Color block positioning

The main purpose of color block positioning is to further achieve color block tracking.

Its working principle is to determine the distance and position information of the color block based on the camera, and to determine the position of the color block by calculating the center point coordinates of the color block in the camera image, thereby achieving color block positioning.

The experimental phenomenon is that we can see the center point of the color block in the camera image, which will always follow the movement of the color block.

1. About code

Code path：~/jetcobot_ws/src/jetcobot_color_follow/color_positioning.ipynb

- Import header file

```
import cv2 as cv
import threading
import random
from time import sleep
import ipywidgets as widgets
from IPython.display import display
from positioning import color_follow
```

- The main recognition function is to simultaneously obtain the target center point of the color block（color_x, color_y)

```
def follow_function(self, img, HSV_config):
        (color_lower, color_upper) = HSV_config
        self.img = cv.resize(img, (640, 480), )
        self.img = cv.GaussianBlur(self.img, (5, 5), 0)
        hsv = cv.cvtColor(self.img, cv.COLOR_BGR2HSV)
        mask = cv.inRange(hsv, color_lower, color_upper)
        mask = cv.erode(mask, None, iterations=2)
        mask = cv.dilate(mask, None, iterations=2)
        mask = cv.GaussianBlur(mask, (5, 5), 0)
        cnts = cv.findContours(mask.copy(), cv.RETR_EXTERNAL,
cv.CHAIN_APPROX_SIMPLE)[-2]

        if len(cnts) > 0:
            cnt = max(cnts, key=cv.contourArea)
            (color_x, color_y), color_radius = cv.minEnclosingCircle(cnt)

            if color_radius > 10:
                # Mark the detected color with the prototype coil
                # 将检测到的颜色用原形线圈标记出来
                cv.circle(self.img, (int(color_x), int(color_y)),
int(color_radius), (255, 0, 255), 3)
                print(color_x,color_y)
        return self.img
```

- Create Control

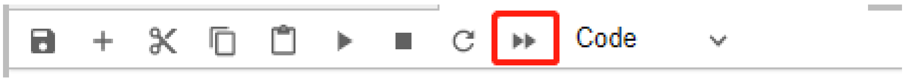
```
button_layout = widgets.Layout(width='200px', height='100px',
align_self='center')
# 输出控件 Output widget
output = widgets.Output()
# 颜色追踪 Color tracking
color_follow = widgets.Button(description='color_follow',
button_style='success', layout=button_layout)
# 选择颜色 Select color
choose_color = widgets.ToggleButtons(options=['red', 'green', 'blue', 'yellow'],
button_style='success',
             tooltips=['Description of slow', 'Description of regular',
'Description of fast'])
# 取消追踪 Cancel tracking
follow_cancel = widgets.Button(description='follow_cancel',
button_style='danger', layout=button_layout)

# 退出 exit
exit_button = widgets.Button(description='Exit', button_style='danger',
layout=button_layout)
# 图像控件 Image widget
imgbox = widgets.Image(format='jpg', height=480, width=640,
layout=widgets.Layout(align_self='auto'))
# 垂直布局 Vertical layout
img_box = widgets.VBox([imgbox, choose_color],
layout=widgets.Layout(align_self='auto'))
# 垂直布局 Vertical layout
Slider_box = widgets.VBox([color_follow,follow_cancel,exit_button],
                          layout=widgets.Layout(align_self='auto'))
# 水平布局 Horizontal layout
controls_box = widgets.HBox([img_box, Slider_box],
layout=widgets.Layout(align_self='auto'))
# ['auto', 'flex-start', 'flex-end', 'center', 'baseline', 'stretch', 'inherit',
'initial', 'unset']
```

Main process

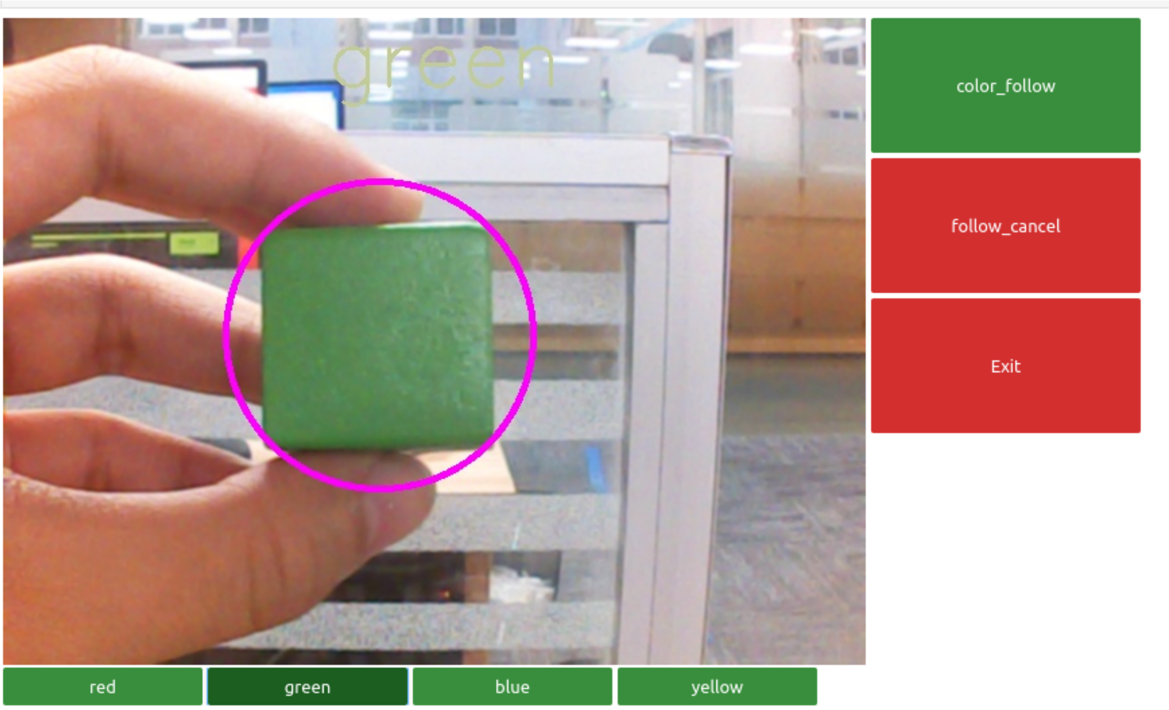
```
def camera():

    global HSV_learning,model
    # 打开摄像头 Open camera
    capture = cv.VideoCapture(0)
    capture.set(3, 640)
    capture.set(4, 480)
    capture.set(5, 30)
    # Be executed in loop when the camera is opened normally
    # 当摄像头正常打开的情况下循环执行
    while capture.isOpened():
        try:
            _, img = capture.read()
            img = cv.resize(img, (640, 480))

            if model == 'color_follow':
                img = follow.follow_function(img, color_hsv[choose_color.value])
                cv.putText(img, choose_color.value, (int(img.shape[0] / 2), 50),
cv.FONT_HERSHEY_SIMPLEX, 2, color[random.randint(0, 254)], 2)

            if model == 'learning_color':
                img,HSV_learning = follow.get_hsv(img)

            if model == 'Exit':
                cv.destroyAllWindows()
                capture.release()
                break
            imgbox.value = cv.imencode('.jpg', img)[1].tobytes()
        except KeyboardInterrupt:capture.release()
```

2. Run program

Click the run button on the jupyterlab toolbar, run the entire program, and then drag it to the bottom.



We can see the image captured by the camera, click on 【 color_follow 】, and you can see that the color blocks will be boxed


green
color_follow
follow_cancel
Exit
red
green
blue
yellow