

C/C++ programming with OpenCV on Ubuntu/Raspbian

Preparation of the computer

- Usually and if there are no specific constraints, it is better to first try to use the default OpenCV version provided with Ubuntu/Raspbian package manager by running the command `sudo apt-get install libopencv-dev`. For **Ubuntu 16.04** it should correspond to **OpenCV 2.4.9**, for **Ubuntu 18.04/Raspbian Buster** it should be **OpenCV 3.2.0**, for **Ubuntu 20.04** it should be **OpenCV 4.2.0**. Warning : versions 2 and 3 of OpenCV have some differences and version 4 is C++11-only so it is good to check which version is installed. On a 64 bit version of Ubuntu, **.h** and **.hpp** files are in `/usr/include/opencv`, `/usr/include/opencv2`, (only `/usr/include/opencv4/opencv2` for version 4) and **.a** and **.so** libraries are in `/usr/lib/x86_64-linux-gnu/libopencv_XXX.a` (there might be also third-party dependencies).
- For instructions to build **OpenCV 4.2.0** from source, see e.g. <http://www.ensta-bretagne.fr/lebars/Share/Ubuntu.txt> .
- For a prebuilt version of **OpenCV 4.2.0** for **Raspbian Buster** and **Raspberry Pi Zero W**, built with a **Raspberry Pi 4**, see <http://www.ensta-bretagne.fr/lebars/Share/OpenCV-4.2.0-pi.tar.gz> (check also <http://www.ensta-bretagne.fr/lebars/Share/Raspbian.txt> for more information on the configuration used).

Tricks/common problems OpenCV

- Depending on the functions you need, check all the libraries `opencv_XXX.a` you need to add to the project settings.
- Do not call `cvReleaseImage()/cv::Mat::release()` on an `IplImage/cv::Mat` returned by `cvQueryFrame()/cv::VideoCapture::read()`.
- Be careful to check the type and dimensions of an image returned by `cvQueryFrame()/cv::VideoCapture::read()`, they might be unusual depending on the characteristics of the camera.
- Always use `cvWaitKey()/cv::waitKey()` somewhere after `cvShowImage()/cv::imshow()` to display an `IplImage/cv::Mat` in a window, otherwise the image might not be displayed.
- Although several samples use the C API, most of the new functionalities of OpenCV are now in its C++ API. Version 4 is C++11-only.
- See also https://www.ensta-bretagne.fr/lebars/tutorials/Complements_C-C++.pdf .

Test

The most portable way to build the programs is using **CMake** (using the `CMakeLists.txt` file), otherwise a **Makefile** is also provided for most of these samples:

- http://www.ensta-bretagne.fr/lebars/Share/ImageOpenCV249_Ubuntu16.04.zip
- http://www.ensta-bretagne.fr/lebars/Share/ImageOpenCV320_Ubuntu18.04.zip
- http://www.ensta-bretagne.fr/lebars/Share/ImageOpenCV420_Ubuntu20.04.zip
- <http://www.ensta-bretagne.fr/lebars/Share/VideoWebcamOpenCV.zip>