

# CS4320/5314 – Artificial Intelligence

Spring 2009

Lab # 5

## Computer Vision

Due electronically before 11:59 p.m., May 1, 2009

The main objective of this lab is to understand basic concepts of Computer Vision working with a simple application in OpenCV.

1. The file **Sobel.cpp** includes an OpenCV program to detect edges using the Sobel operator. The code uses two implementations of the Sobel operator and also uses the `cvSobel` function that is included with OpenCV. The first implementation uses *indirect access* and the second uses *direct access using a pointer*. Given the input image, the program will display the edge image for the three implementations; using different pixel access and the OpenCV implementation. Also, it will display the running time for each implementation. You have to compile the Sobel.cpp code using any C/C++ compatible compiler and comment about the different pixels access modes and the running time of each implementation.

Note: The Sobel.cpp program can apply the Sobel operator to a single image or apply the operator over a video stream from a webcam. You can use any webcam that is working in windows for that purpose.

You can find information about the different pixel access modes in OpenCV in:

<http://www.cs.iit.edu/~agam/cs512/lect-notes/opencv-intro/opencv-intro.html>

2. Write a program in OpenCV for a basic motion detection system. The motion detection system will be based on computing the difference between a background model and the current frame in a video sequence. To detect objects in motion (see Fig. 1b) you have to compute the difference between the current image in the sequence and your background model. If the resulting image is all black or almost black (see Fig. 2a), it means that there is no motion in the scene. After detecting an object in motion you have to display where the object is using a bounding box, as shown in Fig. 3. The background model can be the average image of first 10 frames (images) from you webcam, the 10 frames must not include objects in motion. You can base your program on the **Sobel.cpp** code that includes the video streaming part.

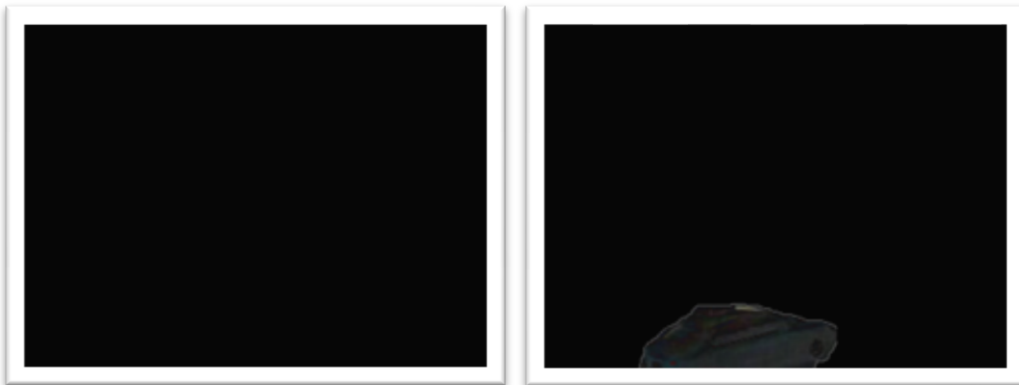
For help with openCV, contact Geovany Ramírez, [geoabi@gmail.com](mailto:geoabi@gmail.com)



(a)

(b)

Fig. 1. (a) Background model. (b) A frame with a new object.



(a)

(b)

Fig. 2. (a) No objects in motion. (b) One object in motion.



Fig. 3. A bounding box indicates the location of an object in motion.