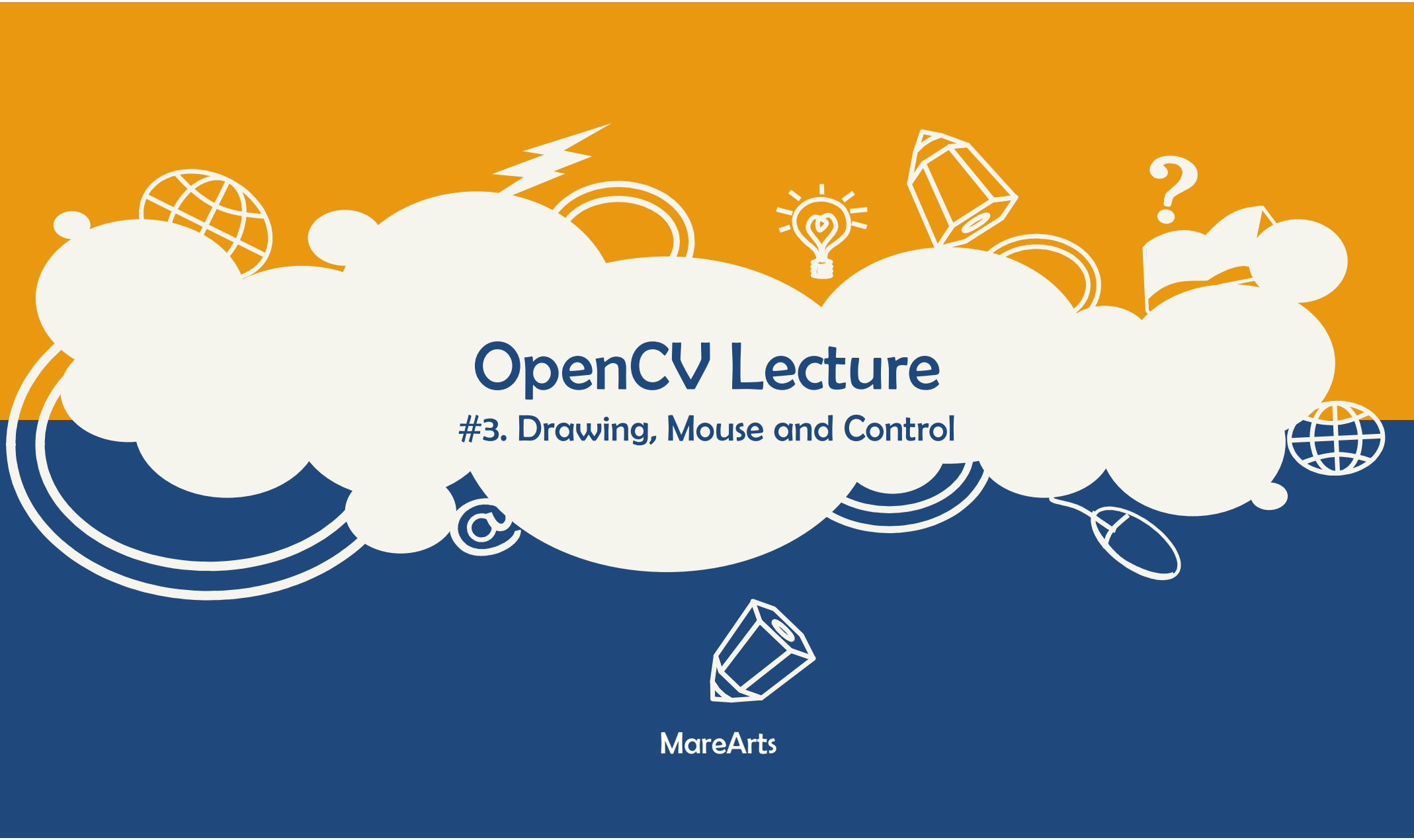


OpenCV Lecture

#3. Drawing, Mouse and Control

MareArts

Contents

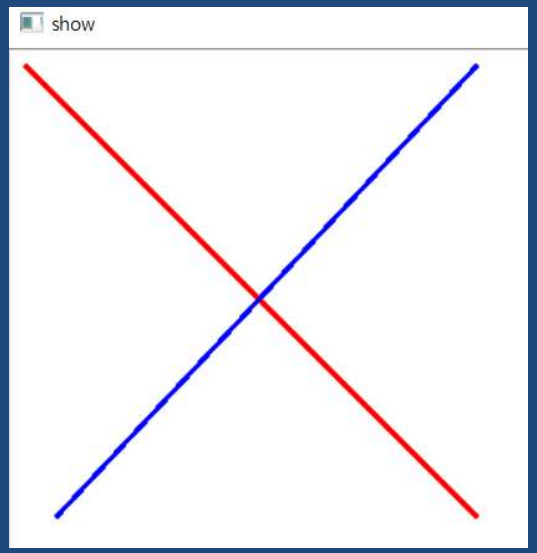
- Drawing
  - Point, Line, Polyline, Circle ...
  - Text Out
  - drawContours
- Mouse event
  - Basic event
  - Application
- Control
  - Slide

Drawing

Line

- void line(InputOutputArray img, Point pt1, Point pt2, const Scalar& color, int thickness=1, int lineType=LINE_8, intshift=0)

```
Mat img(500, 500, CV_8UC3);
img.setTo(255);

////////////////////////////////////////////////////
//line example
cv::Point pt(300, 300);
line(img, Point(10, 10), pt, CV_RGB(255, 0, 0), 2);
line(img, Point(300, 10), Point(30,300), Scalar(255, 0, 0), 2);
////////////////////////////////////////////////////

//namedWindow("show", 0);
imshow("show",img);
waitKey(0);
return 0;
```



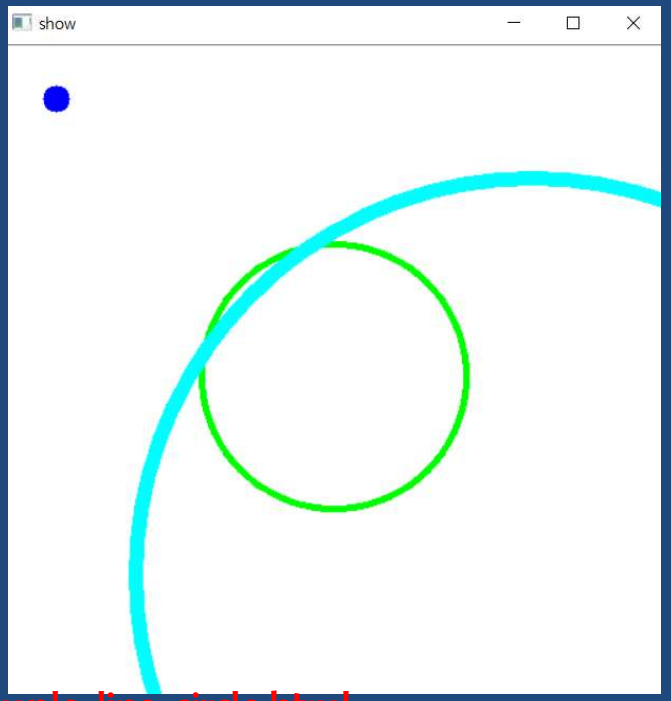
Refer to : http://study.marearts.com/2016/07/opencv-drawing-example-line-circle.html

Drawing

Circle

- void circle(InputOutputArray img, Point center, int radius, const Scalar& color, int thickness=1, intlineType=LINE_8, int shift=0)

```
////////////////////////////////////////////////////
//Circle example
circle(img, Point(250, 250), 100, CV_RGB(0, 255, 0), 3);
cv::Point center(400, 400);
circle(img, center, 300, Scalar(255,255,0), 10);
circle(img, Point(40,40), 10, Scalar(255, 0, 0), -1);
////////////////////////////////////////////////////
```



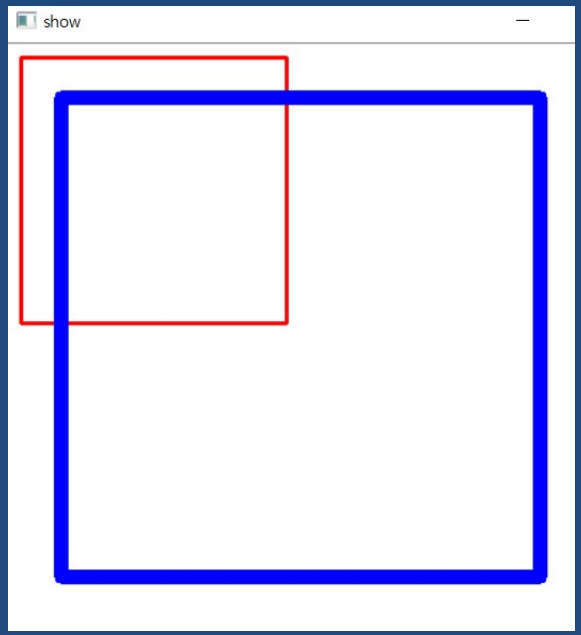
Refer to : http://study.marearts.com/2016/07/opencv-drawing-example-line-circle.html

Drawing

rectangle

- void rectangle(InputOutputArray img, Point pt1, Point pt2, const Scalar& color, int thickness = 1, int lineType = LINE_8, int shift = 0)

```
////////////////////////////////////////////////////
//rectangle example
rectangle(img, Rect(10, 10, 200, 200), CV_RGB(255, 0, 0), 2);
rectangle(img, Rect(Point(40, 40), Point(400, 400)), Scalar(255, 0, 0), 10);
////////////////////////////////////////////////////
```



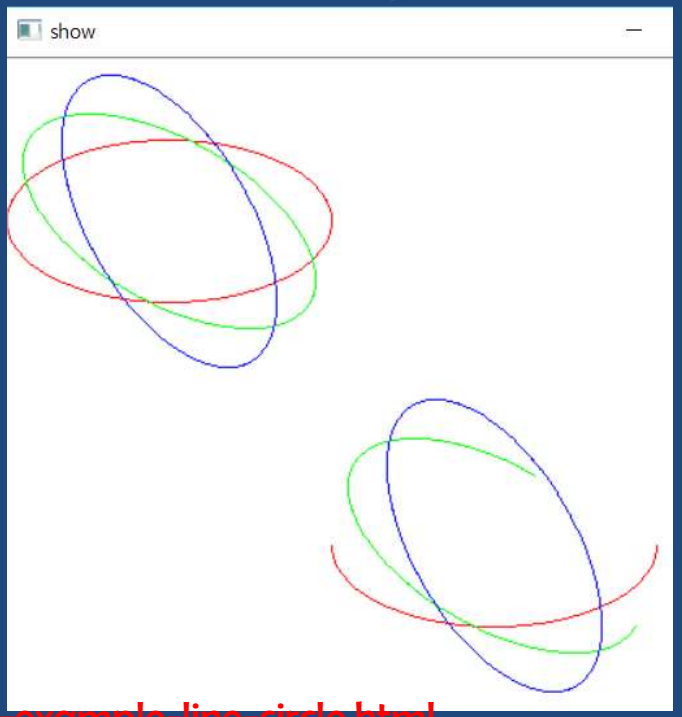
Refer to : http://study.marearts.com/2016/07/opencv-drawing-example-line-circle.html

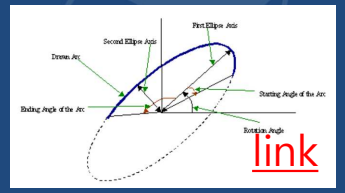
Drawing

ellipse

- void ellipse(InputOutputArray img, Point center, Size axes, double angle, double startAngle, double endAngle, const Scalar& color, int thickness=1, int lineType=LINE_8, int shift=0)

```
////////////////////////////////////////////////////
//rectangle example
ellipse(img, Point(100, 100), Size(100, 50), 0, 0, 360, CV_RGB(255, 0, 0));
ellipse(img, Point(100, 100), Size(100, 50), 30, 0, 360, CV_RGB(0, 255, 0));
ellipse(img, Point(100, 100), Size(100, 50), 60, 0, 360, CV_RGB(0, 0, 255));

ellipse(img, Point(300, 300), Size(100, 50), 0, 0, 180, CV_RGB(255, 0, 0));
ellipse(img, Point(300, 300), Size(100, 50), 30, 0, 270, CV_RGB(0, 255, 0));
ellipse(img, Point(300, 300), Size(100, 50), 60, 0, 360, CV_RGB(0, 0, 255));
////////////////////////////////////////////////////
```





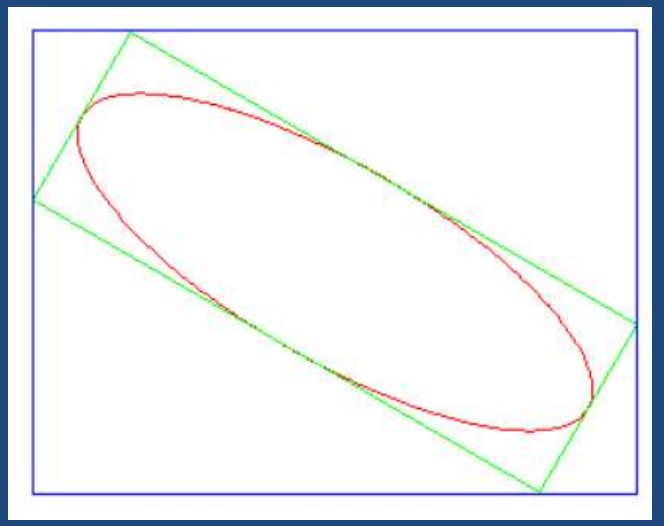
Refer to : http://study.marearts.com/2016/07/opencv-drawing-example-line-circle.html

Drawing

ellipse

- void ellipse(InputOutputArray img, const RotatedRect& box, const Scalar& color, int thickness=1, intlineType=LINE_8)

```
////////////////////////////////////////////////////
//ellipse example 2
RotatedRect rRect = RotatedRect(Point2f(300, 300), Size2f(300, 100), 30);
ellipse(img, rRect, CV_RGB(255, 0, 0));

//draw rect and inside rect in RotatedRect
Point2f vertices[4];
rRect.points(vertices);
for (int i = 0; i < 4; i++)
    line(img, vertices[i], vertices[(i + 1) % 4], Scalar(0, 255, 0));

Rect brect = rRect.boundingRect();
rectangle(img, brect, Scalar(255, 0, 0));
////////////////////////////////////////////////////
```



```
RotatedRect(const Point2f& _center, const Size2f& _size, float _angle)
```

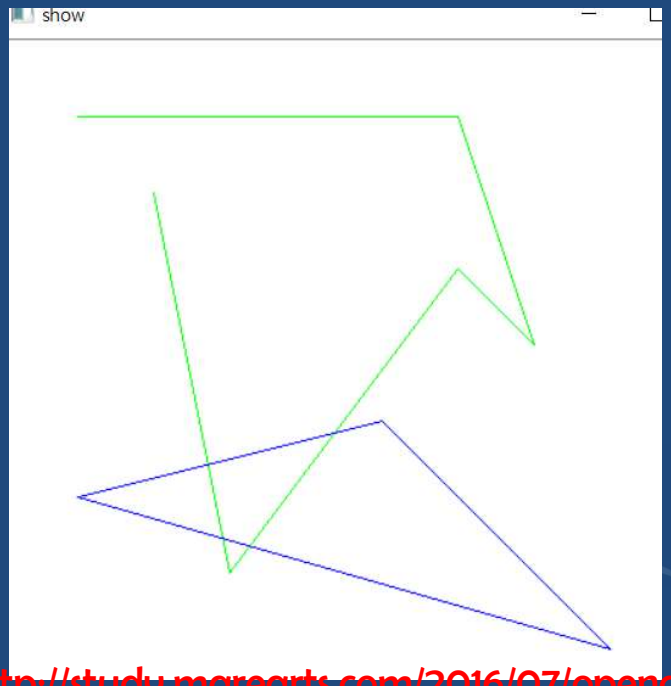
Refer to : http://study.marearts.com/2016/07/opencv-drawing-example-line-circle.html

rotatedrect : http://study.marearts.com/2013/08/opencv-rotatedrect-draw-example-source.html

Drawing

polyline

- void polylines(Mat& img, const Point* const* pts, const int* npts, int ncontours, bool isClosed, const Scalar&color, int thickness=1, int lineType=LINE_8, int shift=0)




```
////////////////////////////////////////////////////
//polylines example 1
vector<Point> contour;
contour.push_back(Point(50, 50));
contour.push_back(Point(300, 50));
contour.push_back(Point(350, 200));
contour.push_back(Point(300, 150));
contour.push_back(Point(150, 350));
contour.push_back(Point(100, 100));

const Point *pts = (const cv::Point*) Mat(contour).data;
int npts = Mat(contour).rows;

std::cout << "Number of polygon vertices: " << npts << std::endl;
// draw the polygon
polylines(img, &pts, &npts, 1, false, Scalar(0, 255, 0));

//polylines example 2
contour.clear();
contour.push_back(Point(400, 400));
contour.push_back(Point(250, 250));
contour.push_back(Point(50, 300));

pts = (const cv::Point*) Mat(contour).data;
npts = Mat(contour).rows;
polylines(img, &pts, &npts, 1, true, Scalar(255, 0, 0));
////////////////////////////////////////////////////
```

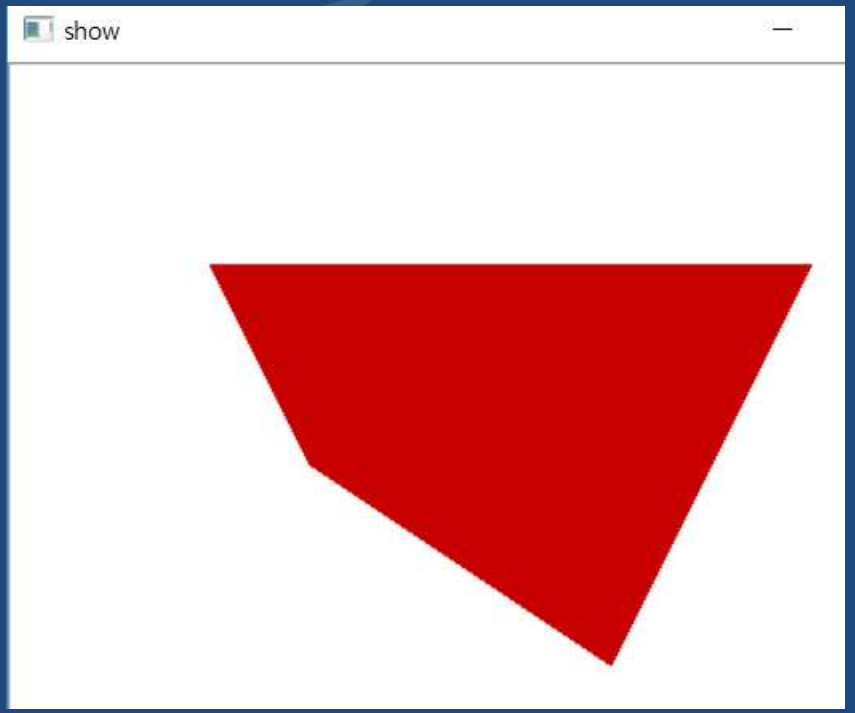
Refer to : http://study.marearts.com/2016/07/opencv-drawing-example-line-circle.html

Drawing

fillConvexPoly

- void fillConvexPoly(Mat& img, const Point* pts, int npts, const Scalar& color, int lineType=LINE_8, int shift=0)

```
////////////////////////////////////////////////////
//fillConvexPoly example 1
cv::Point pt[4];
pt[0] = cv::Point(100, 100);
pt[1] = cv::Point(150, 200);
pt[2] = cv::Point(300, 300);
pt[3] = cv::Point(400, 100);

cv::fillConvexPoly(img, pt, 4, cv::Scalar(0, 0, 200));
////////////////////////////////////////////////////
```



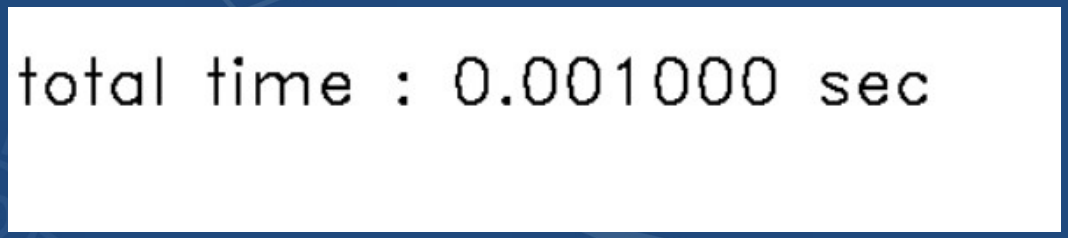
Refer to : http://study.marearts.com/2016/07/opencv-drawing-example-line-circle.html

Drawing

putText

- void putText(InputOutputArray img, const String& text, Point org, int fontFace, double fontScale, Scalar color, intthickness=1, int lineType=LINE_8, bool bottomLeftOrigin=false)

```
char TestStr[100];
sprintf(TestStr, "total time : %lf sec", 0.001);
putText(img, TestStr, Point(10, 250), CV_FONT_NORMAL, 1, Scalar(0, 0, 0), 1, 1); //OutImg is Mat class;
```

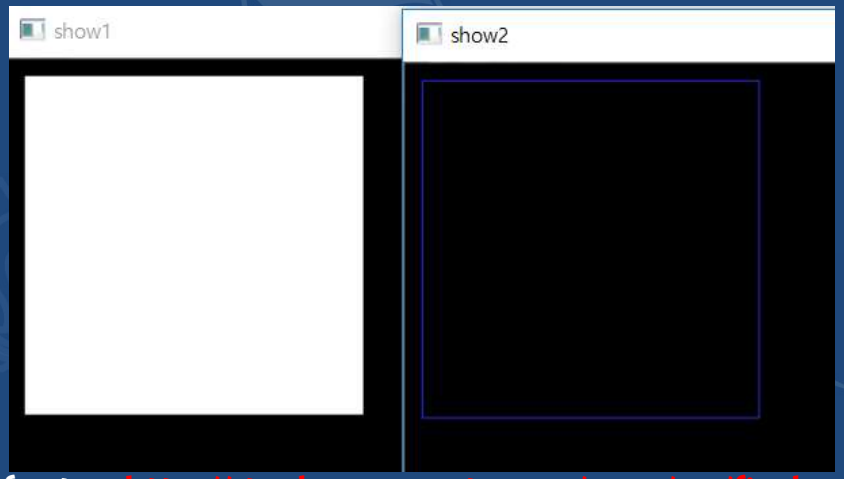


http://study.marearts.com/2016/07/opencv-drawing-example-line-circle.html
http://study.marearts.com/2014/03/opencv-study-write-text-on-image.html

Drawing

drawContours

- void drawContours(InputOutputArray image, InputArrayOfArrays contours, int contourIdx, const Scalar& color, intthickness=1, int lineType=LINE_8, InputArray hierarchy=noArray(), int maxLevel=INT_MAX, Point offset=Point())
- findContours input is only CV_8UC1 !!
- Note, After processing findContours, SRC is changed!!




```
////////////////////////////////////////////////////
//drawContour example1

cvtColor(img, img, CV_RGB2GRAY);
img.setTo(0);
rectangle(img, Rect(10, 10, 200, 200), CV_RGB(255, 255, 255), CV_FILLED );
imshow("show1", img);
waitKey(0);

Mat dst = Mat::zeros(img.rows, img.cols, CV_8UC3);


vector<vector<Point> > contours;
vector<Vec4i> hierarchy;

findContours(img, contours, hierarchy,
    RETR_CCOMP, CHAIN_APPROX_SIMPLE);

// iterate through all the top-level contours,
// draw each connected component with its own random color
int idx = 0;
for (; idx >= 0; idx = hierarchy[idx][0])
{
    Scalar color(rand() & 255, rand() & 255, rand() & 255);
    //drawContours(dst, contours, idx, color, FILLED, 8, hierarchy);
    drawContours(dst, contours, idx, color, 1, 8, hierarchy);
}

imshow("show2", dst);
waitKey(0);
```

Refer to : http://study.marearts.com/2018/05/find-contour-example-source-code.html

Mouse Event

- Mouse event
  - You can capture mouse event very easy using callback function.
  - “setMouseCallback” function is that callback function setting.

```
int main()
{
    // Read image from file
    Mat img = imread("anapji.jpg");

    //if fail to read the image
    if (img.empty())
    {
        cout << "Error loading the image" << endl;
        return 0;
    }

    //Create a window
    namedWindow("My Window", 1);

    //set the callback function for any mouse event
    setMouseCallback("My Window", CallBackFunc, NULL);

    //show the image
    imshow("My Window", img);

    // Wait until user press some key
    waitKey(0);

    return 0;
}
```

```
void CallBackFunc(int event, int x, int y, int flags, void* userdata)
{
    if (event == EVENT_LBUTTONDOWN)
    {
        //use x,y
    }
    else if (event == EVENT_RBUTTONDOWN)
    {
        //use x,y
    }
    else if (event == EVENT_MBUTTONDOWN)
    {
        //use x,y
    }
    else if (event == EVENT_MOUSEMOVE)
    {
        //use x,y
    }
}
```

Refer to : http://study.marearts.com/2016/07/opencv-drawing-example-line-circle.html

Mouse Event

- Mouse event
  - And many another events, so we can do various of application.
    - EVENT_MOUSEMOVE = 0,
    - EVENT_LBUTTONDOWN = 1,
    - EVENT_RBUTTONDOWN = 2,
    - EVENT_MBUTTONDOWN = 3,
    - EVENT_LBUTTONUP = 4,
    - EVENT_RBUTTONUP = 5,
    - EVENT_MBUTTONUP = 6,
    - EVENT_LBUTTONDBLCLK = 7,
    - EVENT_RBUTTONDBLCLK = 8,
    - EVENT_MBUTTONDBLCLK = 9,
    - EVENT_MOUSEWHEEL = 10,
    - EVENT_MOUSEHWHEEL = 11

Mouse Event application

- Mouse event in video
  - http://study.marearts.com/2015/03/to-save-mouse-drag-region-to-image-file.html
  - http://study.marearts.com/2014/05/opencv-study-setmousecallback-function.html
  - Les't review this code with me.

- Assignment #1, draw line : Coding for Drawing on image with the Mouse

Control in opencv

- Trackbar
  - Very simple
  - Create callback function using “createTrackbar” function
  - g_slider value captured when value is changed in on_trackbar
  - g_slider value can use any line in code, because the variable is global.

```
01 #include "opencv2/opencv.hpp"
02 #include < iostream>
03 using namespace cv;
04 using namespace std;
05
06
07
08
09 int g_slider; //slider pos value
10 int g_slider_max; //slider max value
11
12 void on_trackbar(int, void*)
13 {
14  printf("%d\n", g_slider);
15 }
16
17 int main()
18 {
19
20  // Read image from file
21  Mat img = imread("anapji.jpg");
22
23  //set
24  g_slider = 0;
25  g_slider_max = 100;
26
27  //window name
28  namedWindow("My Window", 1);
29
30  //make trackbar call back
31  createTrackbar("TrackbarName", "My Window", &g_slider,
    g_slider_max, on_trackbar);
32
33
34  //show the image
35  imshow("My Window", img);
36
37  // Wait until user press some key
38  waitKey(0);
39 }
```

http://study.marearts.com/2017/01/opencv-trackbar-exmaple-source-code.html

Control in ope

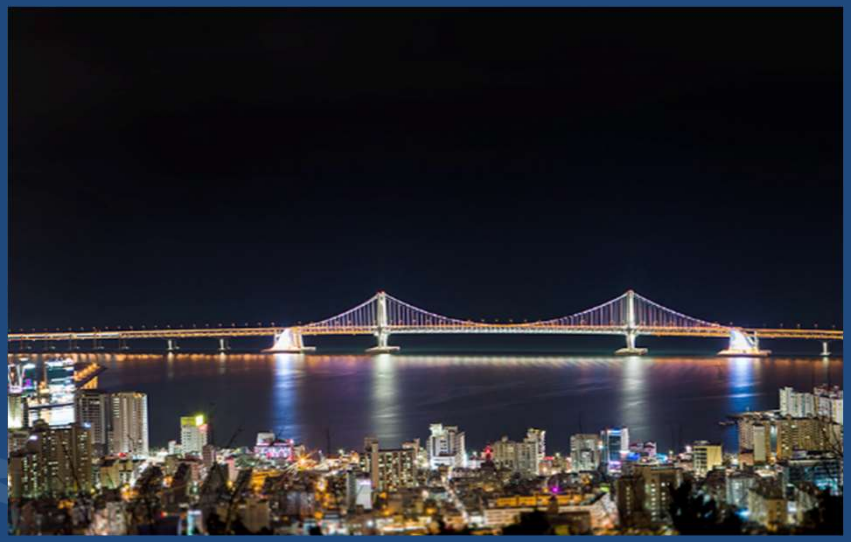
- Trackbar application in video
  - Check this code
  - What is the role of on_trackbar?
  - But function in Canny g_slider value, why use it?

```
#include "opencv2/opencv.hpp"
#include < iostream>
using namespace cv;
using namespace std;

int g_slider; //slider pos value
int g_slider_max; //slider max value

void on_trackbar(int, void*)
{
 printf("%d\n", g_slider);
}


int main()
{
 Mat edges;
 VideoCapture cap = VideoCapture(0);

 if (!cap.isOpened()) return -1;
 //set
 g_slider = 0;
 g_slider_max = 255;
 namedWindow("edges", 1);

 //make trackbar call back
 createTrackbar("TrackbarName", "edges", &g_slider,
g_slider_max, on_trackbar);

 for (;;)
 {
  Mat frame;
  cap >> frame; // get a new frame from camera
  cvtColor(frame, edges, CV_BGR2GRAY);
  GaussianBlur(edges, edges, Size(7, 7), 1.5, 1.5);
  Canny(edges, edges, g_slider, 30, 3);
  imshow("edges", edges);
  if (waitKey(30) >= 0)
 break;
 }

 return 0;
}
```

http://study.marearts.com/2016/07/opencv-30-trackbar-simple-example-in.html

Thank you.

- See you later
  - Do not forget your assignment!!
  - I will miss you very much!!



Night view, Mountain hwangryeong