A *very brief* Introduction to OpenCV

Introduction

- Open Source Computer Vision (OpenCV) library aims at real time computer vision applications.
  - Object Identification
  - Segmentation
  - Face Recognition
  - Motion Tracking
  - Mobile Robotics

Download and Setup

- Download
  - You can download the library from the homepage: http://opencv.org/
  - The latest version is 4.1.1, but you may choose any version > 2.1 to do the homework.
- Setup
  - We will demonstrate how to set up OpenCV 3.0 in Visual Studio.
  - For users of other OSs, please refer to:
    - Linux: http://docs.opencv.org/doc/tutorials/introduction/linux_install/linux_install.html
    - Ubuntu: http://milq.github.io/install-opencv-ubuntu-debian/
    - Mac OS X: http://blogs.wcode.org/2014/10/howto-install-build-and-use-opencv-macosx-10-10/

Resources

- Tutorial
  - http://docs.opencv.org/doc/tutorials/tutorials.html
  - http://docs.opencv.org/master/d9/df8/tutorial_root.html
  - http://www.cs.iit.edu/~agam/cs512/lect-notes/opencv-intro/index.html
- Documents
  - http://docs.opencv.org
  - http://docs.opencv.org/master/index.html
  - $OpencvDirectory/sources/doc/tutorials/tutorials.markdown

Useful Functions: Image reading

- cv::Mat
  - Matrix structure for the OpenCV
  - Mat Mat::clone()
    - Duplicate a image of itself and return it.
- cv::Mat cv::imread(filename, color_flag=1)
  - Load a image by the filename. Color_flag specifies the color type of the image.
- bool cv::imwrite(filename, img_mat)
  - Save a image with the filename.

Useful Functions: User Interface

- void cv::namedWindow(window_name, flags=WINDOW_AUTOSIZE)
  - Create a window with the window_name.
- void cv::imshow(window_name, img_mat)
  - Show the img_mat in the window with that window_name.
- int cv::waitKey(delay=0)
  - delay(ms): how long the window will be shown. 0 means forever.
- void cv::destroyWindow(window_name)
  - Destroy the window with the window_name.

Useful Functions: Image Processing

- void GaussianBlur(src, dst, ksize, sigmaX, sigmaY)
  - Blurs an image using a Gaussian filter.
- double threshold(src, dst, thresh, maxval, type)
  - Applies a fixed-level threshold to each array element.
- void erode(src, dst, kernel)
  - Erodes an image by using a specific kernel.
- void dilate(src, dst, kernel)
  - Dilates an image by using a specific kernel.

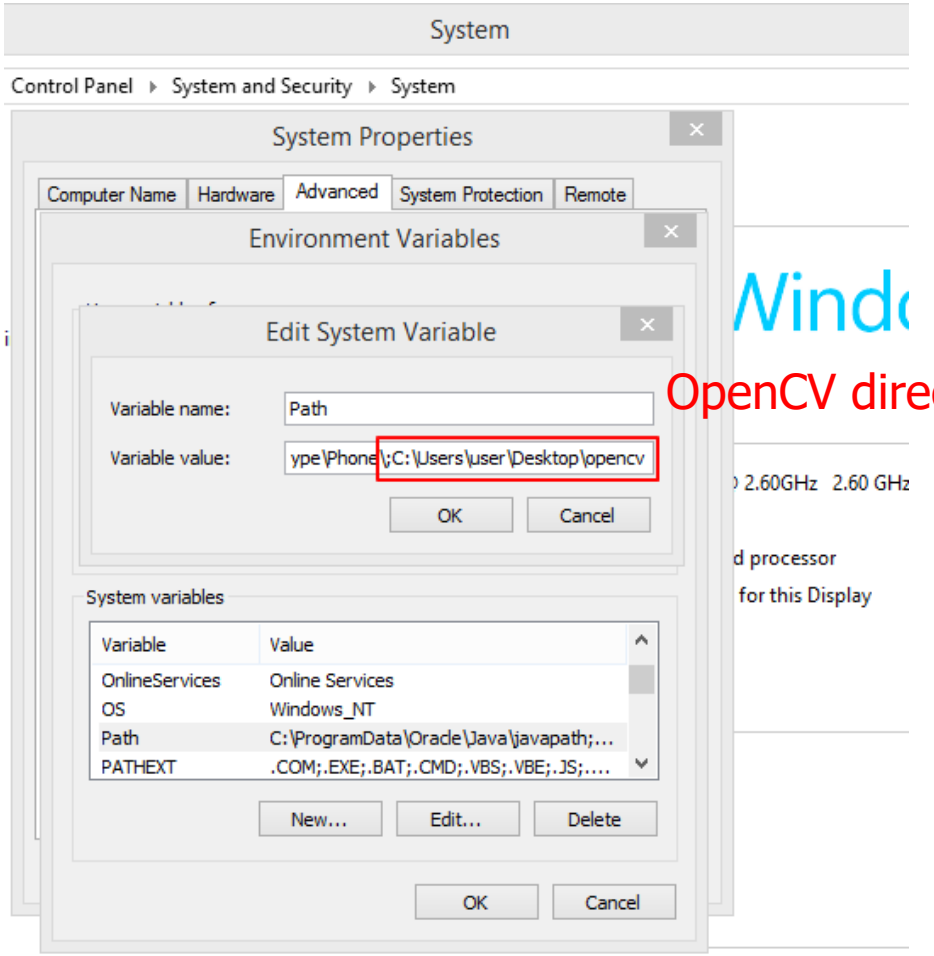
Useful Functions

- If you're familiar with OpenCV, you should try the following functions:

- cvFindContours()
- cvMoments()
- cvGetCentralMoment()

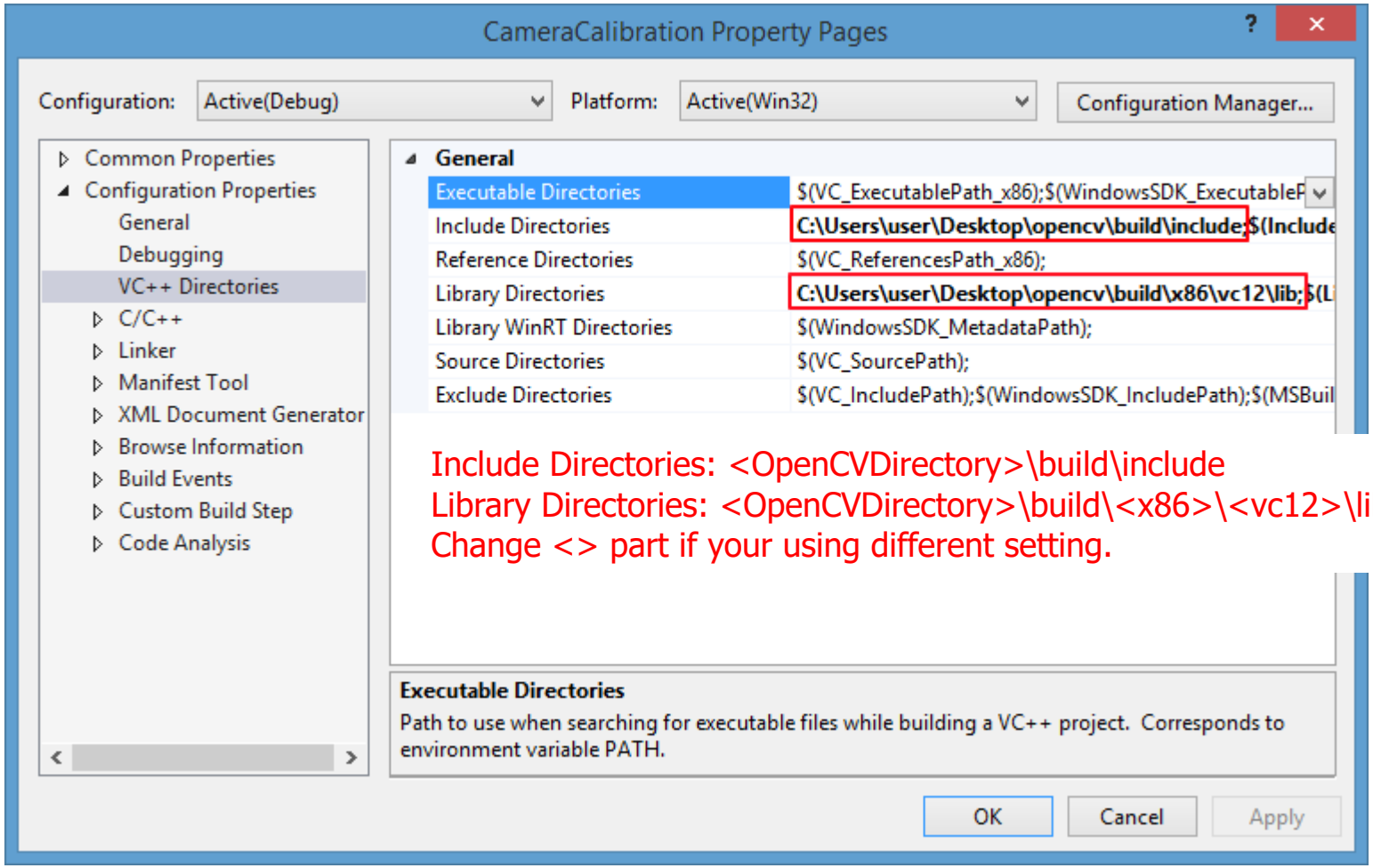
System Configurations

- Environment Variables



Visual Studio Configurations

- Directory Path



Visual Studio Configurations

- Linker->Input: opencv_world300d.lib (debug)
  opencv_world300.lib (release)