4、ROS+OpenCV application

4.1、Overview

wiki：http://wiki.ros.org/opencv_apps

Source code：https://github.com/ros-perception/opencv_apps.git

Function package：~/astra_ws/src/opencv_apps

Most of the code was originally from this website. https://github.com/ltseez/opencv/tree/master/samples/cpp

opencv_apps provides various nodes that run internally OpenCV's functionalities and publish the result as ROS topics. With opencv_apps, you can skip writing OpenCV application codes for a lot of its functionalities by simply running a launch file that corresponds to OpenCV's functionality you want.

Contents

4.2、Usage

4.2.1、Start up

Step 1: Start the camera

```
roslaunch astra_visual opencv_apps.launch
```

If the webpage cannot be viewed, check if there is [web_video_server] node, if not, run the following command

```
rosrun web_video_server web_video_server
```

Step 2: Start the function of Opencv_apps

```
roslaunch opencv_apps face_recognition.launch             # Face recognition
roslaunch opencv_apps corner_harris.launch                # harris corner
detection
roslaunch opencv_apps camshift.launch                     # Target tracking
algorithm
roslaunch opencv_apps contour_moments.launch              # Contour moment
roslaunch opencv_apps convex_hull.launch                  # Polygon outline
roslaunch opencv_apps discrete_fourier_transform.launch   # Discrete Fourier
Transform Algorithm
```

```
roslaunch opencv_apps edge_detection.launch                # Edge detection
algorithm
roslaunch opencv_apps face_detection.launch                # Face detection
algorithm
roslaunch opencv_apps fback_flow.launch                    # Optical flow
detection algorithm
roslaunch opencv_apps find_contours.launch                 # Contour detection
roslaunch opencv_apps general_contours.launch              # General contour
detection
roslaunch opencv_apps goodfeature_track.launch             # Feature point
tracking
roslaunch opencv_apps hls_color_filter.launch              # HLS color filter
roslaunch opencv_apps hough_circles.launch                 # Hough circle
detection
roslaunch opencv_apps hough_lines.launch                   # Hough line detection
roslaunch opencv_apps hsv_color_filter.launch              # HSV color filter
roslaunch opencv_apps lk_flow.launch                       # LK optical flow
algorithm
roslaunch opencv_apps people_detect.launch                 # Human detection
algorithm
roslaunch opencv_apps phase_corr.launch                    # Phase correlation
displacement detection
roslaunch opencv_apps pyramids.launch                      # Image pyramid
sampling algorithm
roslaunch opencv_apps rgb_color_filter.launch              # RGB color filtering
roslaunch opencv_apps segment_objects.launch               # Clear background
detection algorithm
roslaunch opencv_apps simple_flow.launch                   # Simplified optical
flow algorithm
roslaunch opencv_apps smoothing.launch                     # Simple filter
roslaunch opencv_apps threshold.launch                     # Threshold image
processing
roslaunch opencv_apps watershed_segmentation.launch        # Watershed
segmentation algorithm
```

Almost every function case will have a parameter [debug_view], boolean type, whether to use Opencv to display the picture, it is displayed by default.

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

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

4.2.2、Display method

- rqt_image_view

Enter the following command to select the corresponding topic

```
rqt_image_view
```

- opencv

The system displays it by default.

- Web view

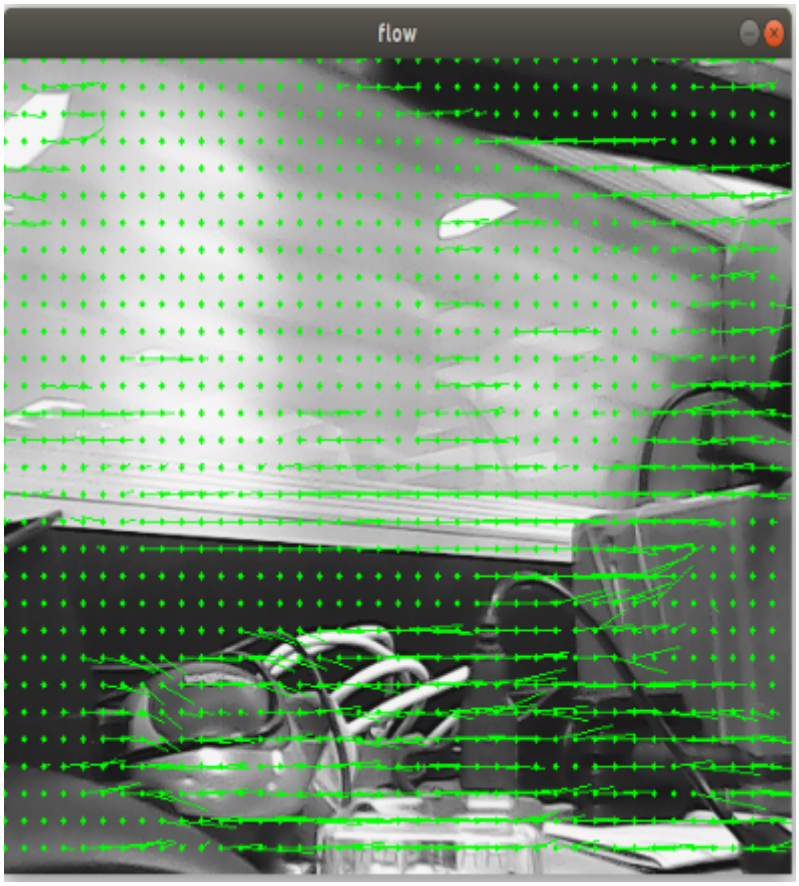
(At the same LAN) Enter IP+port in the browser, for example:

```
192.168.2.102:8080
```

4.2.3、Effect show

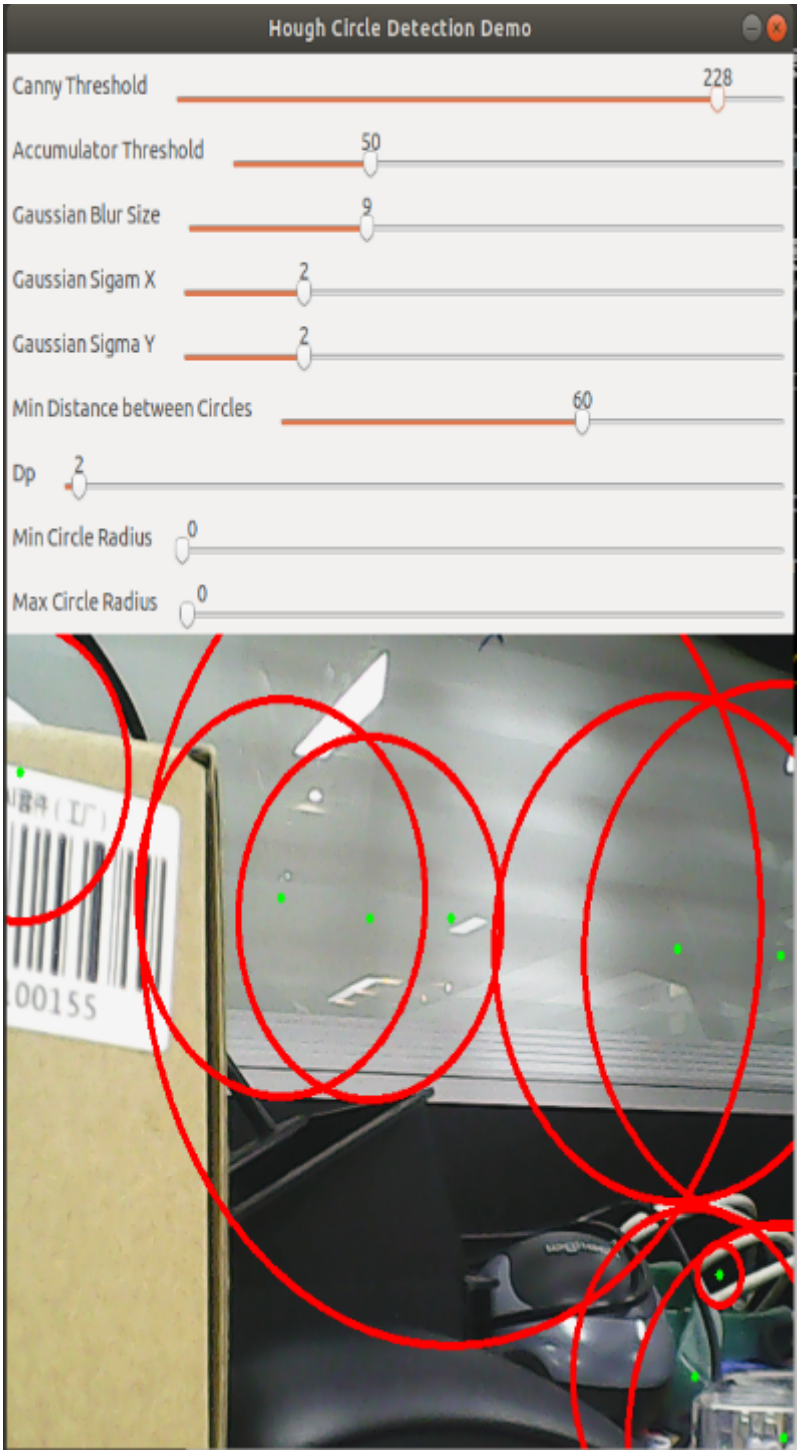
- Optical flow detection algorithm

Move the screen and observe the phenomenon.



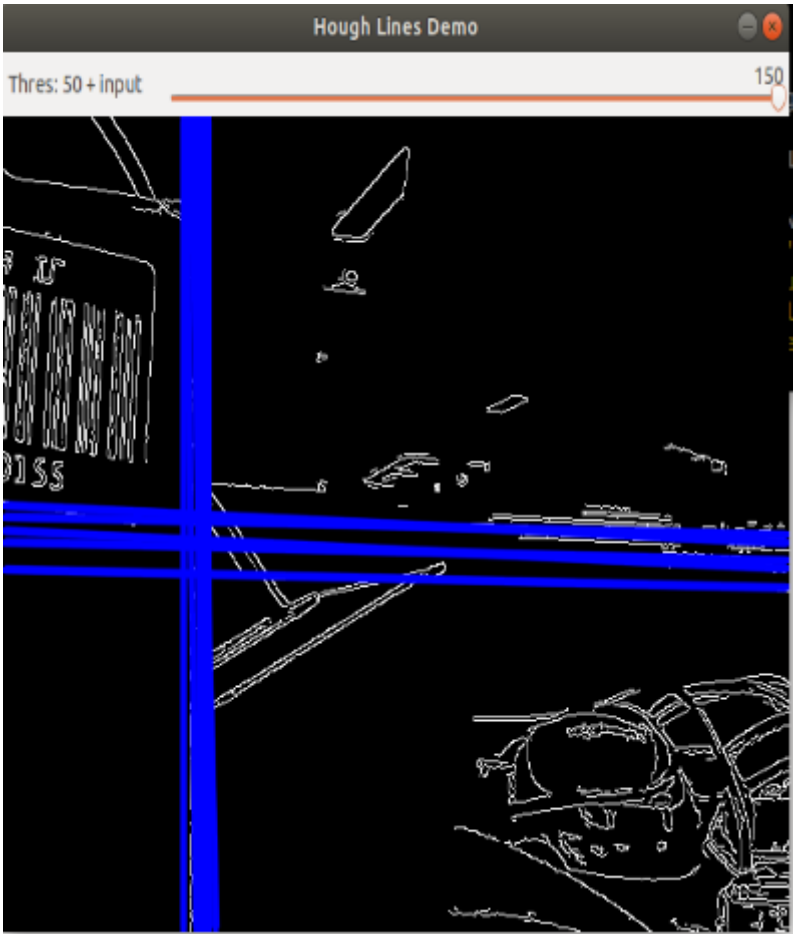
- Feature point tracking

- Hough circle detection



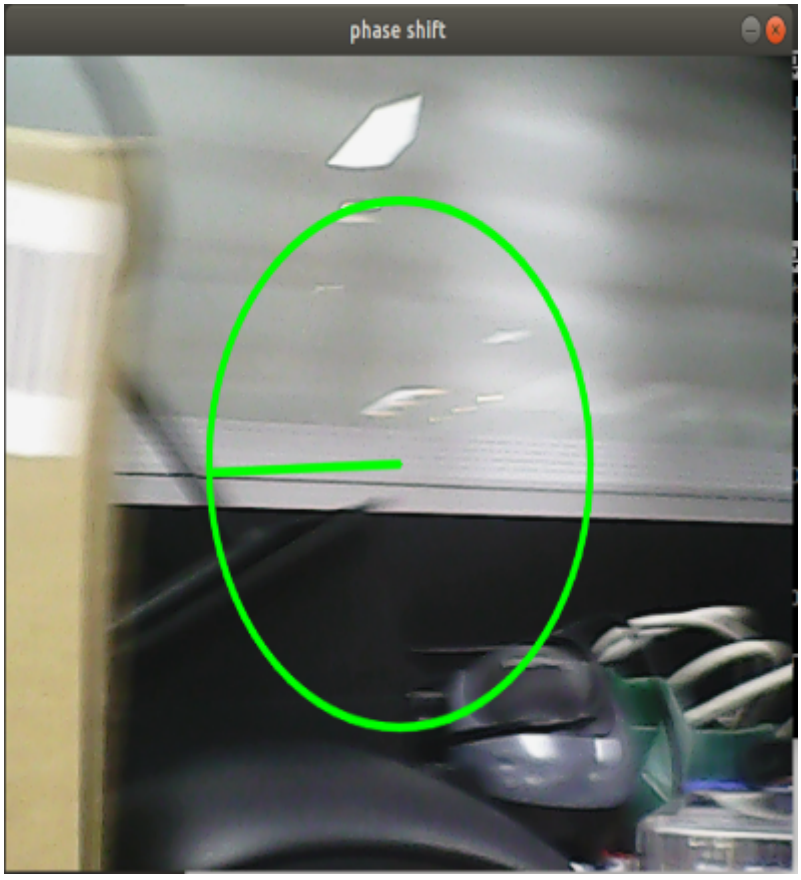
- Hough line detection

The lower the threshold, the more lines there are, and the more easily the picture gets stuck.



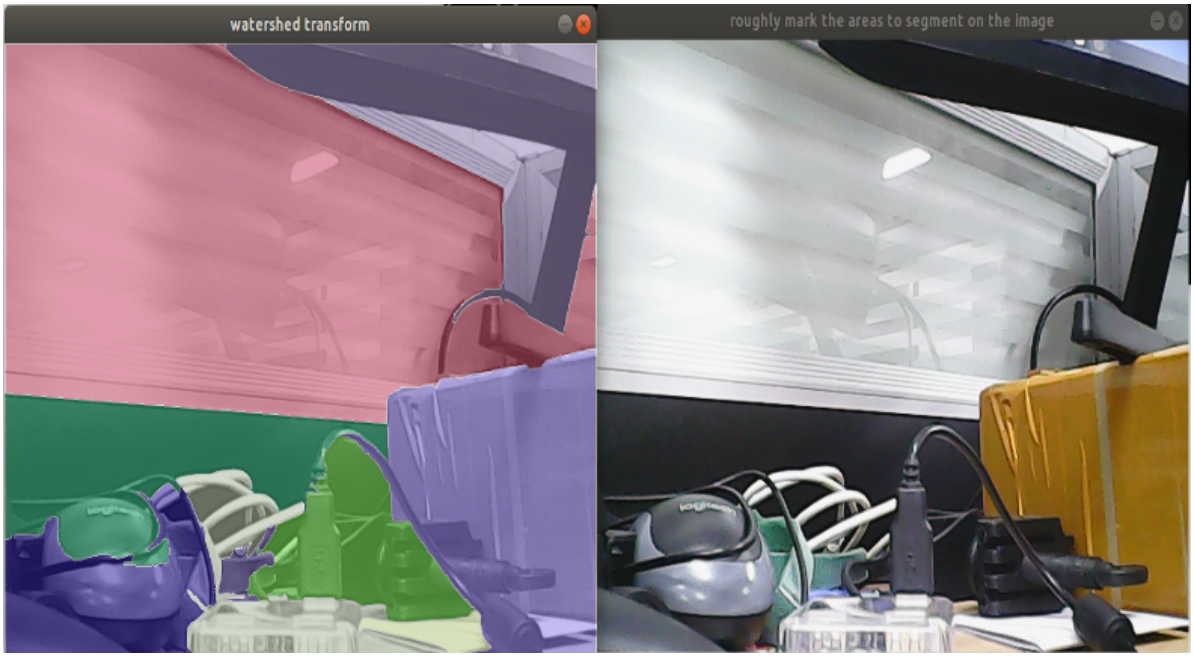
- Phase correlation displacement detection

The faster the camera moves, the larger the radius of the circle.



- Watershed segmentation algorithm

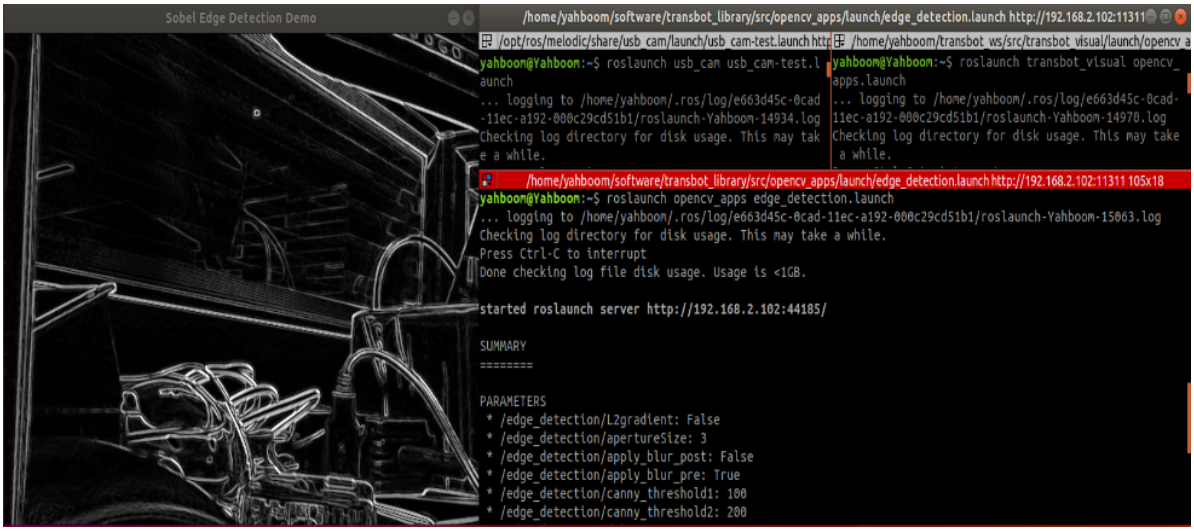
Use the mouse to select different objects, the system automatically distinguishes them.

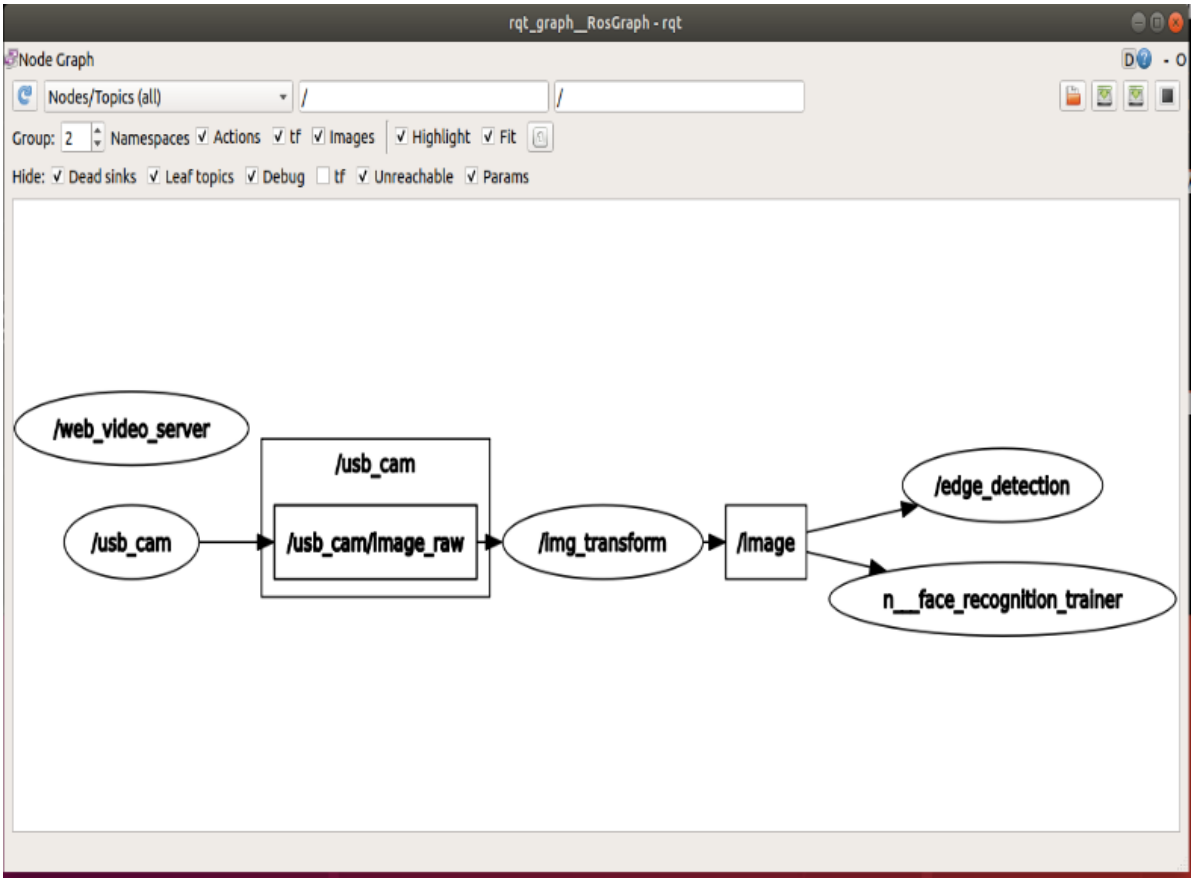


4.3、Node

4.3.1、Edge detection algorithm

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
~edge_type	int	0	Specify the edge detection method: 0: Sobel operator, 1: Laplacian operator, 2: Canny edge detection
~canny_threshold1	int	100	Specify the second canny threshold
~canny_threshold2	int	200	Specify the first canny threshold
~apertureSize	int	3	The aperture size of the Sobel operator.
~apply_blur_pre	bool	True	Whether to apply blur() to the input image
~postBlurSize	double	3.2	Input image aperture size
~apply_blur_post	bool	False	Whether to apply GaussianBlur() to the input image
~L2gradient	bool	False	Parameters of canny
~queue_size	int	3	Queue size





4.3.2、Contour moment

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

4.3.3、Face recognition

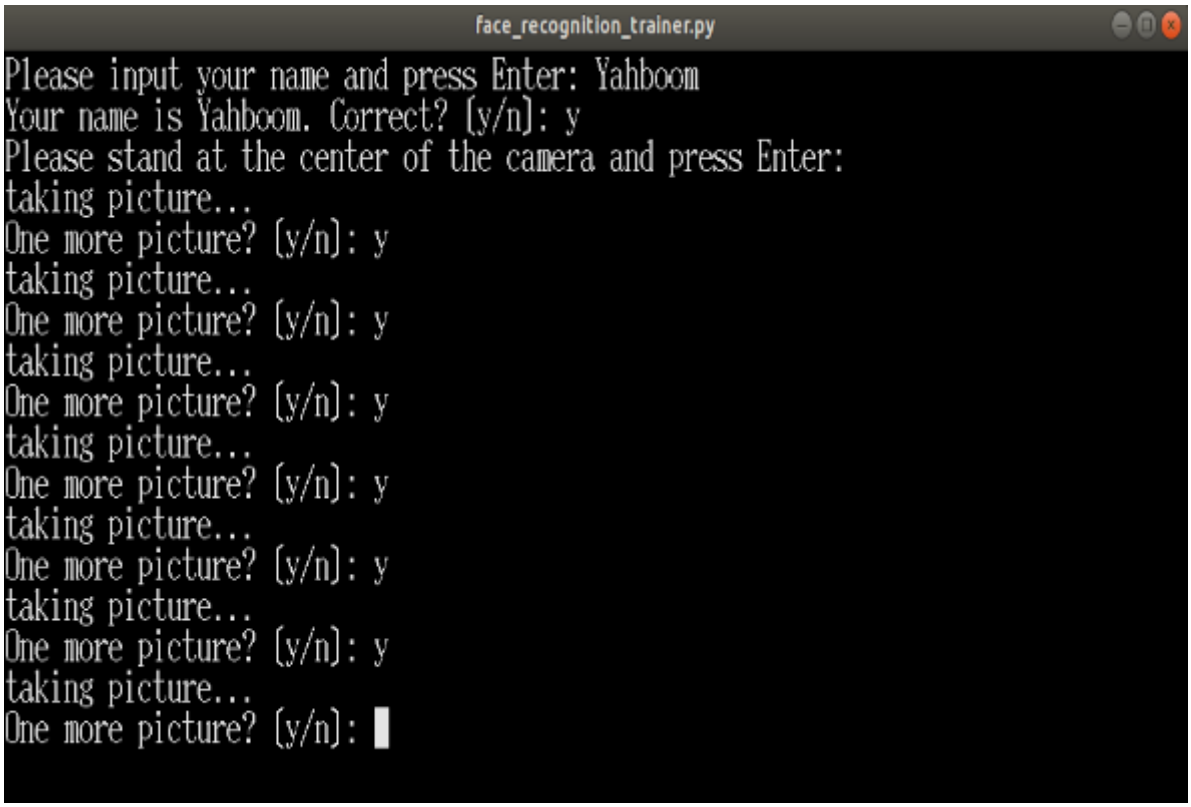
Parameter	Type	Default	Analyze
~approximate_sync	bool	false	Subscribe to the topic [camera_info] to get the default coordinate system ID, otherwise use the image information directly.
~queue_size	int	100	Queue size for subscribed topics
~model_method	string	"eigen"	Face recognition method: "eigen", "fisher" or "LBPH"
~use_saved_data	bool	true	Load training data from the ~data_dir path
~save_train_data	bool	true	Save the training data to the ~data_dir path for retraining
~data_dir	string	"~/opencv_apps/face_data"	保存训练数据路径
~face_model_width	int	190	Train the width of the face image
~face_model_height	int	90	Training the height of the face image
~face_padding	double	0.1	Fill ratio of each face
~model_num_components	int	0	The number of components of the face recognizer model (0 is considered unlimited)
~model_threshold	double	8000.0	Face recognition model threshold
~lbph_radius	int	1	Radius parameter (only applicable to LBPH method)

Parameter	Type	Default	Analyze
~lbph_neighbors	int	8	Neighborhood parameters (only applicable to LBPH method)
~lbph_grid_x	int	8	Grid x parameters (only applicable to LBPH method)
~lbph_grid_y	int	8	Grid y parameter (only applicable to LBPH method)
~queue_size	int	100	Image subscriber queue size者队列大小

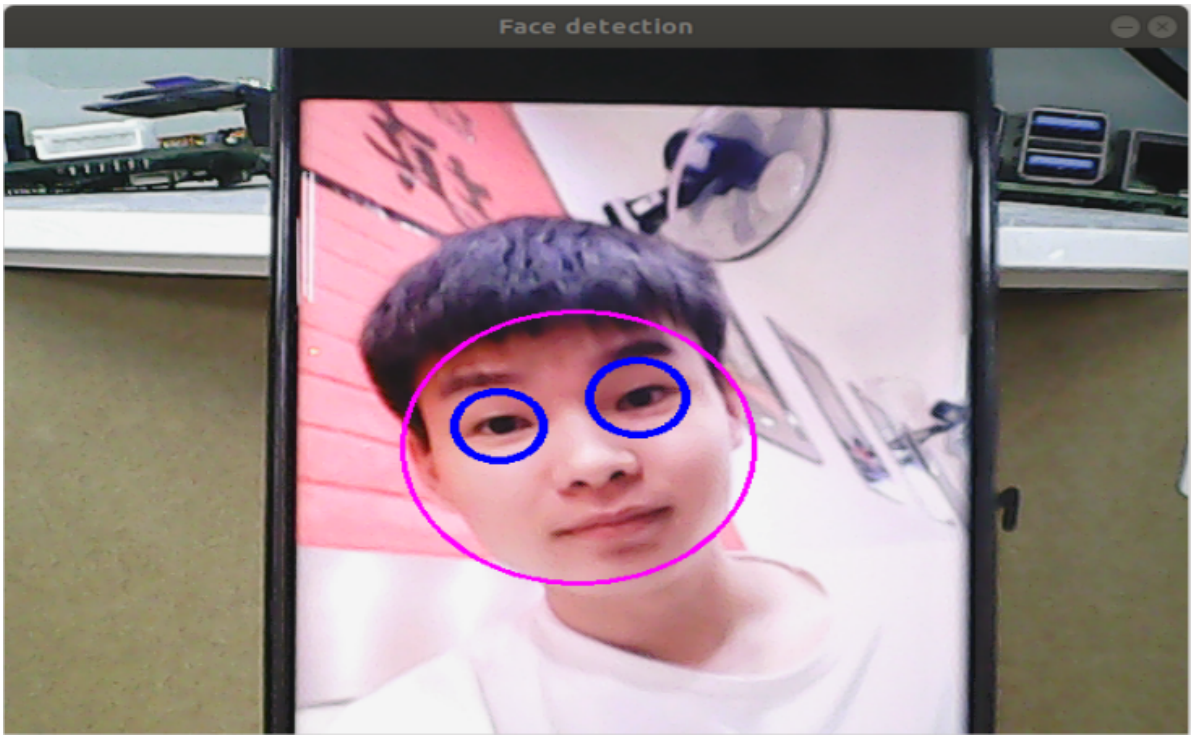
Steps:

1. First, after the colon in the figure below, enter the character's name: Yahboom
2. Confirm name: y
3. Then place the face in the center of the image and click OK.
4. Cycle to add a photo: y, click to confirm.
5. To end the picture collection, enter: n and click to confirm.
6. Close the launch file and restart.

If you need to enter the recognition, cycle 1~5 in turn until all the recognition personnel are entered, and then perform step 6.



Step 3: Ensure that the face can be recognized



Recognition effect