Assignment 2 – Feature Extractions.

This Assignment will be graded. So hand in your work on time.

In this homework assignment, you will be asked to use the Canny Edge Filter first and then the Hough transform. feature extraction on the result. Please watch this demo here. It gives a better explanation comparing to what you saw in the classes about Hough transform.

Canny Edge Detector. Task 1:

Perform a canny edge operation on the picture shown in Figure 1. Make sure that all noises will be removed using i.e. dilate, erode etc. Please show and comment your results. Show also your source code.

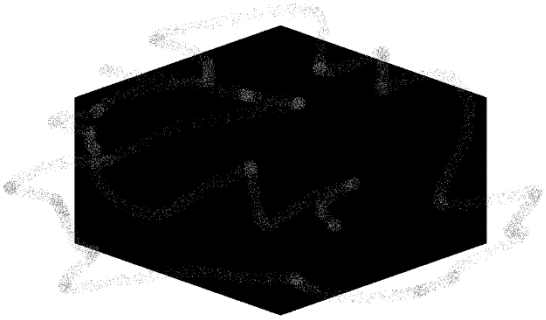

Figure 1 Original object

Hough Lines. Task 2:

a. Create an application to detect lines using the Hough transform. Your result might look like the image as shown in Figure 2

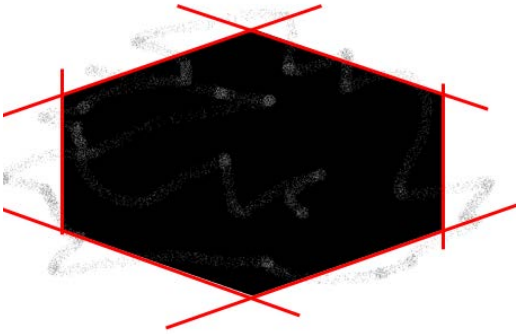

Figure 2 Output Image Hough Lines

Please notice the red lines are the results of the Hough transform. See also example in OpenCV documentation on internet.

b. Hough transform (Hough Lines) is useful to detect parametric objects. In this task, you will be asked to calculate the intersections of the lines found in task a, also seen in *Figure 3* as an example. The pixel coordinates of a, b and c should calculated.

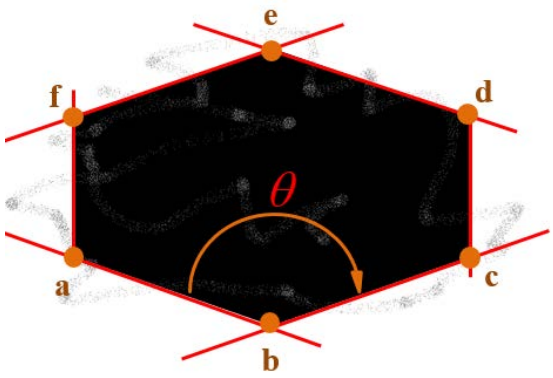

Figure 3 Line Intersections

c. Calculate the angle θ in degrees of the intersection as shown in Figure 3.

(Hint : using dot product of two vectors.)

Your results for the coordinate's values of a, b and c and angle θ [in degrees] must be visible in the Output Image or beneath the Output Image. Please comment your results.

Hough Circles Task 3

a. Please read the tutorial carefully as shown here by clicking and create a program using Hough Transform for Circles on the images "EuroCoins.jpg" and "EuroCoins2.jpg". These images can be found on Canvas.

Figure 4 EuroCoins

Figure 5 EuroCoins2

You are free to discuss with other students, but you hand in your own original material. Don't forget to include your name, maximal 2 students per assignment.

This assignment must be handed in on a separated **pdf** or **word** document with the sources, results, comments, and conclusions, and a compressed file with all your materials. A demo is required!

There are two Demo's available (for Windows) on Canvas e.g. CannyEdgeDetector.exe and LineDetection.exe both both compressed in a .rar file. Use: `<application.exe> <file.avi> |<file.wmv>.` The demo application will use your camera if you execute the demo without parameter.