LAB 1 - OBJECT COUNTING ON IMAGES

Aims

Apply the different concepts of morphological processing for object counting on a blood cells image.

Required tools

The Image Processing Toolbox of Matlab or Python Image Library.

Load and show the image

1. Read the image *bloodcells*
2. Transform this image into a binary image *BW* using a thresholding process or a dedicated function of Matlab or Python.
3. Show the two images with titles within the same figure.
4. The morphological operator operates on the white pixels in the binary image. What do you observe on the image? What's the solution of this problem?

Erosion

5. Open and study the help page of the erosion function.
6. Choose your appropriate structuring element SE (shape and size) and justify your choice.
7. Apply the erosion operator on the binary image BW
8. Repeat the operation with 3 different sizes of SE.
9. Visualize the obtained results.
10. Discuss the results and explain the observed differences.

Dilation

1. Open and study the help page of the dilation function.
2. Choose your appropriate structuring element SE (shape and size).
3. Apply the dilation operator on the binary image BW.
4. Repeat the operation with 3 different sizes of the SE.
5. Visualize the obtained results.
6. Discuss the results and explain the observed differences

Improuvent

7. Are erosion and dilation operators sufficient to extract all the cells with a good precision? Which solution do you propose to improve the segmentation results?
8. Give a solution and test it on your image.

Label connected components and counting

9. Find the appropriate function for labeling the image objects.
10. Use this function to label the segmented objects obtained after the enhancement step.
11. How many cells did you obtain?
12. Show the labelled cells using different colors.
13. Extract the contours of all the segmented cells and superimpose them on the original image.
14. Open and study the help page of the *regionprops* function of Matlab or the equivalent function on Python.
15. Use this function to perform three measurements on one or more objects (areas, perimeter…)
16. Show in one figure the largest cell and on another figure the smallest one.