Tutorials on OpenCV

OpenCV Fundamentals

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Getting Started (1/7)

- Itseez®
  - http://opencv.org/
  - OpenCV 3.0 alpha (September 2014) / 3.1
  - Add OpenCV to the system PATH for all users
- Microsoft Visual Studio® 2013 / 2015 / 2017

Getting Started (2/7)

- Microsoft Visual Studio® 2012 / 2013
  - Create a "Win32 Console Application "
  - Add OpenCV libraries

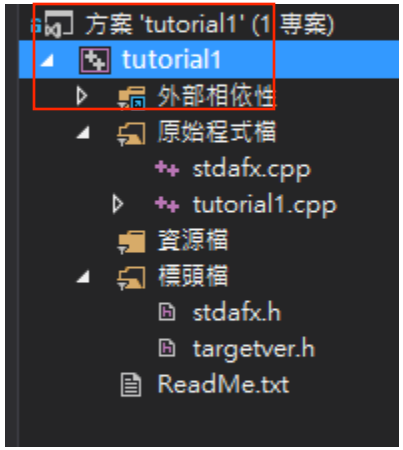
    opencv_world300.lib; opencv_world300d.lib

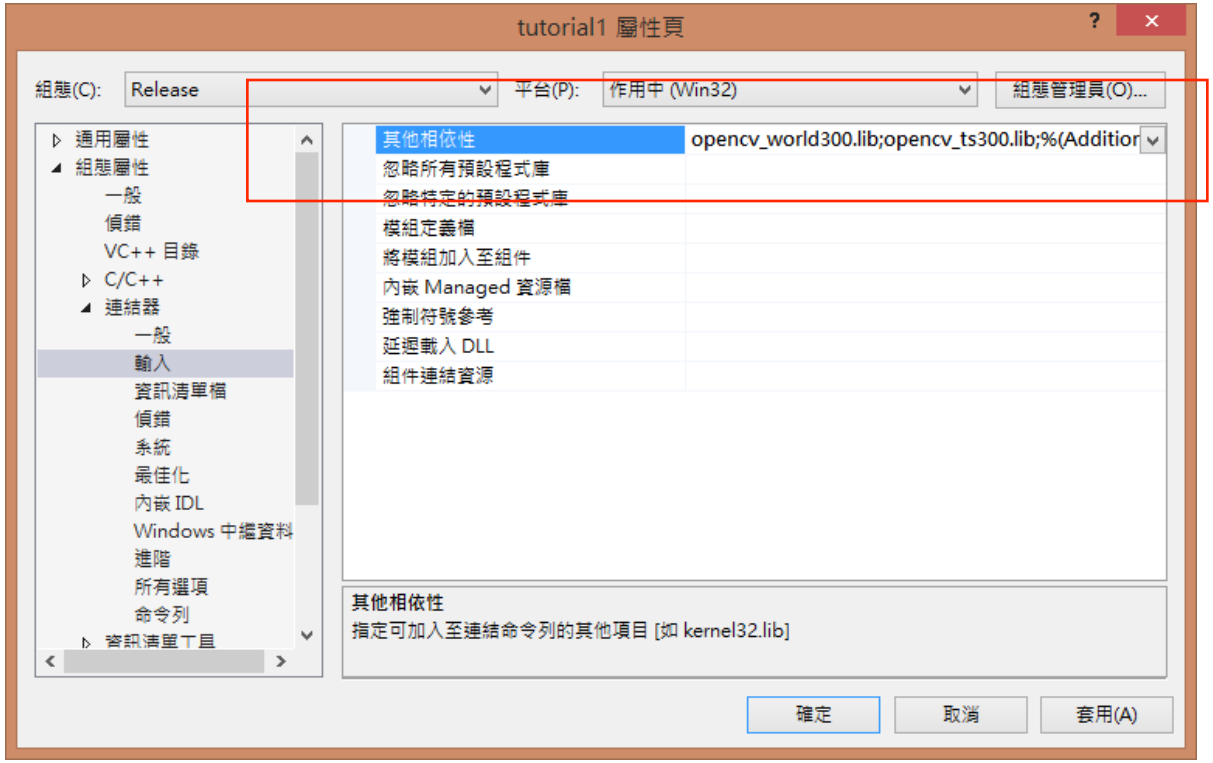
    opencv_ts300.lib; opencv_ts300d.lib

    to Project->Property->Linker->Input->Additional Dependencies:
  - Note: Debug and Release Mode

Getting Started (3/7)

- Microsoft Visual Studio® 2012 / 2013 / 2015 / 2017





Getting Started (4/7)

- Microsoft Visual Studio® 2012 / 2013
- Add OpenCV Include Directory

  ”C:\<OpenCV>\include\opencv;C:\<OpenCV>\include;”

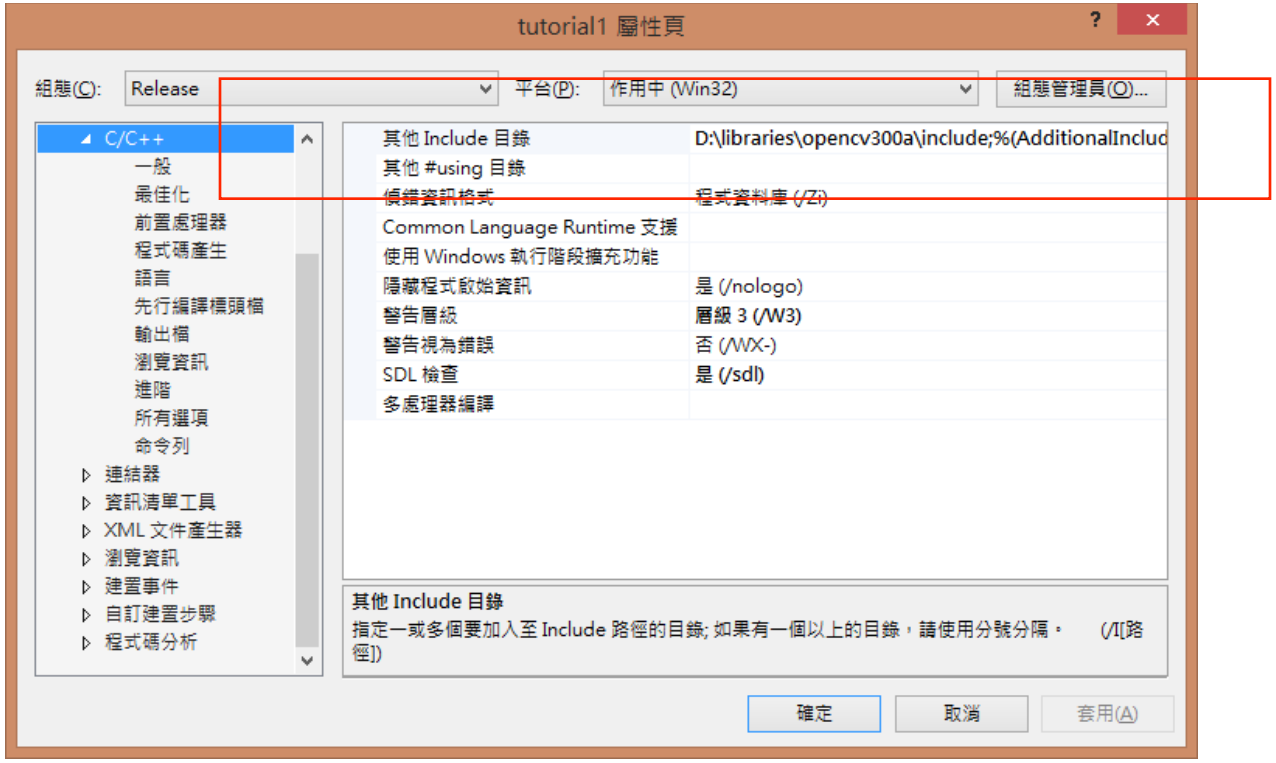
  to Configuration Property->VC++ Directories-> Include Directories
- Add OpenCV Directory

  "C:\<OpenCV>\lib;"

  to VC++ Directories->Library Directories

Getting Started (5/7)

- Microsoft Visual Studio® 2012 / 2013



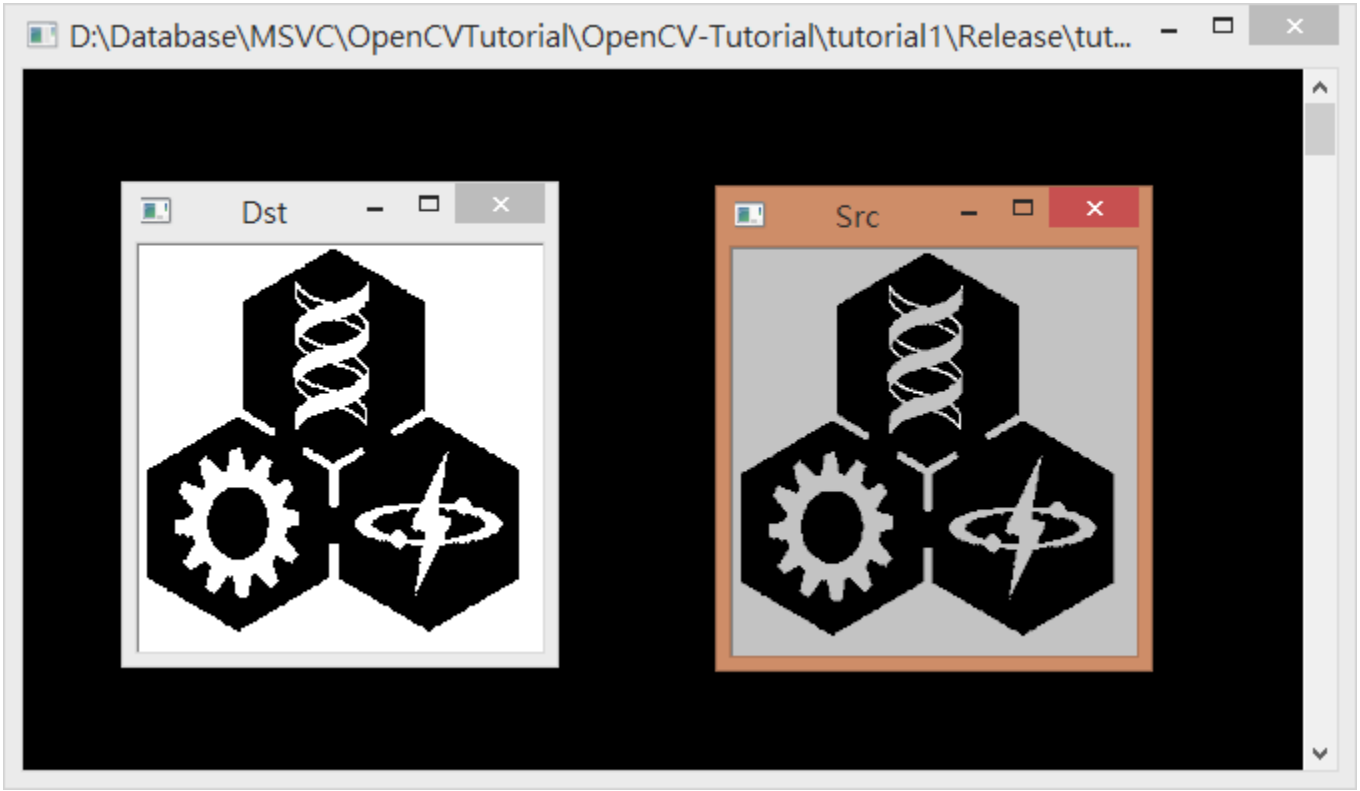
Getting Started (6/7)

- main.cpp

```cpp
#include "stdafx.h"
#include "opencv.hpp"

int _tmain(int argc, _TCHAR* argv[])
{

    cv::UMat imgSrc;        // declare variables
    cv::UMat imgDst;



    cv::imread("lab0.bmp").copyTo(imgSrc);  // load the image

    /*Alternative way
    cv::Mat read;
    read = cv::imread("lab0.bmp");
    read.copyTo(imgSrc);*/

    cv::threshold(imgSrc, imgDst, 10, 255, 0);  //Threshold

    cv::namedWindow("Src");     // declare the window
    cv::namedWindow("Dst");
    cv::imshow("Src", imgSrc);      // show image
    cv::imshow("Dst", imgDst);

    cv::waitKey(0);// press any key to close the window
    cv::destroyWindow("Src");// close window
    cv::destroyWindow("Dst");
    return 0;

}
```

Getting Started (7/7)

- Result



Getting Started - 2015 / 2017

- .pro

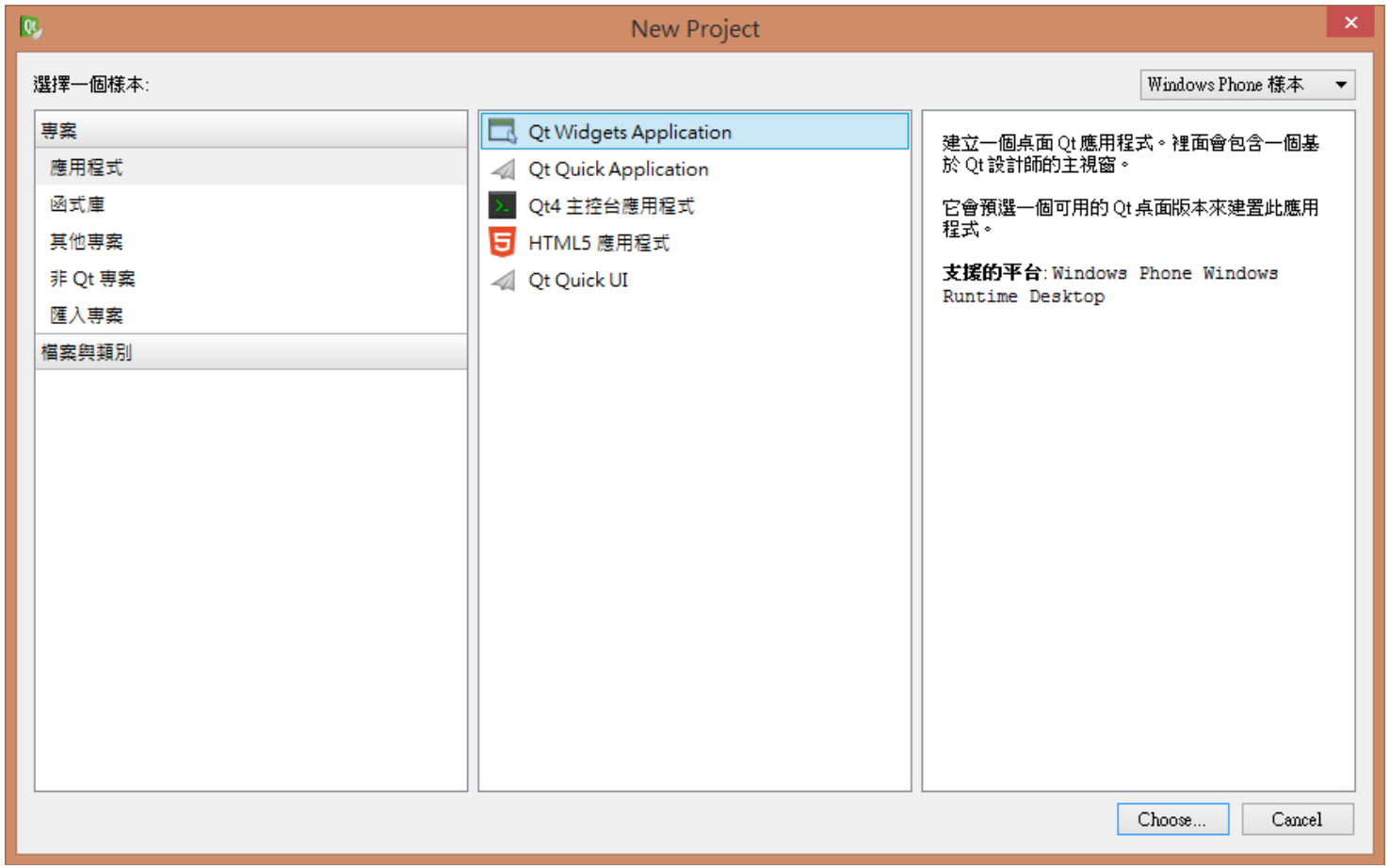
```
SOURCES += main.cpp\
        mainwindow.cpp

HEADERS  += mainwindow.h

FORMS    += mainwindow.ui

INCLUDEPATH += D:\opencv\build\include

LIBS += D:\opencv-build\bin\libopencv_core320.dll
LIBS += D:\opencv-build\bin\libopencv_highgui320.dll
LIBS += D:\opencv-build\bin\libopencv_imgcodecs320.dll
LIBS += D:\opencv-build\bin\libopencv_imgproc320.dll
LIBS += D:\opencv-build\bin\libopencv_features2d320.dll
LIBS += D:\opencv-build\bin\libopencv_calib3d320.dll

# more correct variant, how set includepath and libs for mingw
# add system variable: OPENCV_SDK_DIR=D:/opencv/build
# read http://doc.qt.io/qt-5/qmake-variable-reference.html#libs

#INCLUDEPATH += $$(OPENCV_SDK_DIR)/include

#LIBS += -L$$(OPENCV_SDK_DIR)/x86/mingw/lib \
#        -lopencv_core320        \
#        -lopencv_highgui320     \
#        -lopencv_imgcodecs320   \
#        -lopencv_imgproc320     \
#        -lopencv_features2d320  \
#        -lopencv_calib3d320
```

Getting Started - 2015 / 2017

- .cpp

```
#include "mainwindow.h"
#include "ui_mainwindow.h"

#include <opencv2/core/core.hpp>
#include <opencv2/highgui/highgui.hpp>

MainWindow::MainWindow(QWidget *parent) :
    QMainWindow(parent),
    ui(new Ui::MainWindow)
{
    ui->setupUi(this);

    // read an image
    cv::Mat image = cv::imread("f://1.jpg", 1);
    // create image window named "My Image"
    cv::namedWindow("My Image");
    // show the image on window
    cv::imshow("My Image", image);
}

MainWindow::~MainWindow()
{
    delete ui;
}
```

Add New OpenCV Project in Qt (1/4)



Add New OpenCV Project in Qt (2/4)

Add New OpenCV Project in Qt (3/4)

Add New OpenCV Project in Qt (4/4)

```
INCLUDEPATH += $$quote(D:\libraries\opencv300a\include)\
               $$quote(D:\libraries\opencv300a\include\opencv2)

OPENCVLIB += $$quote(D:\libraries\opencv300a\lib)

CONFIG(debug, debug|release){
LIBS+= $$OPENCVLIB/opencv_world300d.lib\
       $$OPENCVLIB/opencv_ts300d.lib
}

CONFIG(release, debug|release){
LIBS+= $$OPENCVLIB/opencv_world300.lib\
       $$OPENCVLIB/opencv_ts300.lib
}
```

Edit *.pro file

Load Image with QT (1/4)

- Mainwindow.h

```
1  #ifndef MAINWINDOW_H
2  #define MAINWINDOW_H
3
4  #include <QMainWindow>
5  #include "opencv.hpp"
6
7  namespace Ui {
8  class MainWindow;
9  }
10
11 class MainWindow : public QMainWindow
12 {
13     Q_OBJECT
14
15 public:
16     explicit MainWindow(QWidget *parent = 0);
17     ~MainWindow();
18
19 private:
20     Ui::MainWindow *ui;
21     cv::UMat imgSrc;
22 };
23
24 #endif // MAINWINDOW_H
```

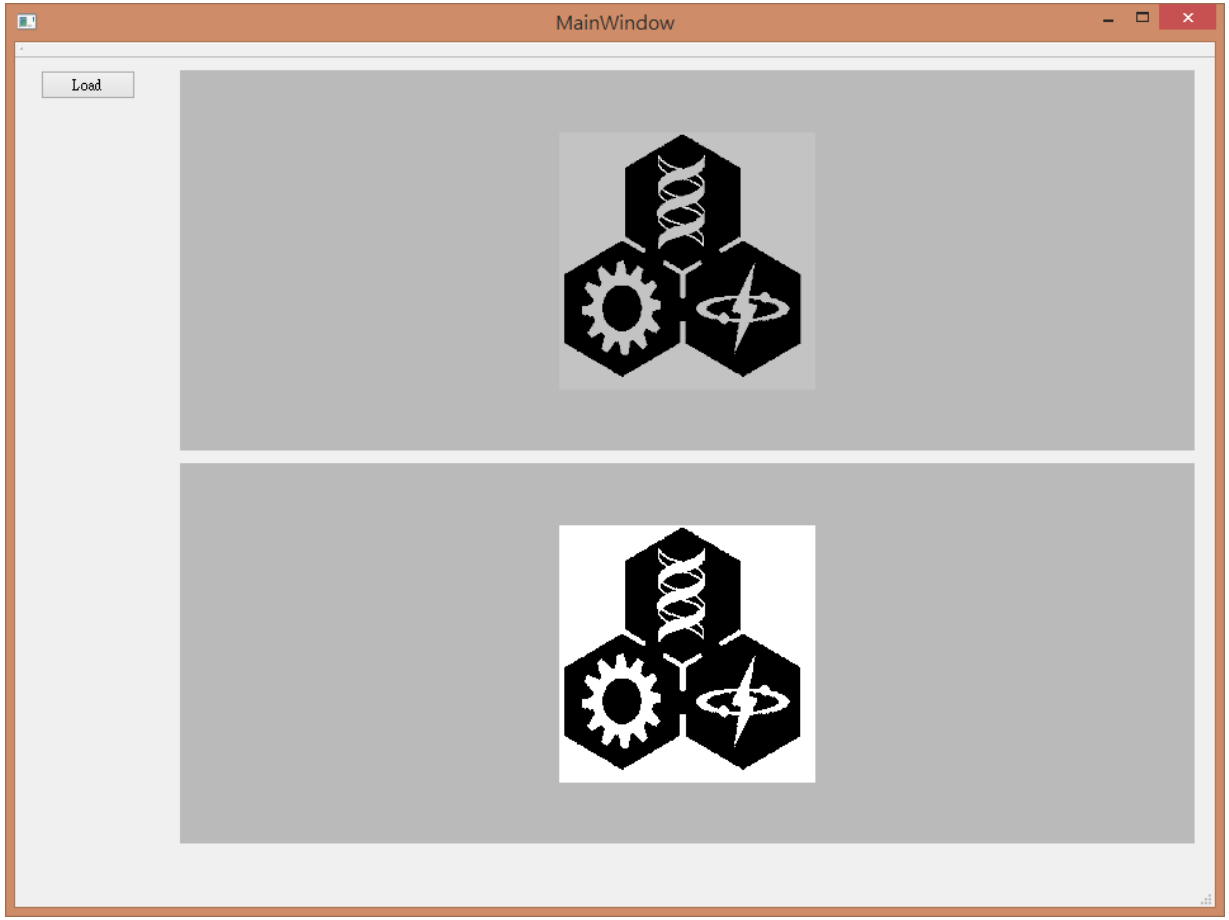
Load Image with QT (2/4)

```
void MainWindow::on_pushButton_loadImage_clicked()
{
      cv::UMat img[2];
      fileName = QFileDialog::getOpenFileName(this,tr("Open File"));
      imgSrc = cv::imread(fileName.toStdString());

      if(!imgSrc.empty())
      {
          for(int i=0;i<2;i++)
          {
              if(i == 1)
                  cv::threshold(imgSrc, img[i], 10, 255, 0);
              else
                  imgSrc.copyTo(img[i]);
```

Load Image with QT (3/4)

```
            QImage tmp(img[i].getMat(1).data,
                       img[i].cols,
                       img[i].rows,
                       img[i].step,
                       QImage::Format_RGB888);

            if(tmp.width() > ui->loadImage->width() ||
               tmp.height() > ui->loadImage->height())
            {
                tmp = tmp.scaled(ui->loadImage->width(),
                                 ui->loadImage->height(),
                                 Qt::KeepAspectRatio);
            }
            if(i == 0)
               ui->loadImage->setPixmap(QPixmap::fromImage(tmp));
            else
                ui->loadImage_2->setPixmap(QPixmap::fromImage(tmp))
            cv::cvtColor(img[i],img[i],cv::COLOR_RGB2BGR);
        }
    }
}
```

Load Image with QT (4/4)



Others

- Example codes available at:
  - https://github.com/KKyang/OpenCV-Tutorial
- The following Dlls are needed if Qt is not installed on the target PC:
  - icudt52.dll
  - icuin52.dll
  - icuuc52.dll
  - Qt5Core.dll
  - Qt5Gui.dll
  - Qt5Widgets.dll
  - platforms/qwindows.dll, platforms/qminimal.dll, platforms/qoffscreen.dll
  - libEGL.dll, libGLESv2.dll

參考網頁

- 官網：http://opencv.org
- 中文教學：http://monkeycoding.com/?page_id=12
- 安裝教學
  https://wiki.qt.io/How_to_setup_Qt_and_openCV_on_Windows