2、Color recognition and object tracking

Official website：https://learnopencv.com/object-tracking-using-opencv-cpp-python/#opencv-tracking-api

2.1、Introduction

2.1.1、Color recognition

- **HSV introduction**

HSV (Hue, Saturation, Value) is a color space created by A. R. Smith in 1978 based on the intuitive characteristics of colors.

The color parameters in this model are: hue (H), saturation (S), and lightness (V).

H: 0 — 180

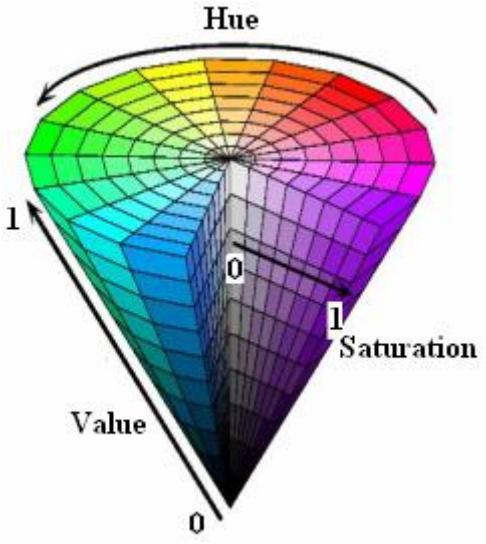
S: 0 — 255

V: 0 — 255

	black	gray	white	red		orange	yellow	green	cyan	blue	purple
H_min	0	0	0	0	156	11	26	35	78	100	125
H_max	180	180	180	10	180	25	34	77	99	124	155
S_min	0	0	0	43		43	43	43	43	43	43
S_max	255	43	30	255		255	255	255	255	255	255
V_min	0	46	221	46		46	46	46	46	46	46
V_max	46	220	255	255		255	255	255	255	255	255

- **HSV**

The 3D diagram of the HSV model, as shown below.



2.1.2、Object tracking

Object tracking is to locate an object in consecutive video frames.

2.2、Steps

2.2.1、Start up

Start up camera

```
roslaunch realsense2_camera rs_camera.launch
```

Start up function

```
roslaunch visual object_Tracker.launch VideoSwitch:=false tracker_type:=color #
Color recognition
roslaunch visual object_Tracker.launch VideoSwitch:=false tracker_type:=KCF   #
Object tracking
```

Method 2

Note: 【q】key to exit.

```
roslaunch visual object_Tracker.launch VideoSwitch:=true tracker_type:=color #
Color recognition
python3 ~/realsense_ws/src/visual/Tracker/object_Tracker.py                   #
Object tracking
```

This method can only be started in the main control board that has been connected to the camera

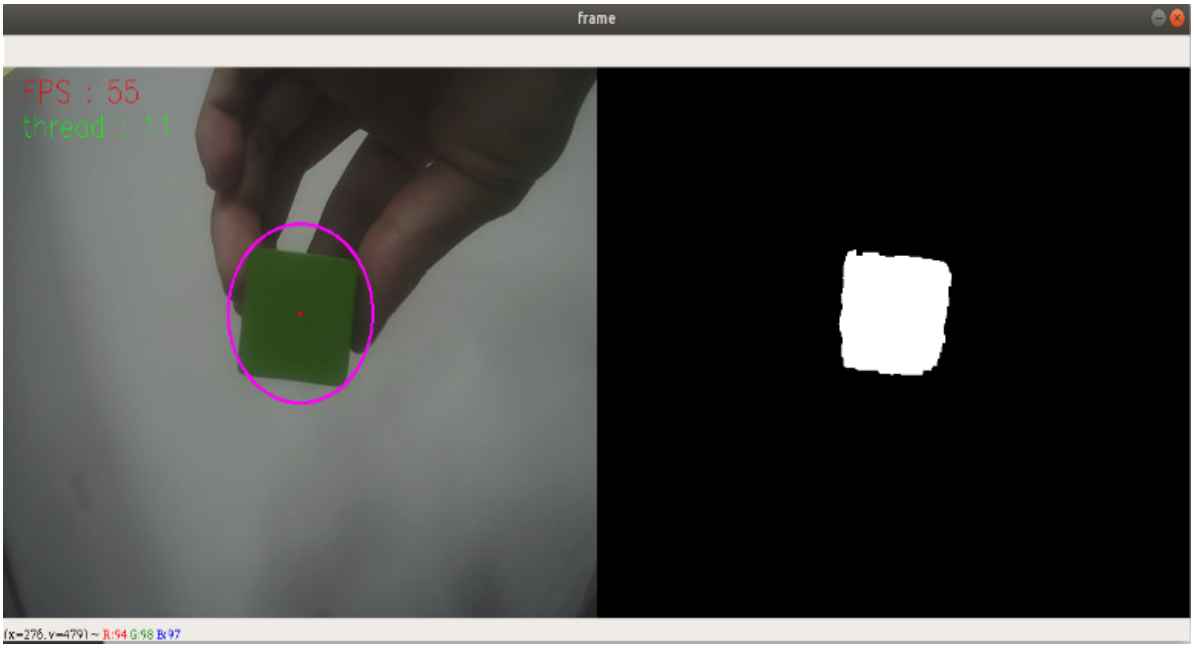
- VideoSwitch parameter: whether to use the camera function package to start; for example: start rs_camera.launch, this parameter must be set to true; otherwise, it is false.
- tracker_type parameter: function gameplay, select color recognition.

Set the parameters according to your needs. You can also modify the launch file directly, if you do that, you don't need to attach parameters when you start this function.

2.2.2、recognition

- Color recognition

After starting, the system defaults to【Target Detection Mode】, the color image on the left (Color), and the binary image on the right (Binary). As shown below.

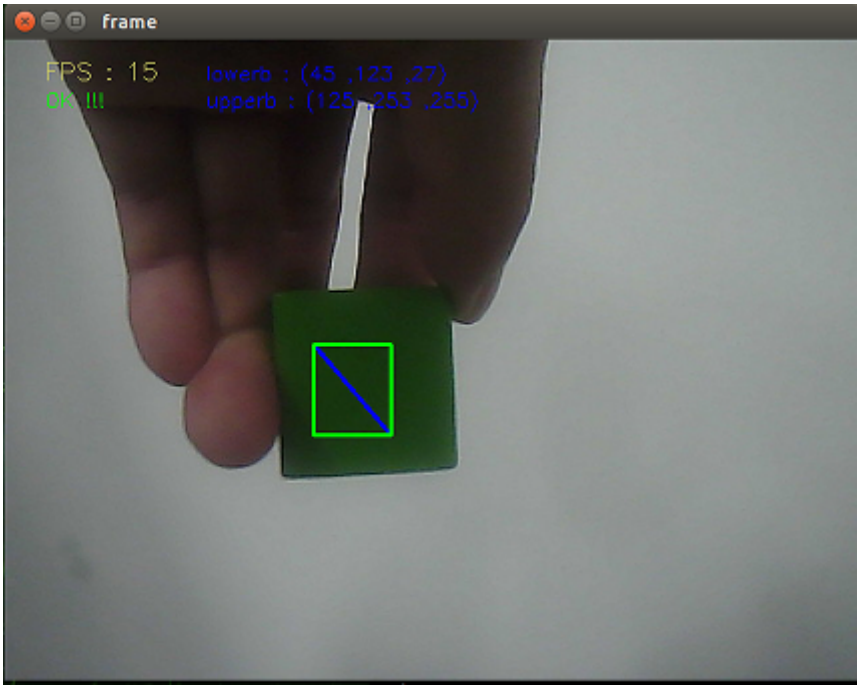


Keyboard control:

【r】: Select mode, you can use the mouse to select the target to be identified, as shown above.

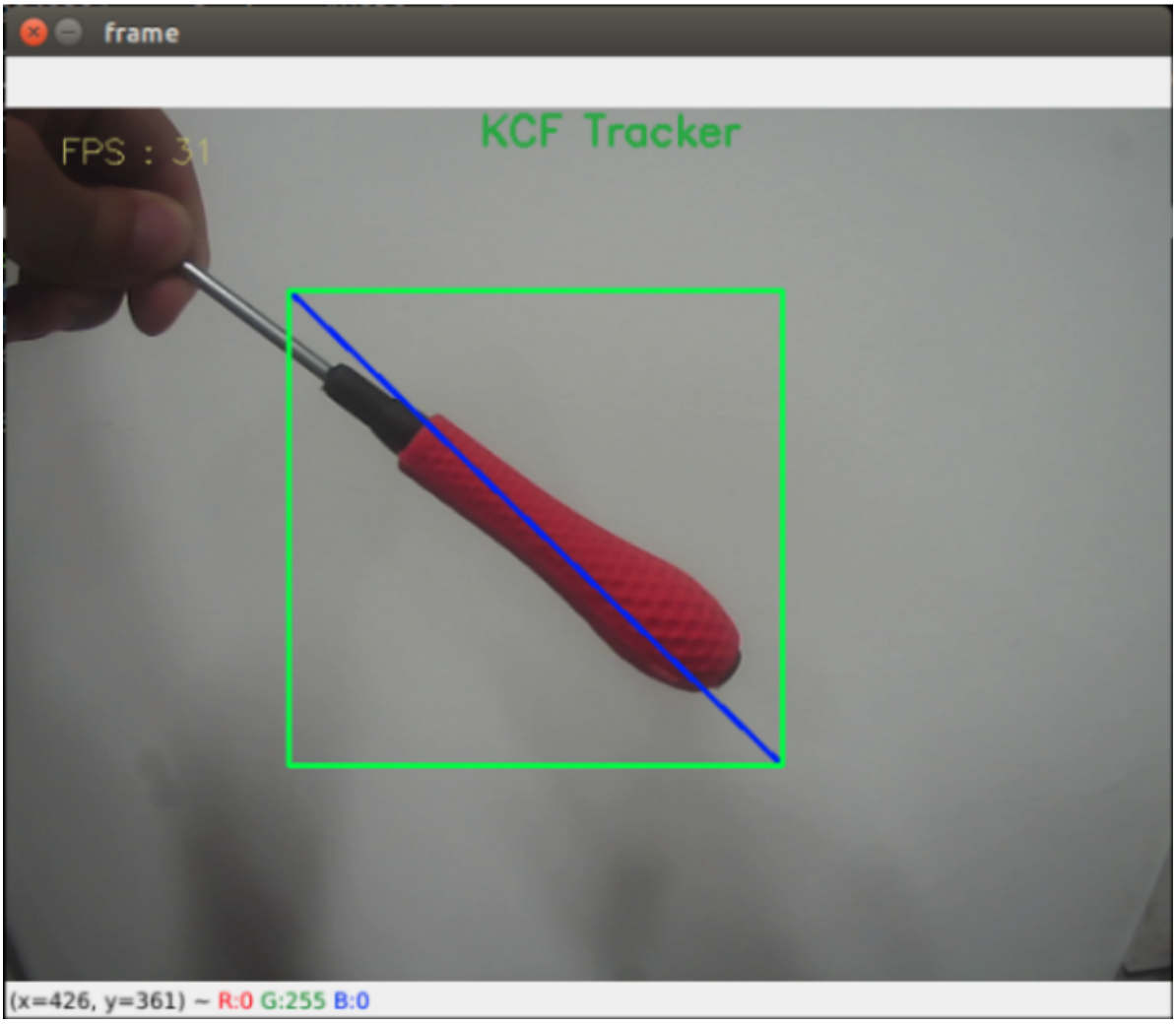
【q】: Exit.

Use the mouse to select the location of the color block, as shown below, and release the mouse to start recognition.



- Object tracking

After starting, enter the selection mode, use the mouse to select the location of the target, as shown below, release mouse to start recognition.



Keyboard control:

【r】: Select mode, you can use the mouse to select the target to be identified, as shown above.

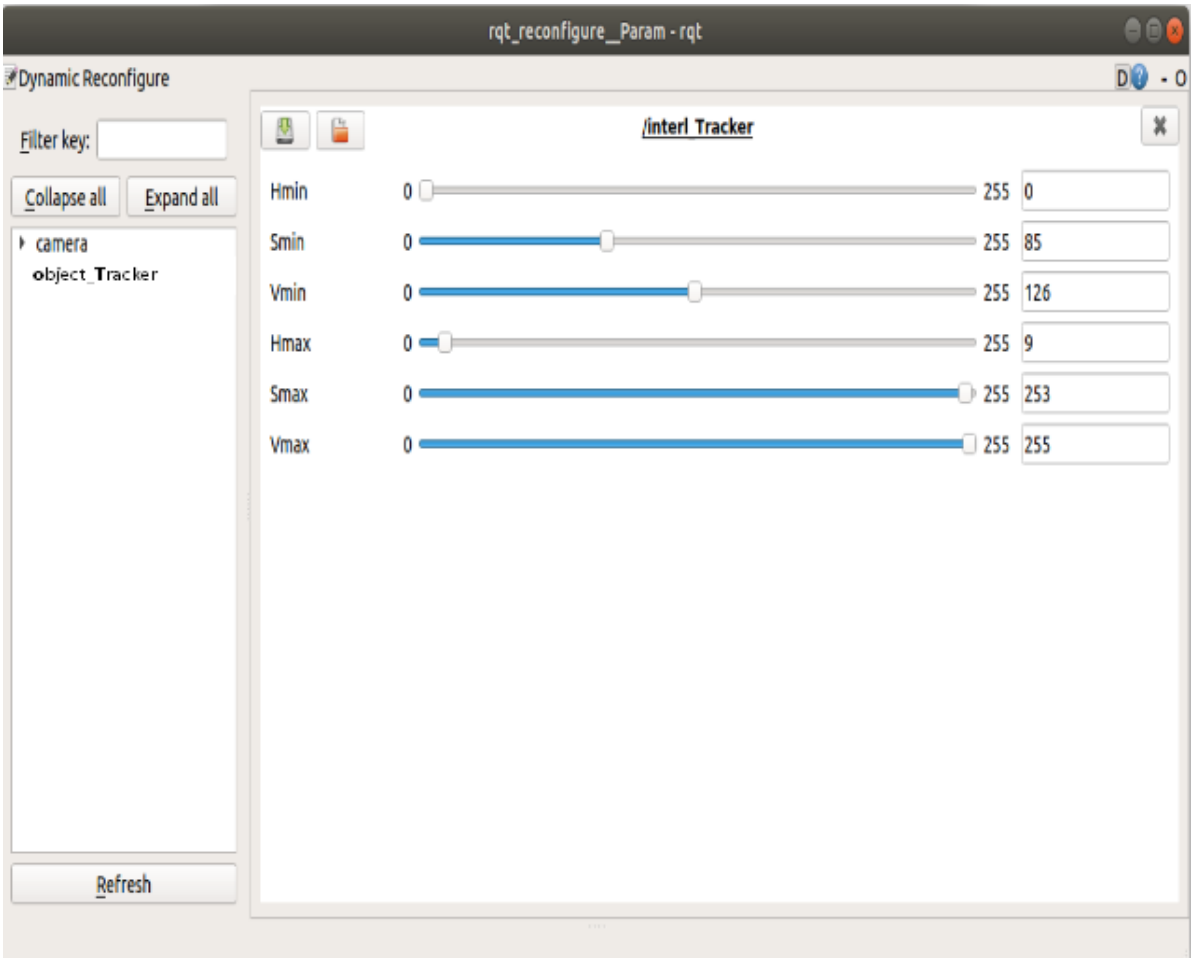
【f】: Switching algorithm; ['BOOSTING','MIL','KCF','TLD','MEDIANFLOW','MOSSE','CSRT','color'].

【space bar】: Target tracking, we need to move the target slowly, moving too fast will lose the target.

2.2.3、Color calibration

Dynamic parameter

```
rosrun rqt_reconfigure rqt_reconfigure
```



Select 【object_Tracker】node, generally only need to adjust 【Hmin】,【Smin】, 【Vmin】, 【Hmax】, these four parameters can be well identified.

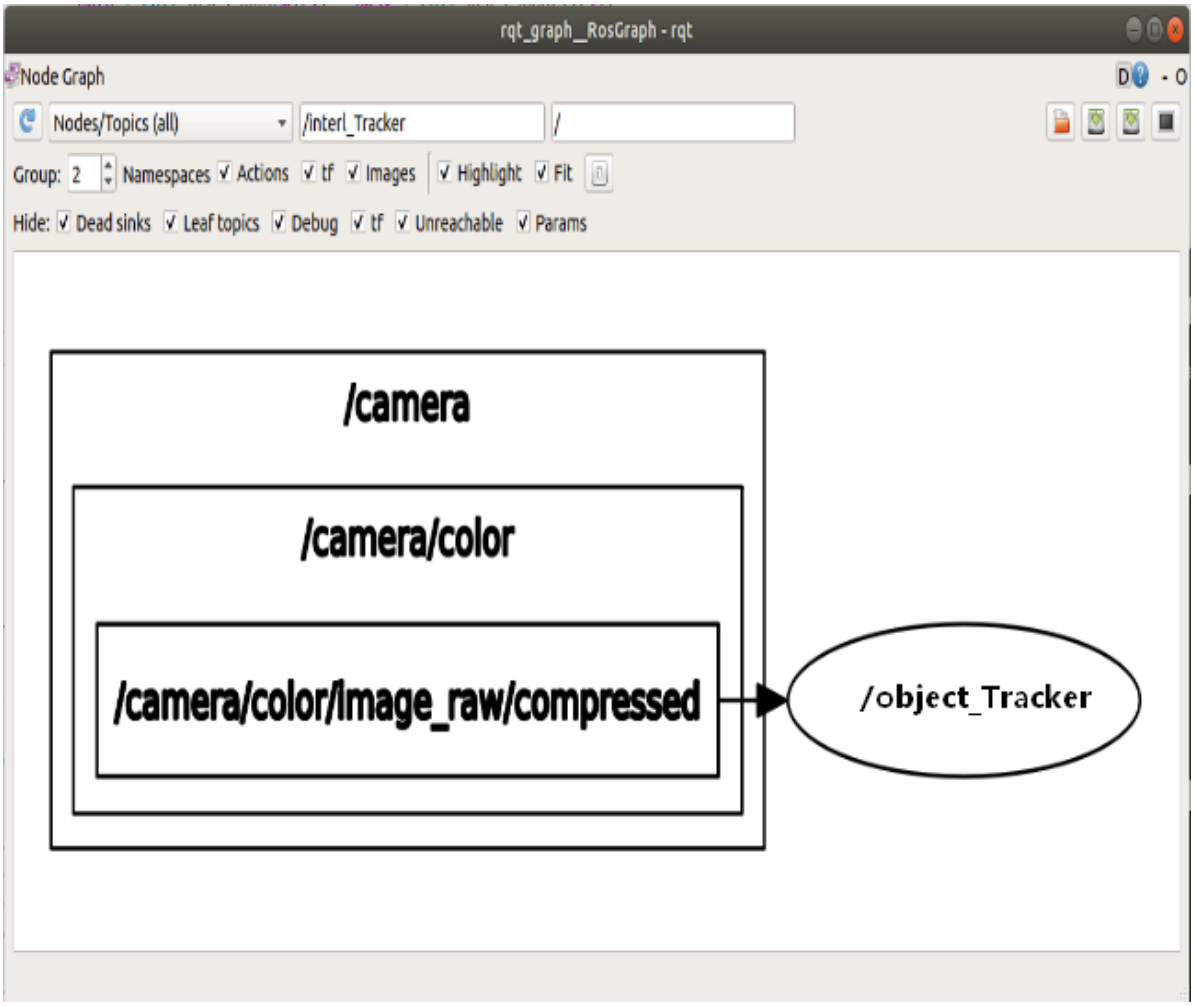
The slide bar is always in the dragging state, and the data will be transferred to the system when you release it.

2.2.4、View node

- view node

```
rqt_graph
```

- When method one is started, the node [object_Tracker]


rqt_graph__RosGraph - rqt
Node Graph
Nodes/Topics (all)
/interl_Tracker
/
Group: 2
Namespaces
Actions
tf
Images
Highlight
Fit
Hide:
Dead sinks
Leaf topics
Debug
tf
Unreachable
Params
/camera
/camera/color
/camera/color/image_raw/compressed
/object_Tracker