Lesson 3 OpenCV Modules and Components

1.OpenCV Component

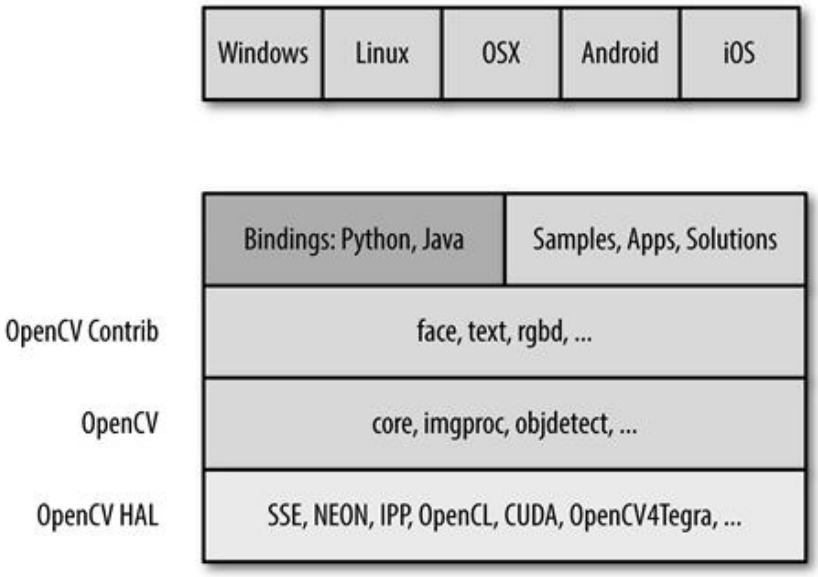
OpenCV is composed of several layers of modules.

1) The bottom layer is the hardware optimization based on HAL (Hardware Acceleration Layer)

2) Above the bottom layer are the codes contributed by other developers contained in opencv_contrib module. These codes, core of OpenCV, involves most of the high-level functionality.

3) The next layer are language bindings and sample applications.

4) The top layer is the interaction between OpenCV and operating system.



2.Specific Module of OpenCV

1) Core: Contain the basic structure and operation of OpenCV library.

2) Improc: Image processing module can transform the basic image, including filtering and convolution.

3) Highgui: Seen as lightweight Windows UI Toolkit, it is divided into imcodecs, videoio and highgui in OpenCV 3.0. It contains user-interaction function used to display the images or simple input.

4) Video: Contain the functions for reading and writing the video streams.

5) Calib3d: Contain the algorithm of the calibration of single, binocular and multiple cameras.

6) Feature2d: Used for the algorithm of feature point detection, description and matching.

7) Objdectect: Contain the algorithm of specific target detection, including human face or passengers. And it can be used to train the detector to detect other objects.

8) Ml: Machine learning module is a comprehensive module that involves a mass of machine learning algorithms which can interact with OpenCV data type.

9) Flann: Flann stands for Fast Library for Approximate Nearest Neighbors, which will be called by the functions in other modules for fast nearest neighbor search in large datasets.

10)GPU: It is segmented into several cuda* modules in OpenCV. GPU module can optimize the functions on CUDA GPU and involves the functions only applicable to GPU. Without GPU, the computing resources cannot be promoted causing that some functions cannot return good results.

11)Photo: A new module that contains the functions of computational photography.

12)Stitching: Also a new module that stitches sophisticated images

13)Nonfree: It is moved to opencv_contrib/xfeatures2d in OpenCV 3.0. There are some algorithms that is protected by patent and limited in usage in

OpenCV, such as SIFT. These algorithms are isolated into their own modules, therefore you need to take special measures to use them in commercial products.

14)Contrib: It involves something new that haven't been integrated into OpenCV.

15)Legacy: It has been removed from OpenCV 3.0. This module contains some old stuffs that haven't been completely removed.

16)Ocl: Khronos OpenCL standard. It has been removed from OpenCV 3.0 and replaced by T-API. Similar to GPU module, it realizes Khronos OpenCL standard for open parallel programming.

Compared with GPU module, it has fewer functions, but it aims at providing the parallel devices that can run on any GPU or is powered by Khronos. However, GPU module can only run on Nvidia GPU devices for the reason that it utilizes Nvidia CUDA toolkit to develop.