Contour moment

Moment functions are widely used in image analysis, such as pattern recognition, target classification, target recognition and orientation estimation, image encoding and reconstruction, etc. The moment set calculated from an image can not only describe the global characteristics of the image shape, but also provide a large amount of different geometric feature information about the image, such as size, position, direction and shape. The description ability of image moments is widely used in target recognition and orientation estimation in various fields of image processing, computer vision and robotics.

First moment: related to shape;

Second moment: shows how much the curve extends around the mean of the straight line;

Third-order moment: a symmetry measurement about the mean value; 7 invariant moments can be derived from the second-order moment and the third-order moment. The invariant moment is a statistical characteristic of the image, which satisfies the invariance of translation, expansion and contraction, and rotation, and is widely used in the field of image recognition.

1. Use

Source code launch file path：/opt/ros/noetic/share/opencv_apps/launch

Step 1: Start the camera

```
roslaunch dofbot_visual opencv_apps.launch img_flip:=false
```

- img_flip parameter: whether the image needs to be flipped horizontally, the default is false.

The [usb_cam-test.launch] file opens the [web_video_server] node by default, and you can directly use the [IP:8080] web page to view images in real time.

Step 2: Start the corner detection function of Opencv_apps

```
roslaunch opencv_apps contour_moments.launch              # Contour moment
```

Each functional case will have a parameter [debug_view], Boolean type, whether to use Opencv to display images, which is displayed by default.

If no display is required, set it to [False], for example

```
roslaunch opencv_apps contour_moments.launch debug_view:=False
```

However, after starting in this way, some cases cannot be displayed in other ways, because in the source code, some [debug_view] is set to [False], which will turn off image processing.

2. Display method

- rqt_image_view

Enter the following command to select the corresponding topic

```
rqt_image_view
```

- opencv

The system displays it by default, no need to do anything.

- Web viewing

(Same as under LAN) Enter IP+port in the browser, for example:

```
192.168.2.116:8080
```

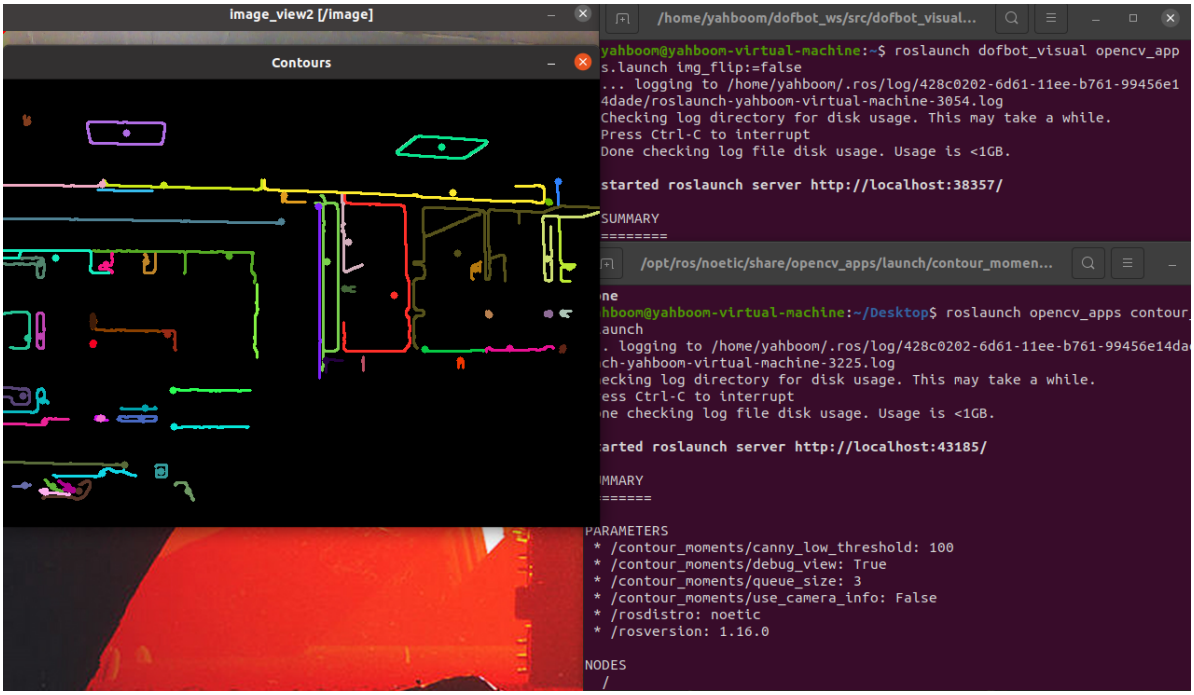
For specific IP, use your current virtual machine IP.

3. Effect display

Contour moments use parameters. There will be a topic for subscribing images and publishing images.

Parameter	Type	Default	Analyze
~use_camera_info	bool	true	Subscribe to the topic [camera_info] to get the default coordinate system ID, otherwise use the image information directly.
~debug_view	bool	false	Whether to create a window to display the node image
~canny_low_threshold	int	0	Canny edge detection low threshold
~queue_size	int	3	Queue size

Effect picture:


image_view2 [/image]
Contours
/home/yahboom/dofbot_ws/src/dofbot_visual...
yahboom@yahboom-virtual-machine:~$ roslaunch dofbot_visual opencv_app
s.launch img_flip:=false
... logging to /home/yahboom/.ros/log/428c0202-6d61-11ee-b761-99456e1
4dade/roslaunch-yahboom-virtual-machine-3054.log
Checking log directory for disk usage. This may take a while.
Press Ctrl-C to interrupt
Done checking log file disk usage. Usage is <1GB.
started roslaunch server http://localhost:38357/
SUMMARY
/opt/ros/noetic/share/opencv_apps/launch/contour_momen...
hboom@yahboom-virtual-machine:~/Desktop$ roslaunch opencv_apps contour
aunch
. logging to /home/yahboom/.ros/log/428c0202-6d61-11ee-b761-99456e14da
ch-yahboom-virtual-machine-3225.log
ecking log directory for disk usage. This may take a while.
ess Ctrl-C to interrupt
ne checking log file disk usage. Usage is <1GB.
arted roslaunch server http://localhost:43185/
MMARY
PARAMETERS
* /contour_moments/canny_low_threshold: 100
* /contour_moments/debug_view: True
* /contour_moments/queue_size: 3
* /contour_moments/use_camera_info: False
* /rosdistro: noetic
* /rosversion: 1.16.0
NODES