

2. Opencv Application

2.1. Overview

OpenCV is a cross-platform computer vision and machine learning software library released under the BSD license (open source), which can run on Linux, Windows, Android and MacOS operating systems. [1] It is lightweight and efficient - consisting of a series of C functions and a small number of C++ classes, while providing interfaces for languages such as Python, Ruby, and MATLAB, and implementing many common algorithms in image processing and computer vision.

2.2. QR code

2.2.1. Introduction to QR code

QR code is a type of two-dimensional barcode. QR comes from the abbreviation of "Quick Response" in English, which means quick response. It comes from the inventor's hope that QR code can allow its content to be decoded quickly. QR code not only has large information capacity, high reliability and low cost, but also can express a variety of text information such as Chinese characters and images, has strong confidentiality and anti-counterfeiting properties and is very convenient to use. More importantly, the QR code technology is open source.

2.2.2, QR code structure

图片	解析
	定位标识（Positioning markings）标明二维码的方向。
	对齐标记（Alignment markings）如果二维码很大，这些附加元素帮助定位。
	计算模式（Timing pattern）通过这些线，扫描器可以识别矩阵有多大。
	版本信息（Version information）这里指定正在使用的QR码的版本号，目前有QR码有40个不同的版本号。用于销售行业的版本号通常为1-7。
	格式信息（Format information）格式模式包含关于容错和数据掩码模式的信息，并使得扫描代码更加容易。
	数据和错误校正值（Data and error correction keys）这些模式保存实际数据。
	宁静区域（Quiet zone）这个区域对于扫描器来说非常重要，它的作用就是将自身与周边的进行分离。

2.2.3, QR code characteristics

The data value in the QR code contains repeated information (redundant value). Therefore, even if up to 30% of the two-dimensional code structure is destroyed, it does not affect the readability of the two-dimensional code. The storage space of the QR code is up to 7089 bits or 4296 characters, including punctuation marks and special characters, which can be written into the QR code. In addition to numbers and characters, words and phrases (such as URLs) can also be encoded. As more data is added to the QR code, the code size increases and the code structure becomes more complex.

2.2.4, QR code creation and recognition

Install the relevant environment (the supporting virtual machine has already set up the environment)

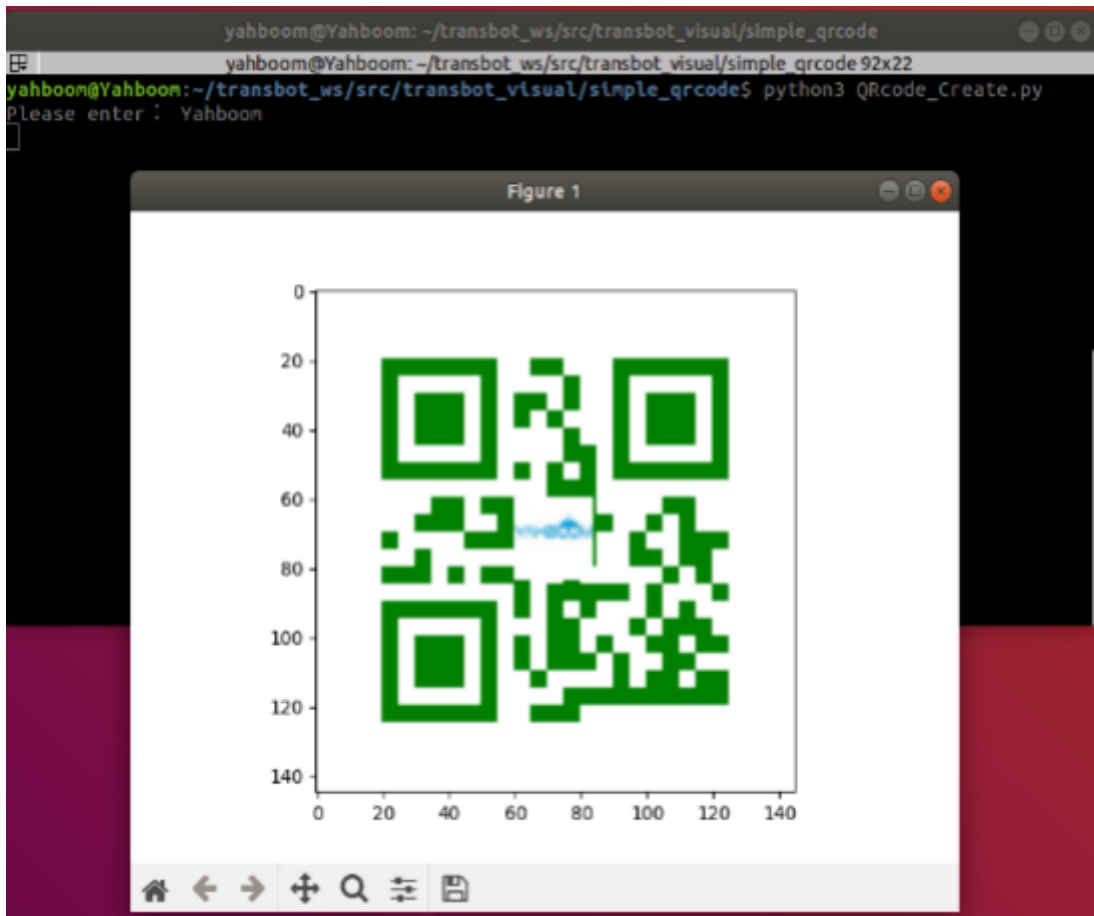
```
python3 -m pip install qrcode pyzbar
sudo apt-get install libzbar-dev
```

- Create

Source code location: ~/orbbec_ws/src/astra_visual/qrcode/QRcode_Create.py

```
cd ~/orbbec_ws/src/astra_visual/qrcode
python Qrcode_Create.py
```

Enter the content to be generated in the terminal and press Enter to confirm.



- Recognition

Source code location: ~/orbbec_ws/src/astra_visual/qrcode/Qrcode_Parsing.py

```
cd ~/orbbec_ws/src/astra_visual/qrcode
python Qrcode_Parsing.py
```

If the following situation occurs, replug the camera and run it again.

```
yahboom@yahboom-virtual-machine:~/orbbec_ws/src/astra_visual/qrcode$ python QRco
de_Parsing.py
[ WARN:0@0.533] global cap_v4l.cpp:982 open VIDEOIO(V4L2:/dev/video0): can't ope
n camera by index
[ERROR:0@0.534] global obsensor_uvc_stream_channel.cpp:156 getStreamChannelGroup
Camera index out of range
capture get FPS : 0.0
```

After normal startup, put the QR code in front of the camera. After recognizing the QR code, the QR code will be framed and the QR code content will be printed out.

