SEGMENTATION

1. The pipeline for quantitative analysis of materials consist of following steps (in random order): meshing, reconstruction, simulation, segmentation, scanning. Which place in this pipeline is segmentation normally placed in? Answers: 1,2,3 (correct),4,5.
2. Image analysis and segmentation is: a) a standard pipeline, which should be performed unchanged regardless of the characteristics of the imaged sample, b) data driven step which depends on the characteristics of the imaged sample, c) a step largely independent of other steps in pipeline (e.g. reconstruction and simulation), d) a step where you should consider how images were created (e.g. scanning and reconstruction) and how segmentation results are going to be used (e.g. meshing and simulation).
3. Image formate: tif, png, jpg
4. Dynamic range: Your volumetric data is saved as uint16 files. You inspect your images and notice that the smallest intensity value is 8, and the largest intensity value is 159.
5. Histogram – what does it show? Or make and image and 4 histograms. Which matches the image?

CHECK NOTEBOOK

SEGMENTATION STRATEGIES

1. Which information is useful for segmentation? Low level information: Intensity, texture, boundary. Information about the imaged object: size, shape, directionality.
2. What is the most common segmentation strategy, which is usually the first approach you should try? Computing local features, edge-detection, thresholding?
3. Show histogram. Which threshold?
4. Your thresholding gives an outcome shown in the image (show noisy outcome). What can you do to improve this result? Choose a better value for the threshold. Remove image noise by filtering before the thresholding. Improve the result by applying morphological filtering after thresholding. Remove small isolated speckles using connected component analysis.

NEXT

1. You inspect your data and observe serious ring artifacts.
2. You inspect the image and make a histogram of pixel intensities (show image with strong bias field). What would be your approach to segmentation? Threshold, remove noise and threshold, remove bias field and threshold, remove noise and bias field and threshold.
3. You inspect the image and make a histogram of pixel intensities. What would be a reasonable threshold value?
4. You inspect the image and make a histogram of pixel intensities (show image with strong Gaussian or s&p noise) *Maybe those should just be recongnition of noise, bias field, ring artifacts…*
5. You obtained following segmentation of xxx, and you want to compute the area of each xxx. Which methodology could you use to achieve this? Morphological filtering, Gaussian filtering, bias field removal, connected component analysis.
6. You are given a following image and you need to identify the lines.
7. You obtained following segmentation of xxx and you want to remove the small and spurious segments. What do you do?
8. You need to characterize the fibers. Which parameters would you choose?
9. You obtained a following segmentation and you need to compute the length of the perimeter of your object. How could you approach this?