2.cvtColor(dst, cv2.COLOR_BGR2RGB)

plt.imshow(img_bgr2rgb0)


plt.show()
```

