

Student name: _____ **Total mark:** _____ / 8

Student number: _____ **TA signature:** _____

Lab5: Image segmentation and classification:

A goal of this lab is to count the number of objects in the image.

Instructions

- Print and bring this lab sheet to the lab.
- **Prior to the lab, see:** <http://www.mathworks.com/help/images/examples/correcting-nonuniform-illumination.html>
- Complete all three parts of the lab below following the instructions.
- Answer all questions using complete sentences in the boxes provided. Answers may be typed or hand-written **legibly**. You may exceed the box size if necessary.
- Before leaving the lab, give the completed lab sheet to the TA.
- If you have any questions, or get stuck please do not hesitate to ask the TA for assistance.

Download “lab5a.tif” and “lab5b.tif” from the course website in cuLearn. Display the images. Notice that the objects in these images are represented by the dark intensity and background by the bright intensity.

In each task below, **explain** and **justify** the image processing techniques, filters, masks, and/or structuring elements that you used.

Part I [1 mark]: _____ / 2

Perform the following tasks with “lab5a.tif”.

- a) Segment the image by thresholding to create a binary image. What is the threshold value you use and why? Be as specific as possible.

- b) Identify and remove undesired features in the image to have a final binary image.
c) How many objects do you have?

Number of Objects = _____

Part II [1 mark]: _____ / 1

Perform the following tasks with the segmented image obtained in Part I.

- a) Label the objects with different colors.
- b) Compute the area of each object and create a histogram of the object area distribution. **Attach or Insert your histogram**

HISTOGRAM

Part III [1 mark]: _____ / 5

Perform the following tasks with “**lab5b.tif**”. This image contains noises.

- a) Perform Part I with this image. Does it work? Why?

- b) What type(s) of noises in this image? Justify your answer. *Hint: Compare the histograms of lab5a.tif and lab5b.tif.*

- c) Remove the noises. What denoising technique do you use and why?

d) Perform Part I with the denoised image. Is the number of the objects same in Part I

Number of Objects = _____

e) Perform Part II with the denoised image. Is the histogram of the object area distribution the same in Part II? **Attach or insert your histogram.**

HISTOGRAM