

8.1、 color recognition

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8.1.1、 Experimental objectives

This lesson mainly learns the color recognition function, and according to the LAB value of the color, the items of the same color are framed.

The reference code path for this experiment is: K210_Broad\05-AI\color_recognition.py

8.1.2、 experiment procedure

The factory firmware of the module has integrated the AI vision algorithm module. If you have downloaded other firmware, please burn it back to the factory firmware and then conduct experiments.

1. Import related libraries, and initialize camera and LCD display.

```
import sensor, image, time, lcd

lcd.init()
sensor.reset()
sensor.set_pixformat(sensor.RGB565)
sensor.set_framesize(sensor.QVGA)
sensor.skip_frames(time = 2000)
sensor.set_auto_gain(False)
sensor.set_auto_whitebal(False)
clock = time.clock()
```

2. Draw a 50*50 white box on the camera screen, the function at this time is to prompt the user to put the color to be recognized into the box

```
r = [(320//2)-(50//2), (240//2)-(50//2), 50, 50]
for i in range(50):
    img = sensor.snapshot()
    img.draw_rectangle(r)
    lcd.display(img)
```

3. When the box turns from white to green again, start learning the LAB value of the color, read the value multiple times, and take the average value as the result of the learned LAB value

```

print("Learning thresholds...")
threshold = [50, 50, 0, 0, 0, 0] # Middle L, A, B values.
for i in range(50):
    img = sensor.snapshot()
    hist = img.get_histogram(roi=r)
    lo = hist.get_percentile(0.01) # Get the CDF of the histogram at the 1% range
    (ADJUST AS NECESSARY)!
    hi = hist.get_percentile(0.99) # Get the CDF of the histogram at the 99% range
    (ADJUST AS NECESSARY)!
    # Average in percentile values.
    threshold[0] = (threshold[0] + lo.l_value()) // 2
    threshold[1] = (threshold[1] + hi.l_value()) // 2
    threshold[2] = (threshold[2] + lo.a_value()) // 2
    threshold[3] = (threshold[3] + hi.a_value()) // 2
    threshold[4] = (threshold[4] + lo.b_value()) // 2
    threshold[5] = (threshold[5] + hi.b_value()) // 2
    for blob in img.find_blobs([threshold], pixels_threshold=100,
area_threshold=100, merge=True, margin=10):
        img.draw_rectangle(blob.rect())
        img.draw_cross(blob.cx(), blob.cy())
        img.draw_rectangle(r, color=(0,255,0))
lcd.display(img)

```

4. When the color learning is completed, create a while loop to start identifying the color in the camera screen, analyze whether it matches the LAB value of the color learned in the previous step, and if so, frame the corresponding color block

```

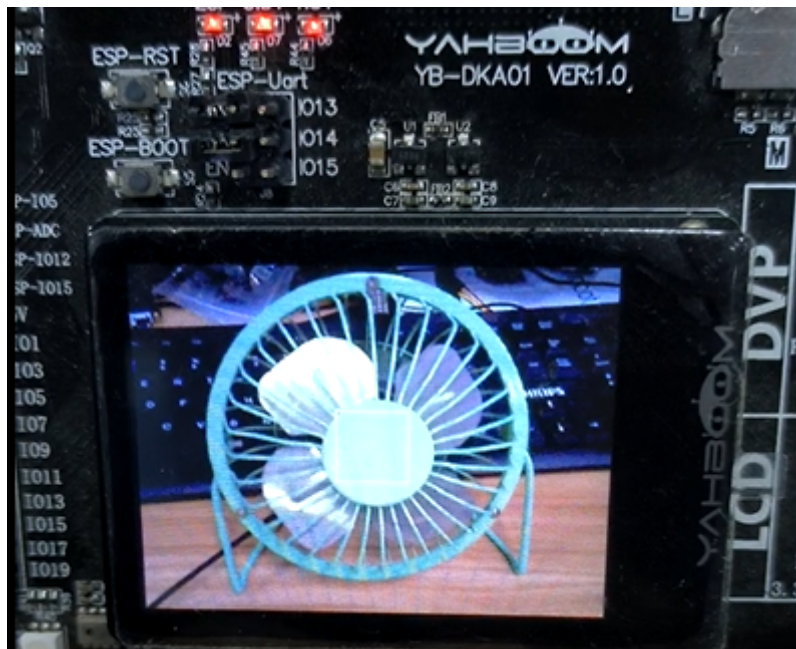
print("Thresholds learned...")
print("Start Color Recognition...")
while(True):
    clock.tick()
    img = sensor.snapshot()
    for blob in img.find_blobs([threshold], pixels_threshold=100,
area_threshold=100, merge=True, margin=10):
        img.draw_rectangle(blob.rect())
        img.draw_cross(blob.cx(), blob.cy())
    lcd.display(img)
    print(clock.fps())

```

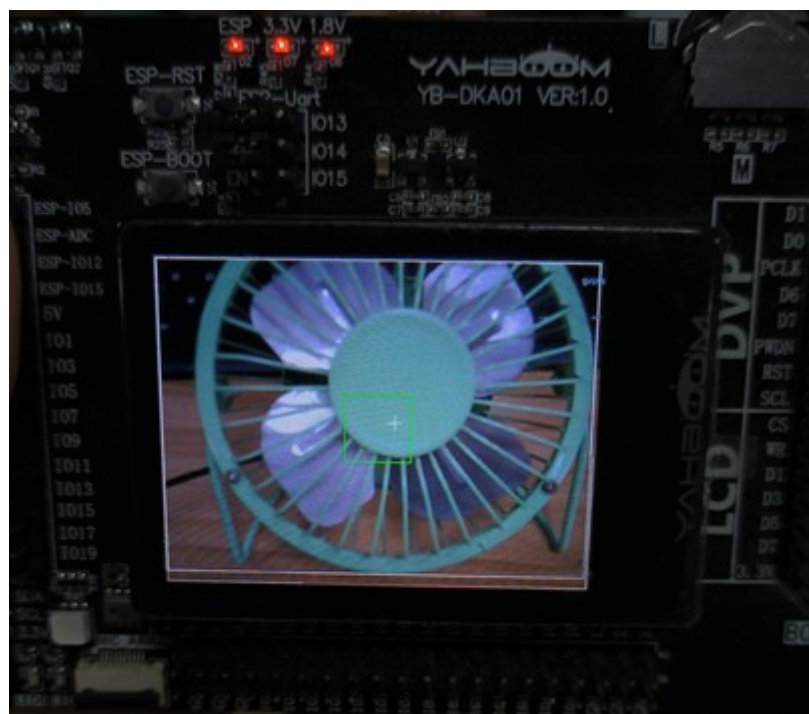
8.1.3、Experimental effect

Connect the K210 development board to the computer through the TYPE-C data cable, click the connect button in CanMV IDE, and click the run button after the connection is completed to run the routine code. You can also download the code as main.py to the K210 development board to run.

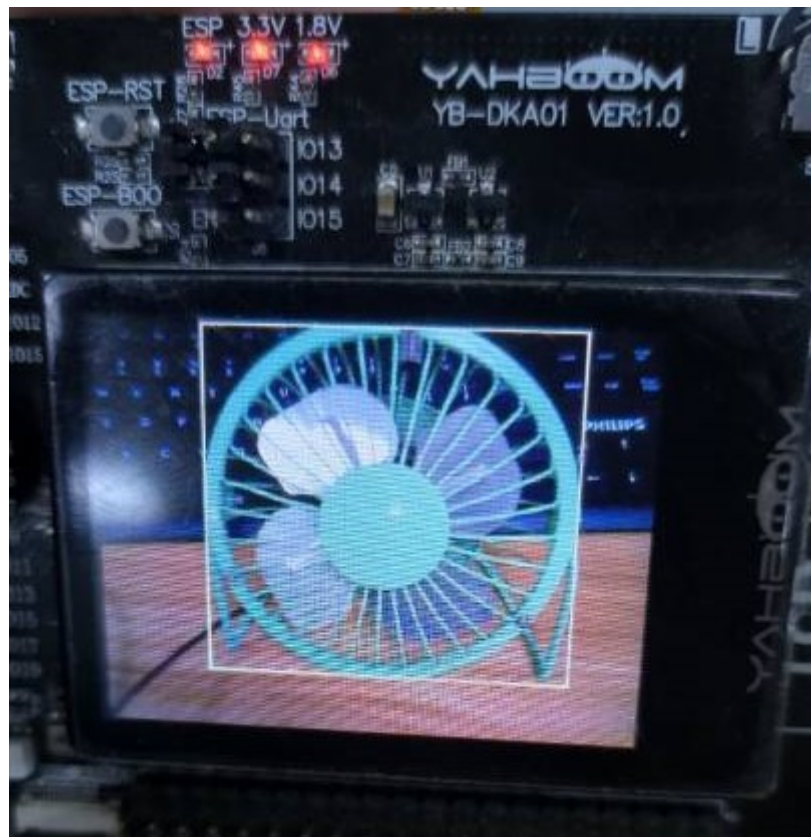
After the system initialization is complete, the LCD displays the camera image, and there is a white box in the middle of the screen, please put the color to be recognized in the white box, and the white box lasts for about 3 seconds.



When the white box turns into a green box, the system starts to learn the color LAB value in the green box, and other white boxes will appear as a preview effect. After about 5 seconds, the green box disappears, indicating learning Finish.



At this time, point the camera towards the color to be recognized, and the system will automatically frame the recognized color



8.1.4、 Experiment summary

The function of color recognition is mainly to analyze the LAB value of the color. First put the color to be recognized in the box, and then the system will use the LAB value of the color read in the box, and then use the LAB value of the color collected by the camera as the Analysis and comparison. If it meets the requirements, draw a box to indicate that the color is recognized. Due to errors in the recognition color, it is best to recognize when the recognition color is far from the background color. If the background color is similar to the recognized color, the probability of misrecognition will increase.