5. Contour moment

The moment function has a wide range of applications 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 lot of information about the different geometric features of the image, such as size, position, direction and shape. The descriptive ability of image moments is widely used in target recognition and orientation estimation in various image processing, computer vision and robotics fields.

First-order moment: related to shape;

Second-order moment: shows the extension of the curve around the average value of the straight line;

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

5.1, Use

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

Step 1: Start the camera

```
roslaunch ascam_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 the image in real time.

Step 2: Start the contour moment function of Opencv_apps

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

Each function case will have a parameter [debug_view], Boolean type, whether to use Opencv to display the image, the default is displayed.

If you don't need to display, set it to [False], for example

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

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

5.2, Display method

- rqt_image_view

Enter the following command and select the corresponding topic

```
rqt_image_view
```

- opencv

The system displays by default, no processing is required.

- Web viewing

(Under the same LAN) Enter IP+port in the browser, for example:

```
192.168.2.116:8080
```

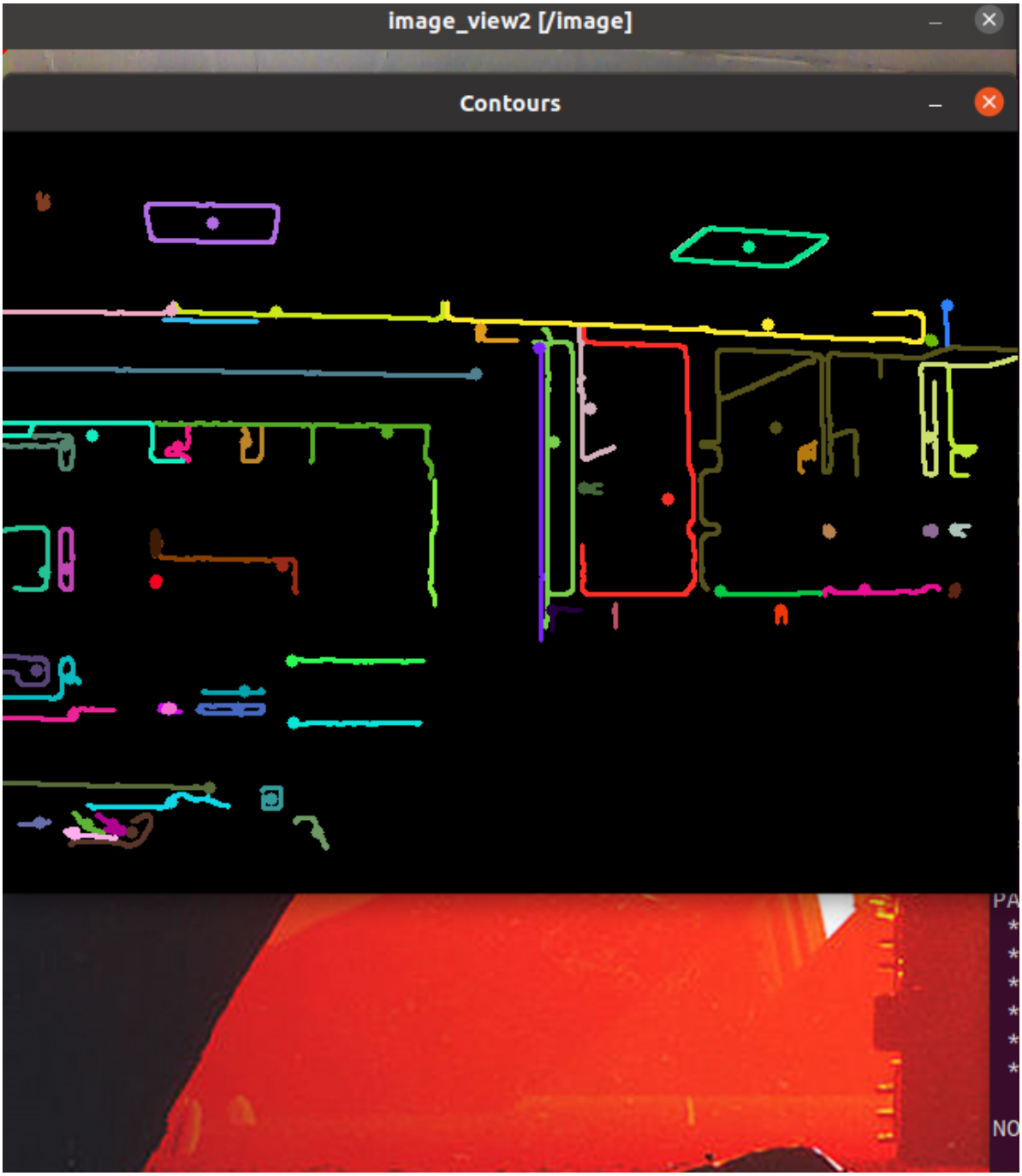
For specific IP, use your current virtual machine IP.

5.3, Effect display

The contour moment uses parameters. There will be a topic for subscribing to images and publishing images.

Parameter	Type	Default	Analysis
~use_camera_info	bool	true	Subscribe to the topic [camera_info] to obtain 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 diagram:


image_view2 [/image]
Contours