5. Voice control color recognition

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5.1. Description

Start or stop the color recognition function of ROSMASTER by voice module.

5.2. Steps

5.2.1. Function package path

```
~/yahboomcar/src/yahboomcar_voice_ctrl/
```

5.2.2. Start

```
cd ~/yahboomcar_ws/src/yahboomcar_voice_ctrl/scripts #switch directory
python3 voice_Ctrl_color_identify.py #Run program
```

1. After the program is run, we put the object to be identified in front of the camera, select the color area of the object with the mouse, keep the mouse and do not release it.
2. Then, say "Hi Yahboom" to the voice module, wait until the voice module replies saying "Hi, i'm here".
3. We can say "What color is this?" and the voice module will announce the color of the area selected by the mouse.

Note: Since the camera is more sensitive to light, the recognition results of the same color will be different in environments with different intensities of light.

5.3. Code analysis

5.3.1. Import the speech recognition library and create speech recognition objects

```
from Speech_Lib import Speech
self.spe = Speech()
```

5.3.2. Get mouse events and specify the area selected by the mouse

```
def onMouse(self, event, x, y, flags, param):
    if event == 1:
        self.select_flags = True
        self.Mouse_XY = (x,y)
    if event == 4:
        self.select_flags = False
    if self.select_flags == True:
        self.cols = min(self.Mouse_XY[0], x), min(self.Mouse_XY[1], y)
        self.rows = max(self.Mouse_XY[0], x), max(self.Mouse_XY[1], y)
        self.Roi_init = (self.cols[0], self.cols[1], self.rows[0], self.rows[1])
```

This step is mainly to get the value of self.Roi_init, which is used to obtain the HSV value of the area

5.3.3. Get the HSV value of the selected area

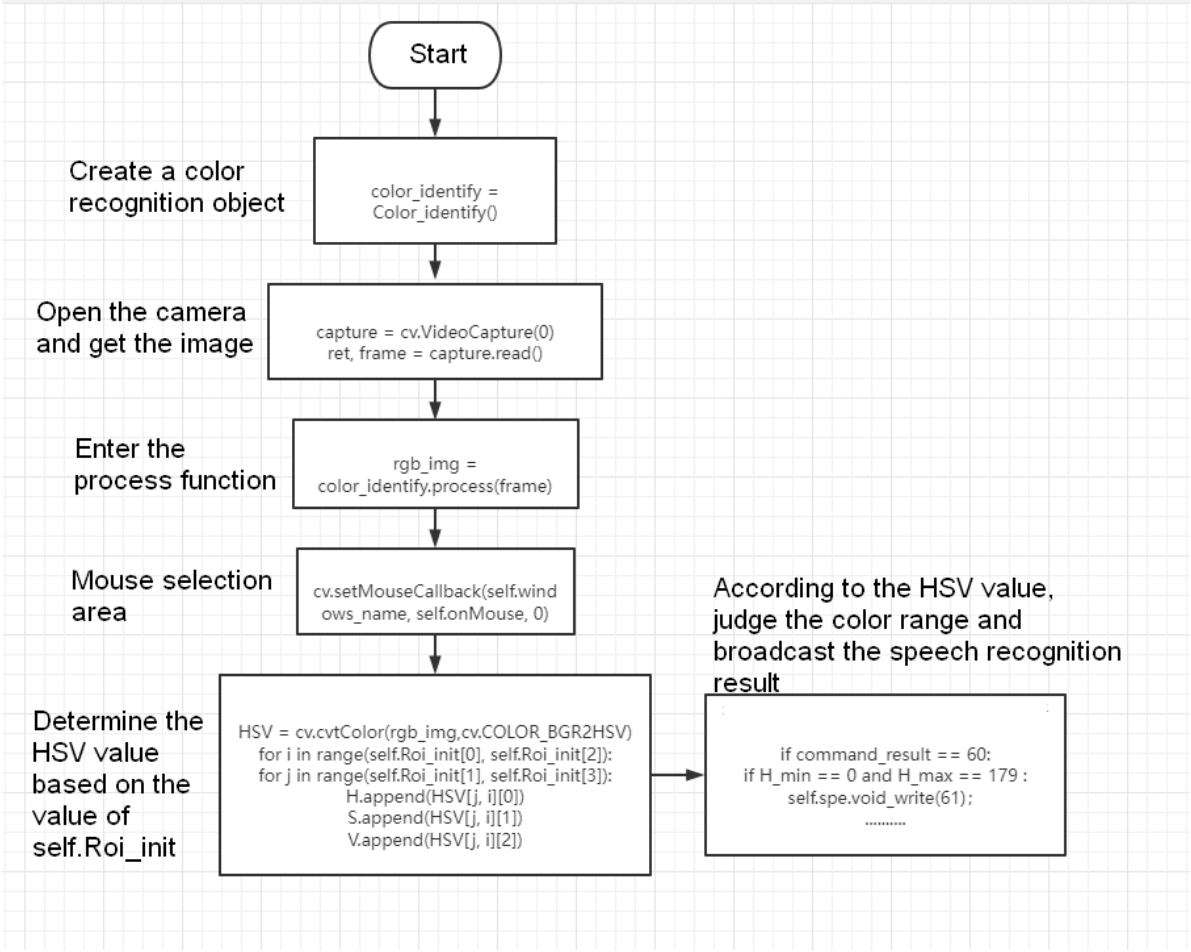
```
if self.Roi_init[0]!=self.Roi_init[2] and self.Roi_init[1]!=self.Roi_init[3]:
    HSV = cv.cvtColor(rgb_img,cv.COLOR_BGR2HSV)
    for i in range(self.Roi_init[0], self.Roi_init[2]):
        for j in range(self.Roi_init[1], self.Roi_init[3]):
            H.append(HSV[j, i][0])
            S.append(HSV[j, i][1])
            V.append(HSV[j, i][2])
    H_min = min(H); H_max = max(H)
    S_min = min(S); S_max = 253
    V_min = min(V); V_max = 255
```

5.3.4. Determine the area where the HSV value is located, and broadcast the identification result according to the interval

```
command_result = self.spe.speech_read()
    if command_result !=999:
        print(command_result)
    if command_result == 60:
        if H_min == 0 and H_max == 179 :
            self.spe.void_write(61)
            print("red")
        elif H_min >= 23 and H_min <= 56:
            print("yellow")
            self.spe.void_write(64)
        elif H_min >= 56 and S_min < 200:
            print("green")
            self.spe.void_write(63)
        elif H_min >= 60 and S_min >200:
            print("blue")
```

```
            self.spe.void_write(62)
```

5.3.5. Program flow chart



Code path:

```
~/yahboomcar/src/yahboomcar_voice_ctrl/scripts/voice_Ctrl_color_identify.py
```

5.3.6. Voice module communication protocol

function word	Speech Recognition Module Results	Voice broadcast content
What color is this?	60	Reply according to the color identified, as following table

color	The host sends the result of the recognition	Voice broadcast content
red	61	This is red
blue	62	This is blue
green	63	This is green
yellow	64	This is yellow