Opencv seminar

1. Introduction to image processing

2018. 01 .10

기본 설정 (1/2)

- **Basic operation**
  - **include 해야 하는 헤더 파일**
    - highgui.hpp / imgproc.hpp
  - **namespace 설정(cv)**
  - **Mat : 이미지를 저장할 클래스**
  - **이미지 파일에 접근하기 위한 기본 함수**
    - imread : 이미지를 불러오는 함수
    - imshow : 이미지를 띄워서 보기 위한 함수
    - imwrite : 이미지를 저장하는 함수

```
1  #include <opencv2/imgproc.hpp>
2  #include <opencv2/highgui.hpp>
3
4  using namespace cv;
5
6  int main() {
7      Mat img = imread("zzangu.bmp",CV_LOAD_IMAGE_COLOR);
8      imshow("image",img);
9      imwrite("img.bmp",img);
10     waitKey(0);
11
12 }
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```
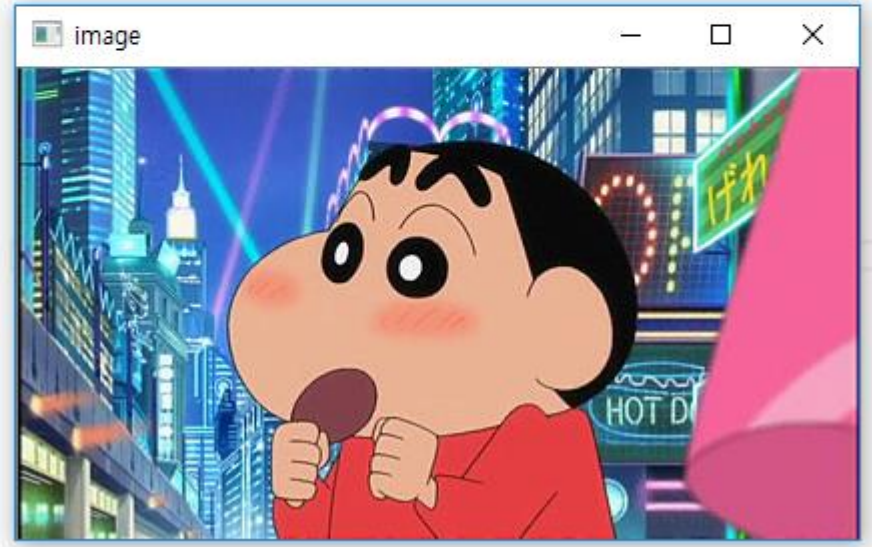



기본 설정 (2/2)

- **Basic operation – cont'd**
  - **이미지의 높이와 너비**
    - Height = img.rows;
    - Width = img.cols;
  - **새로운 Mat object 생성**
    - Mat result(height, width, CV_8UC1); // for gray-scale (one channel, unsigned char)
    - Mat colors(height, width, CV_8UC3); // for color (three channels, unsigned char)
  - **Mat 의 모든 pixel 값을 특정 값으로 설정**
    - Mat img = Mat::zeros(height, width, CV_32FC1); // one channel, float type
    - Mat img = Mat::ones(height, width, CV_64FC3); // three channels, double type
    - Mat img(height, width, CV_8UC1); img = Scalar(39);

remember above skills !

Image pixel 접근 방법

- **Color image**

Mat imgColor

```
int x = 390, y = 10;
int rVal, gVal, bVal;

rVal = imgColor.at<Vec3b>(y,x)[2];
gVal = imgColor.at<Vec3b>(y,x)[1];
bVal = imgColor.at<Vec3b>(y,x)[0];
```

- **Grayscale image**

Mat imgGray

```
int x = 390, y = 10;
int grayVal;

grayVal = imgGray.at<uchar>(y,x);
```

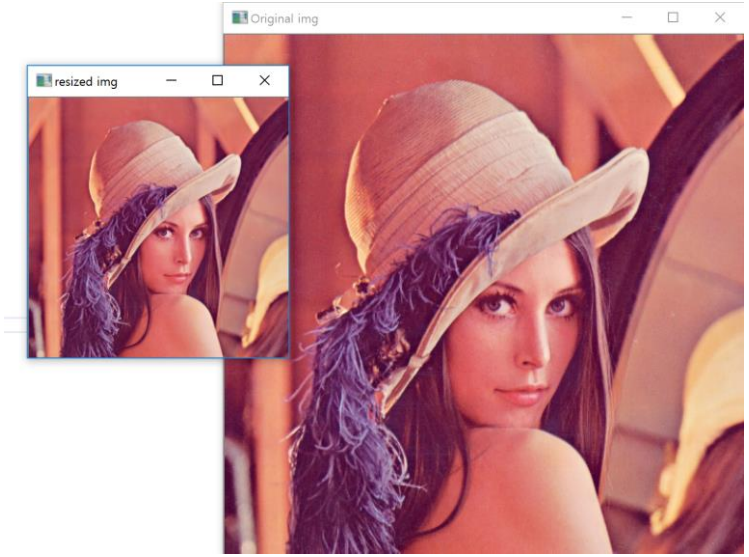
Color Image -> Grayscale image

- **Color image : 3 channel / Gray image : 1 channel**
  - **Opencv 함수**
    - cvtColor(input, output, BGR2GRAY)
  - **C로 구현해보기**

```
#include <opencv2/highgui.hpp>
#include <opencv2/imgproc.hpp>

using namespace cv;

int main() {

    Mat img = imread("lenna.jpg",1);
    int height = img.rows;
    int width = img.cols;
    Mat grayimg(height,width,CV_8UC1);
    cvtColor(img,grayimg,CV_BGR2GRAY);
    imshow("Original img",img);
    imshow("Gray img", grayimg);
    waitKey(0);
}
```

Resize image

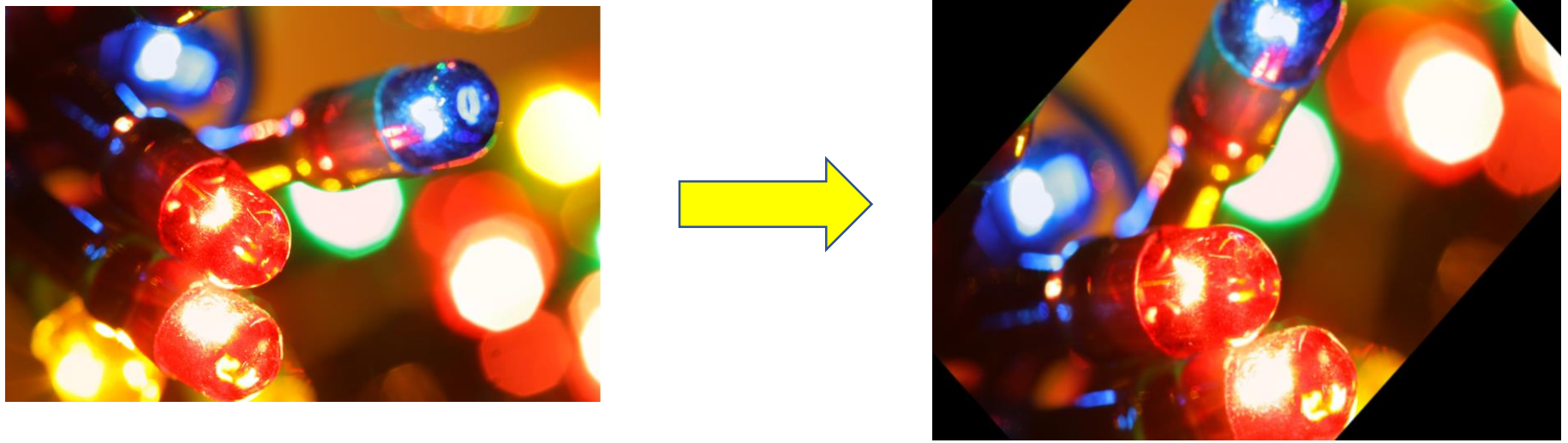
- **Resize image with a Scale factor !**
  - **Opencv 함수**
    - resize(input, output, Size(),fx,fy,1)
  - **C로 구현해보기(예외처리 할 것)**




```cpp
#include <opencv2/highgui.hpp>
#include <opencv2/imgproc.hpp>

using namespace cv;

int main() {

    Mat img = imread("lenna.jpg",1);
    int height = img.rows;
    int width = img.cols;
    Mat resize_img(height,width,CV_8UC3);
    resize(img,resize_img,Size(),0.5,0.5,1);

    imshow("Original img",img);
    imshow("resized img", resize_img);
    waitKey(0);
}
```

Image rotation

- **Image rotation with 예외 처리**
  - **C로 구현해보기**



- **Use the rotation matrix** $\begin{bmatrix} \cos\theta & -\sin\theta \\ \sin\theta & \cos\theta \end{bmatrix}$ **Consider its inverse !**