UNIVERSITY OF MINNESOTA
DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

5561 **COMPUTER VISION** **SPRING 2016**

PROGRAMMING ASSIGNMENT 3 (70 points)
Assigned: 4/05/16 Due: 4/28/16

The programming assignment 3 asks you to build a major component of a simple object recognition system. If you use Matlab v4, apply your code to the reg3.gif and reg4.gif images. If you are using Matlab v5 and above, use reg3.jpg and reg4.jpg instead. All of these images can be found at the class website. The assignment consists of the following problems:

- Histogram the intensity values of each image (15 points). Write a program that sets an appropriate intensity threshold for each image by analysis of the histogram. Hint: begin by smoothing the histogram, replacing each element by the sum of itself plus its two (or more) neighbors. Turn in a description of how you select thresholds. For each image (reg3 and reg4), tell what threshold value is selected.

- Connected region extraction (35 points). Write a program to perform connected region extraction, using any algorithm you desire. Hint: the simplest flood-fill method and the simple raster-scan method with partial regions are the two algorithms easiest to program. Turn in a description of your algorithm (describe any possible problems); show each individual resulting region for reg4 in a separate image file (turn in a hardcopy of the individual images or give us the URL of your images).

- Computation of blob statistics (20 points). Write a program to compute blob statistics for each object of each image. Make sure that you include at least the following statistics: MBR, centroid, number of holes, area, area of holes, perimeter, and elongation ($P^2/Area$). Add any additional features you desire, such as perimeter and elongation of approximating polygon, or whatever thing you may think of. Turn in a list of the features you are computing; list the values of all features for each object in each of the images reg3 and reg4.

Moreover, you must provide a one page discussion of the results. AVOID USING THE MATLAB BUILT-IN FUNCTIONS. Your grade in this case will be reduced. Finally please submit everything through moodle (including copies of your code and your write-ups) as well.

You should do the assignment in stages. Please do not waste paper by printing continuously images. View first the results at the IT machines and when you are sure that they are correct, print them and submit the materials through moodle. I suggest you to use MATLAB. For the three problems, it is essential to provide screendumps or a URL to check your results.