# HOMEWORK 1

## A. Working with images and the mouse (30 pts)

### 1. Purpose and Required Functionality

Using OpenCV, your goal is to create a user interface (**UI**), which enables selection of a rectangle shaped area in an image, using the mouse.

**Selection**: is defined here, by marking a rectangle with the mouse with some visual feedback (e.g. as selecting an area in MSpaint).

Two options for the action should be performed, once an area is selected (you may select your favorite one):

**Option 1:** Once selection is done, the marked rectangle will contain that part of the original image, while the rest of the image will become black.

**Option 2:** A second image will show the above, while original image is only marked with the rectangle.

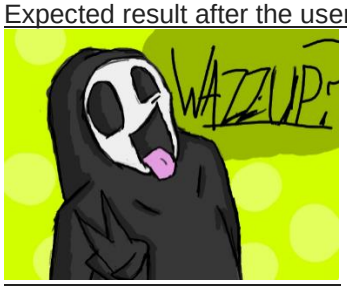
You may use any input you like (an image / a video file / live camera feed)

### 2. Some relevant functions:

```
setMouseCallback("Image",OnClick, &box); // sets a callback on the window called "image"

rectangle(img, …); // draws a rectangle on 'img'

void OnClick(int event, int x, int y, int flags, void* userdata) // the mouse callback
{
switch(event){
        case CV_EVENT_MOUSEMOVE:
        if(drawing_box){
        }
        break;

        case CV_EVENT_LBUTTONDOWN:
        drawing_box = true;
        break;

        case CV_EVENT_LBUTTONUP:
        break;
}
```

### 3. Sample Results

Expected result after the user clicks again:




## B. Background subtraction (50 pts)

### 1. Purpose

The purpose of the exercise is to separate an object from the background. The input source will be either a video clip, or a camera's live video feed. The background in this HW should be relatively constant or slowly changing, generated by a real camera, and not computer graphics software.

### 2. Required Functionality

You should implement the background subtraction algorithm (will be explained in class). In class we shall work on a sample clip. For your homework you may separate

### 3. Bonus points:

- (+10%) Working in real time with the camera (=8 points to your HW1 grade)
- (+5%) Working with color images (instead of gray) (=4 pts to your HW1 grade)

## C. Write a project report (20 pts)

You should summarize your work by writing a report according to the submission instructions.

**Extra points:** Publishing online / creating a video clip of the results.

If applicable, publishing online will give 5 extra points, for the first online published submission, of each student.

Alternatively, if full online publication will not be applicable, the best video clip, summarizing each HW, as voted by the class and the course team, will get a bonus of 5 points to the relevant student.

## Submission Instructions

In order to understand how to submit correctly, please take a look at the submission instructions document.

The exercise must be completed per the date published online. Submission will automatically be closed 3 days after the due date, as detailed next.

Late submission is not allowed, unless pre-approved by the course team. Late submission will lose 10% per day, max 3 days of late submission. (Authorized late submissions due to justified reasons are not penalized – please pre-approve).

If time permits, results will be reviewed during the lab hour, 2 weeks after the current lab. If published online, the 2 best projects will be voted in class. Participation in online publishing is recommended, but not mandatory.

## Good Luck!

**Credits:** Originally Written by Alon Biran; Edited and modified by Dr. Eyal Katz.