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 -y install libopencv-dev**. For **Ubuntu 22.04** it should be **OpenCV 4.5.4**, for **Ubuntu 20.04** it should be **OpenCV 4.2.0**, for **Ubuntu 18.04/Raspbian Buster** it should be **OpenCV 3.2.0**. Warning : versions 2 and 3 of OpenCV have some differences and version 4 is requires C++11 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 **cv::Mat::release()/cvReleaseImage()** on an **cv::Mat/IplImage** returned by **cv::VideoCapture::read()/cvQueryFrame()**.
- Be careful to check the type and dimensions of an image returned by **cv::VideoCapture::read()/cvQueryFrame()**, they might be unusual depending on the characteristics of the camera.
- Always use **cv::waitKey()/cvWaitKey()** somewhere after **cv::imshow()/cvShowImage()** to display an **cv::Mat/IplImage** 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 requires C++11.
- 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, you might need also to run **sudo apt-get -y install build-essential cmake cmake-gui**), otherwise a **Makefile** is also provided for most of these samples:

- http://www.ensta-bretagne.fr/lebars/Share/ImageOpenCV454_Ubuntu22.04.zip
- http://www.ensta-bretagne.fr/lebars/Share/ImageOpenCV420_Ubuntu20.04.zip
- http://www.ensta-bretagne.fr/lebars/Share/ImageOpenCV320_Ubuntu18.04.zip

- http://www.ensta-bretagne.fr/lebars/Share/VideoWebcamOpenCV.zip