CSCI 8820 Computer Vision and Pattern Recognition

Assignment 1, Due February 19, 2021 (Friday) by 11.59pm (23:59 EST)

For the test image **B** carry out the following operations

1. Threshold the image using threshold value **T** = 128 to generate a binary image $\mathbf{B_T}$.
2. Determine the connected components in $\mathbf{B_T}$ using the *iterative* connected component labeling (CCL) algorithm. The inputs to the iterative CCL algorithm are:
    a. The binary image $\mathbf{B_T}$.
    b. The minimum size specification for the component in terms of the number of pixels it should contain (i.e., size filter parameter).

    The outputs of the algorithm are:
    a. The total number of components that meet or exceed the minimum size specification.
    b. A description of each component in terms of
        (i) The component size i.e. area.
        (ii) The location of the centroid.
        (iii) The coordinates of the bounding box.
        (iv) The orientation of the axis of elongation.
        (v) The eccentricity, perimeter and compactness.
    c. A graphical display **C** of the components where the pixels belonging to a certain component are assigned a unique gray level or color.

When submitting the assignment include the following:

1. A well documented hardcopy of the source code.
2. Hardcopies of the images **B** and $\mathbf{B_T}$.
3. Hardcopies of the images **C**, for three values of the minimum size specification (i.e., size filter parameter) along with a description of the components in **C**.
4. Comments on the results obtained in each case. In particular, comment on the tradeoff involved in the selection of the size filter parameter.
5. Upload all the above items as a **single PDF file** to the specified ELC dropbox.

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Instructions Regarding Assignments

1. The assignments are to be done individually. Only the final project is potentially a group project.
2. The image file can be downloaded from http://cobweb.cs.uga.edu/~suchi/comb.img. This file is also available on ELC in the *Images* subfolder within the *Assignments* folder. This file is a gray-scale image file of 512 × 512 pixels with 8 bits per pixel (essentially a file of unsigned characters). There is a 512 byte header in the front which needs to be stripped off before you store the image in a 2D array of unsigned characters.
3. You may convert the 2D array of unsigned characters to any other format for the purpose of further processing, display or printing. You may use public domain software such as *ImageMagick* (http://www.imagemagick.org) for this purpose. Note that there are several other publicly available software packages that possess similar functionality.