5. Voice control color recognition

5.1. Function description

By interacting with the voice recognition module on ROSMASTER, the function of voice recognition of the selected color in the camera area of ROSMASTER can be turned on or off. The R2 key on the handle can cancel/enable this function at any time. **(Because this function does not require moving the car, the R2 button does not apply to this function)**

5.2. start

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
```

After the program runs, put the object whose color needs to be recognized in front of the camera, and then select the color area of the object with the mouse, hold down the mouse and do not release it; say "Hi Yahboom" to the voice module, and wait for the voice module to report back After saying 'Hi , I'm here.', ask it "What color is this?", and it will announce the color of the area of the object selected by the mouse.

Note: Since the camera is more sensitive to light, the same color will appear differently under different light intensities, resulting in different color recognition results.

5.3. core 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

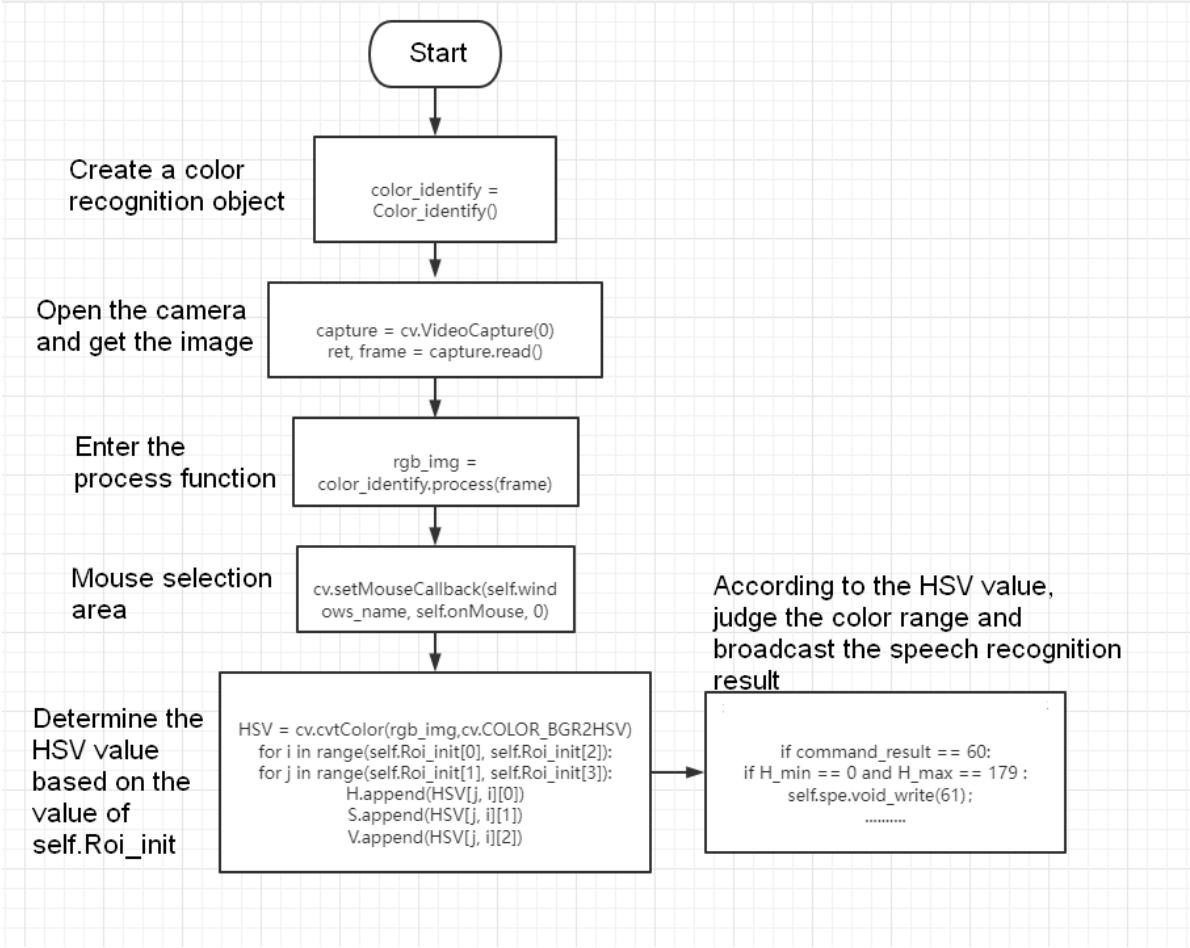
5.3.3. Get the HSV value of the selected area

```
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



The complete code can refer to:

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

5.3.6. Function module communication table

function word	Speech Recognition Module Results	Voice broadcast content
What color is this?	60	Announcement according to the color identified, see table below.

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