

Root segmentation in 3d tomography images

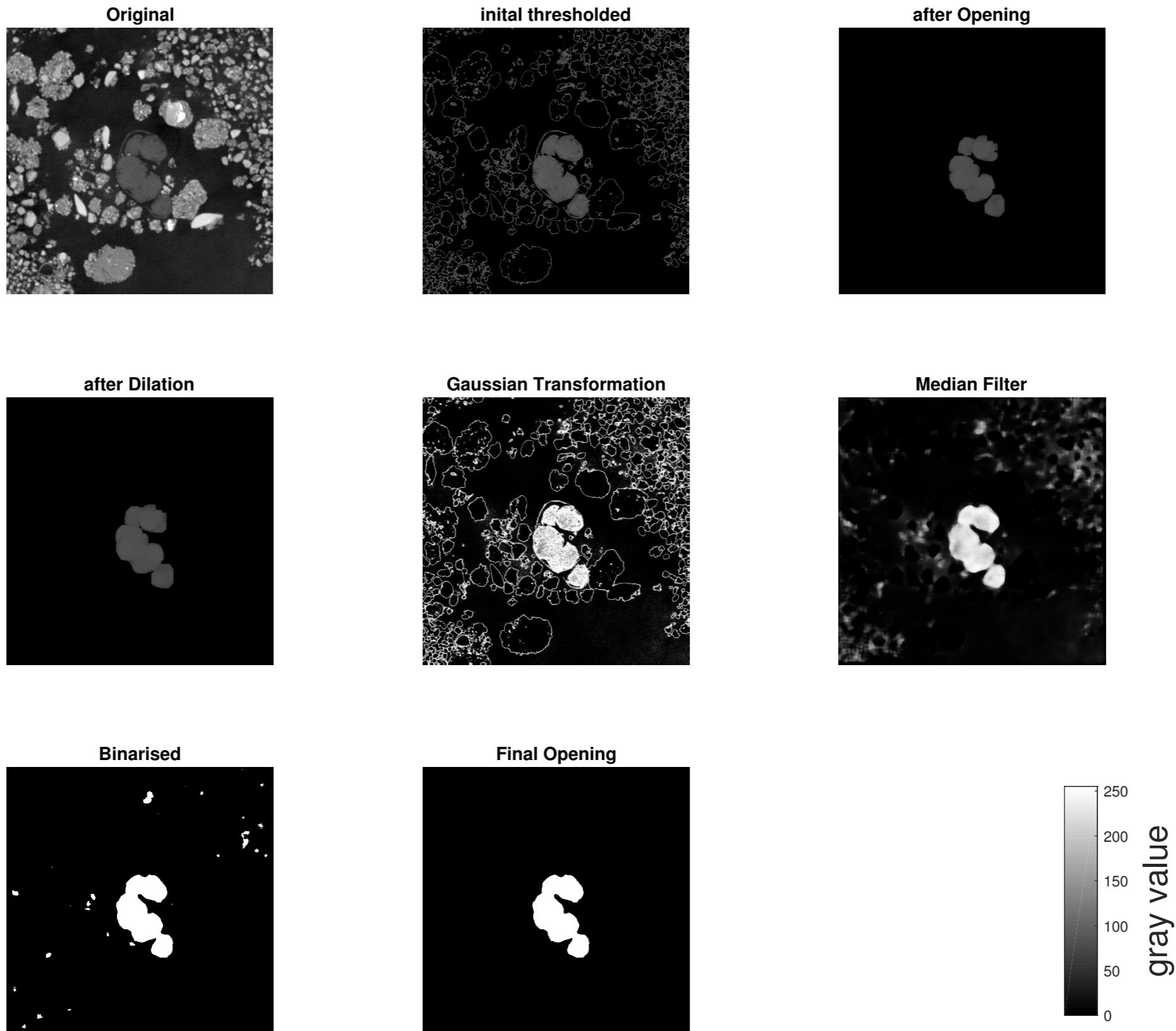
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Tom Shearer, Tom from Birmingham, Clare Ziegler, Florian Klimm
(in no particular order)

Problem description

Outline of the algorithm

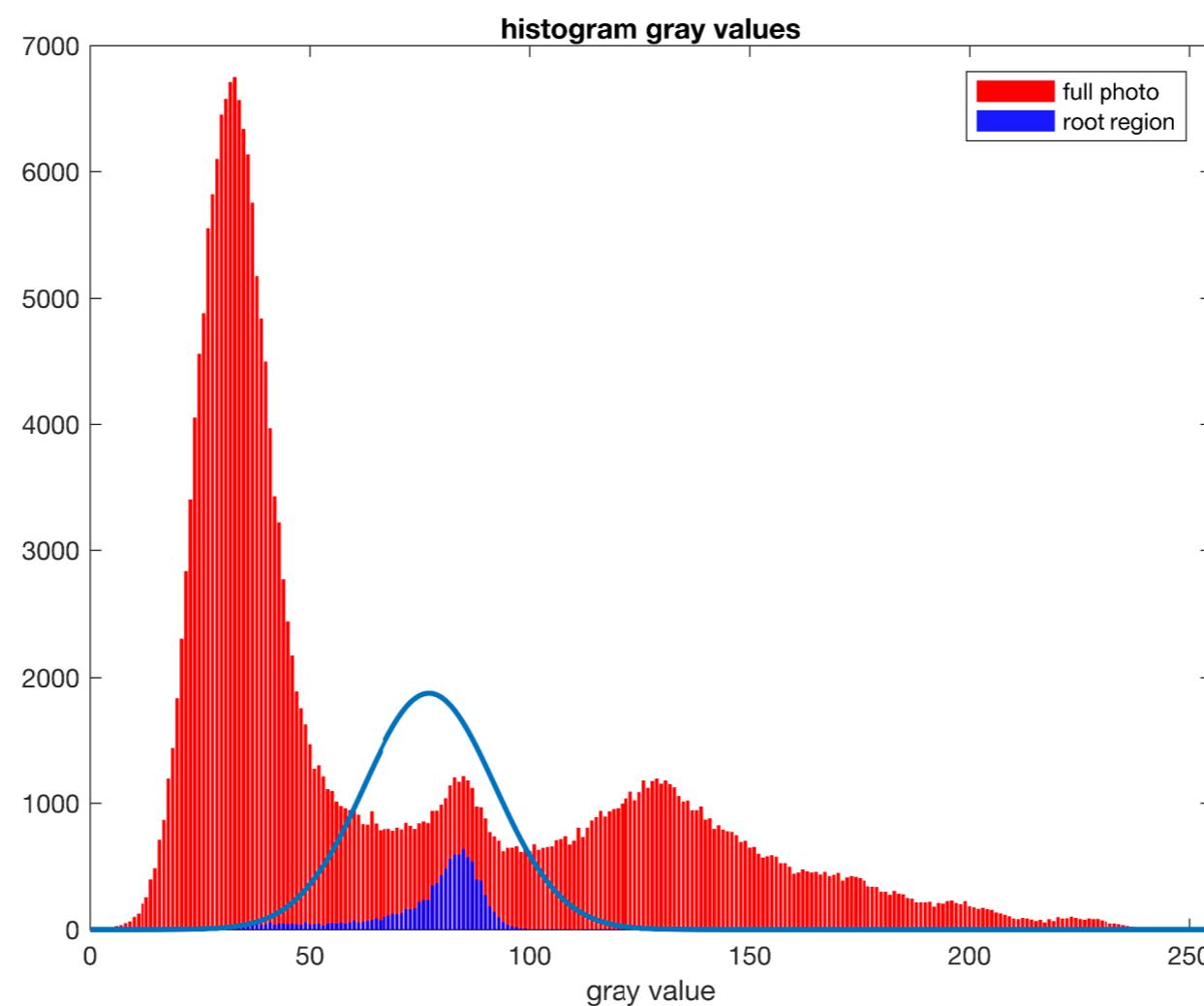
- 1.Detection of roots in the first layer
- 2.Iterative detection of roots in the following layer in the surrounding of the last layer
- 3.'Cleaning' of the 3d detected structure

Detection of roots in the first layer

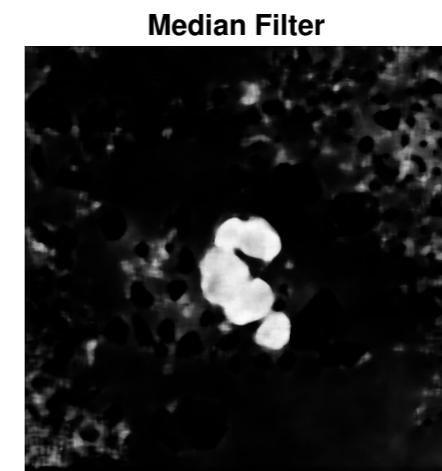
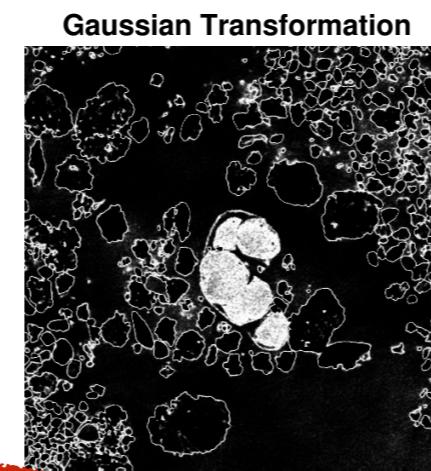
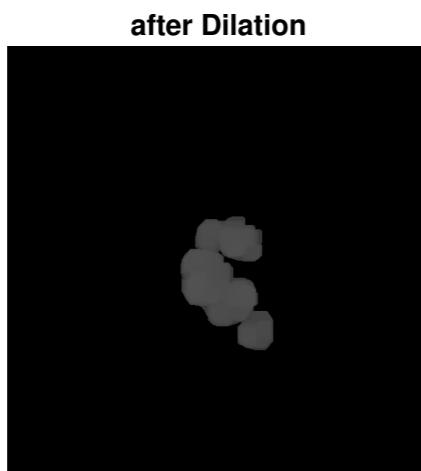
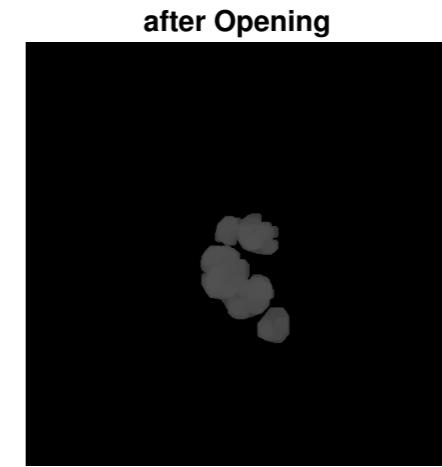
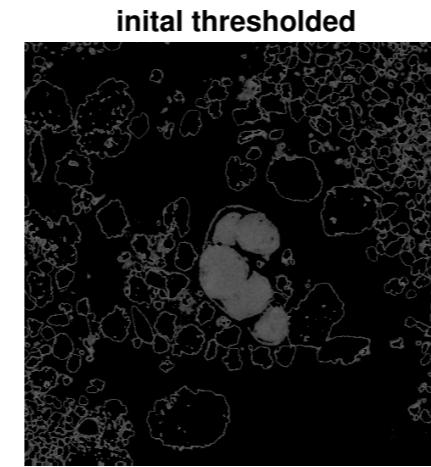
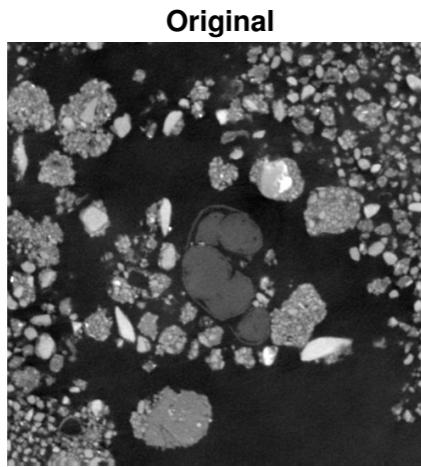


Gaussian Transformation

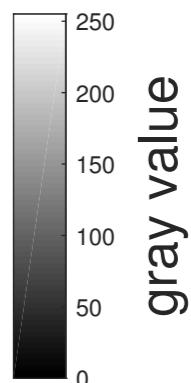
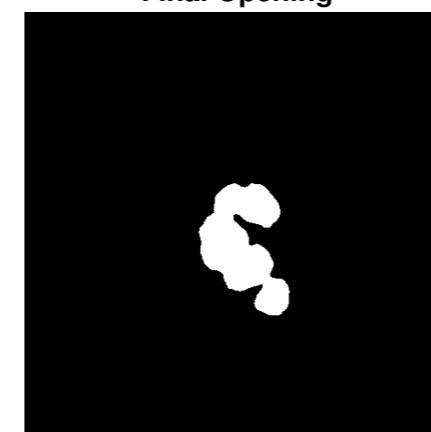
GaussianTrans(Picture,AreaOfInterest) -> Cleaned Image



Detection of roots in the first layer

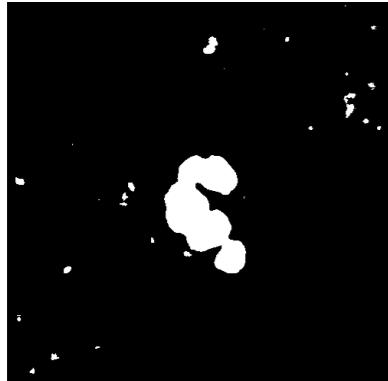


Remove outliers

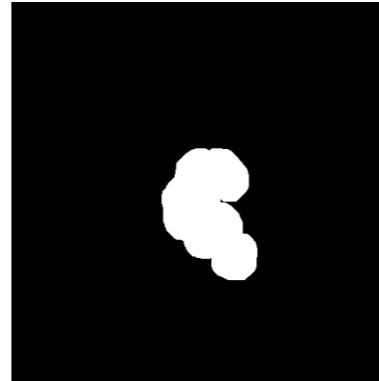


Now: Iterative detection in the following layer

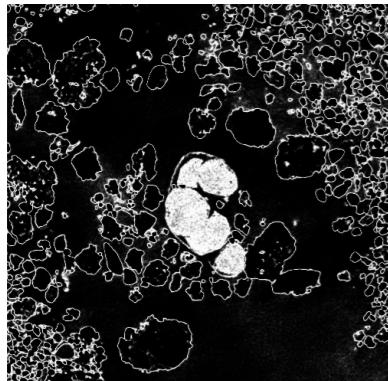
Binarised layer above



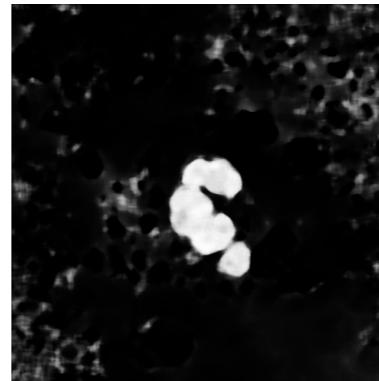
Binarised layer above, dilated



Gaussian Transformed second layer



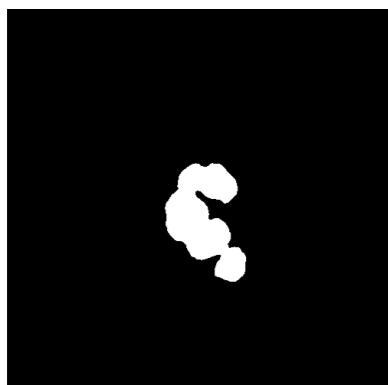
Median Filter



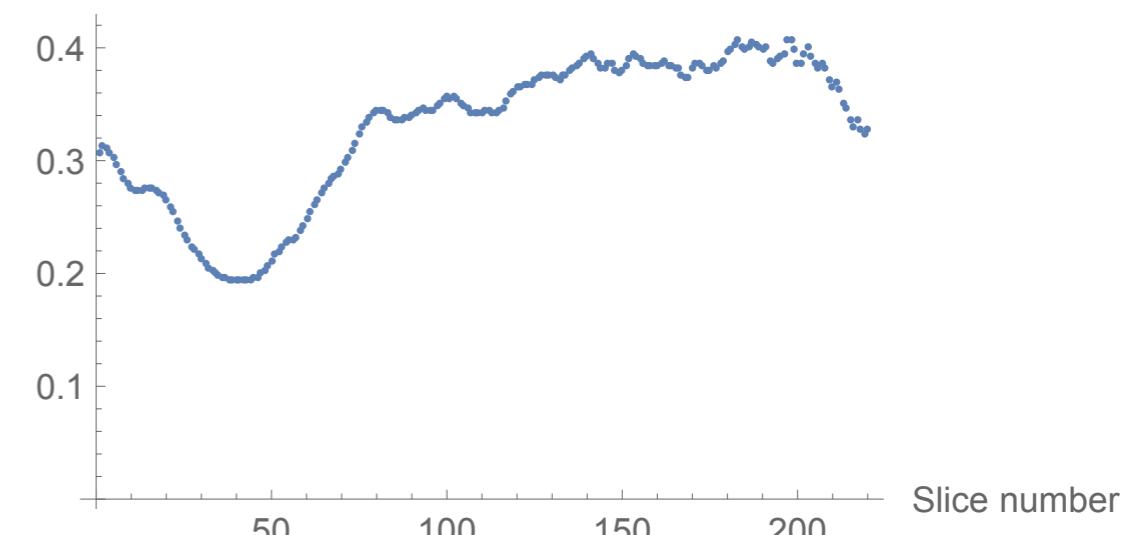
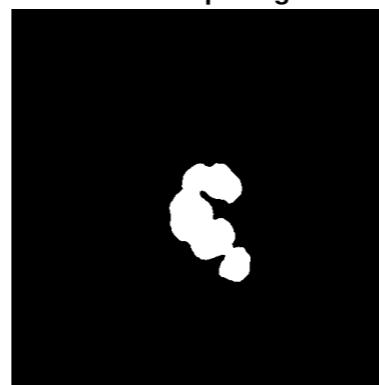
- take the detected roots from the slice above
- look in its surroundings in the next layer
- adopt the gray scale

Average grayscale value of root

Binarised

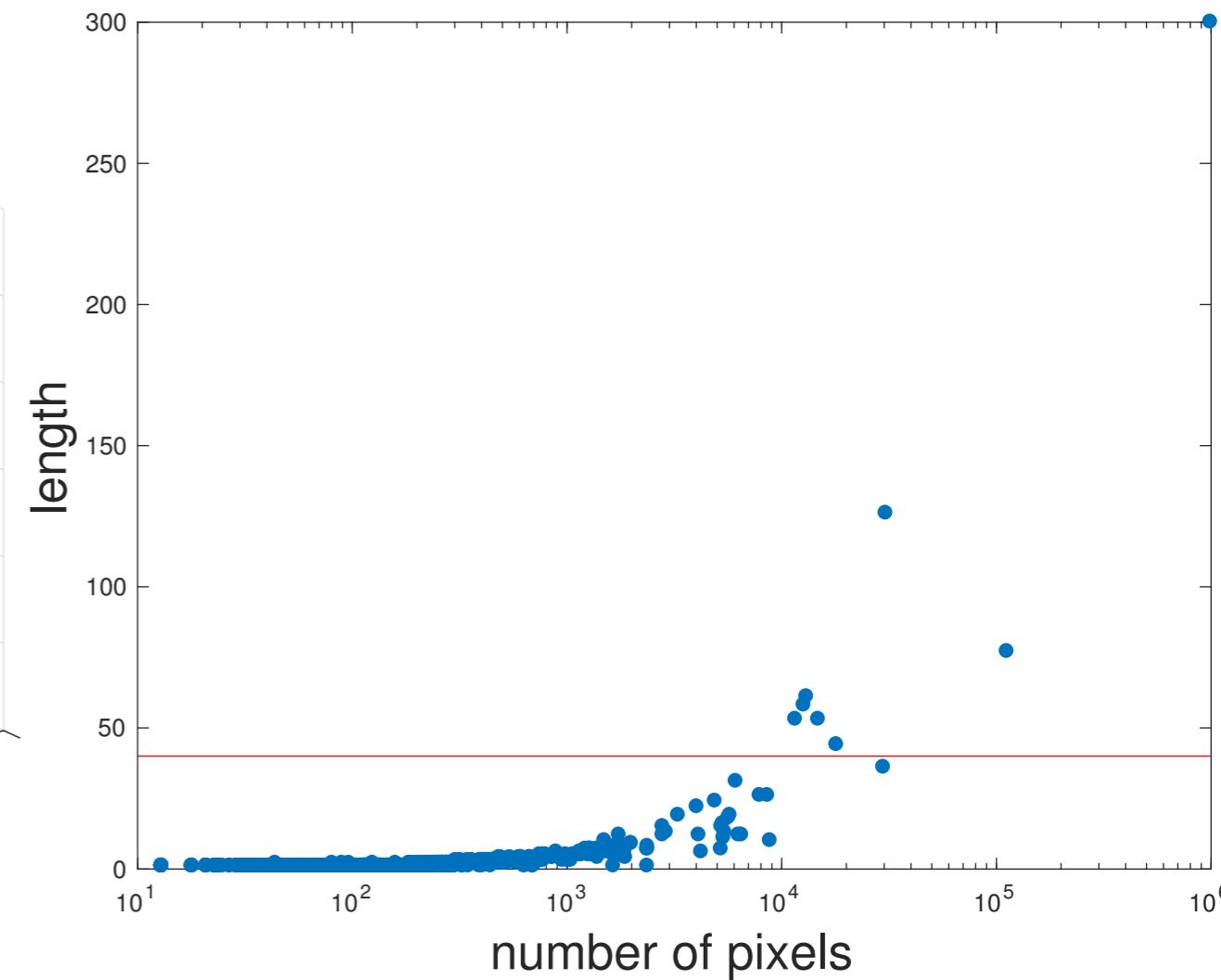
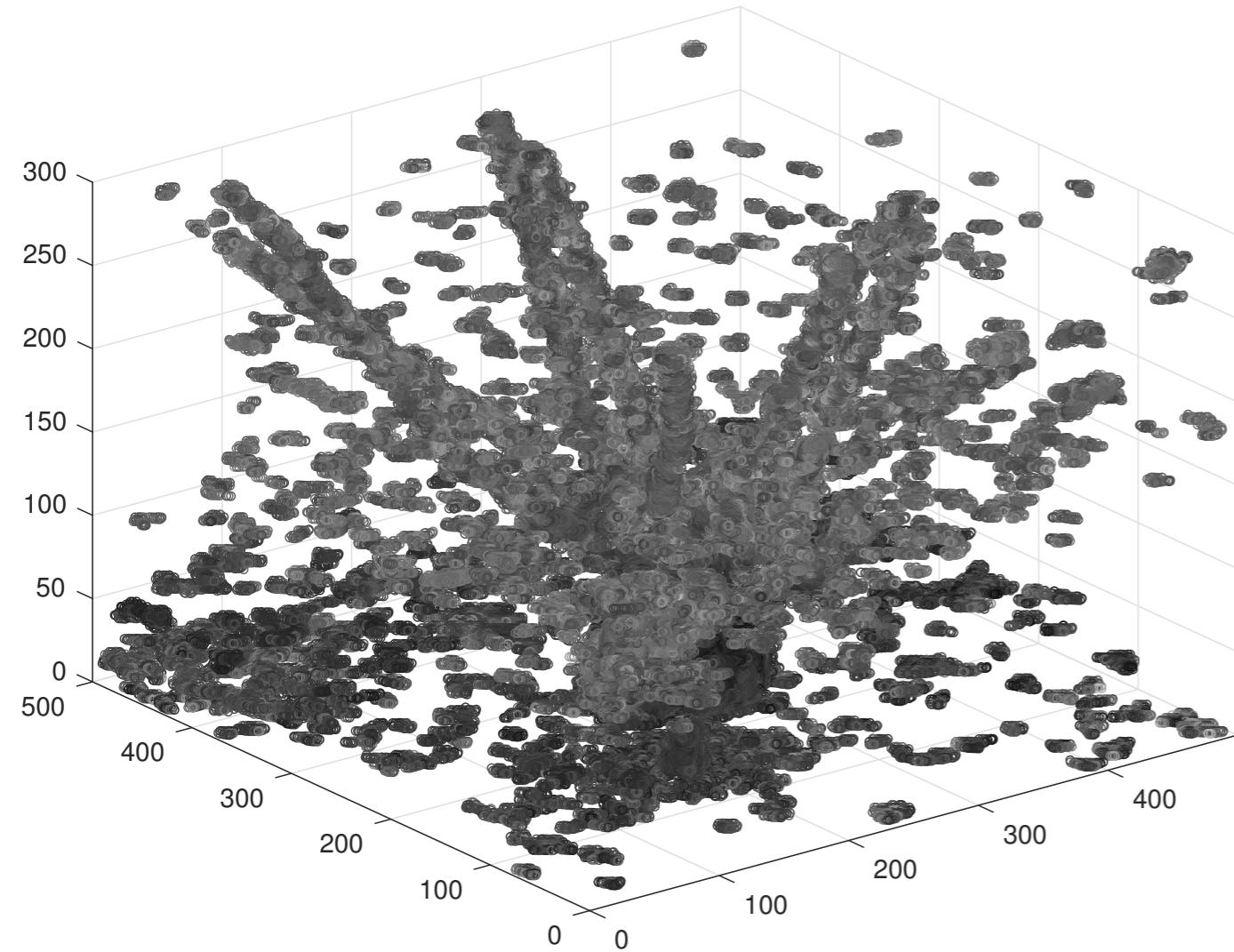


Final Opening



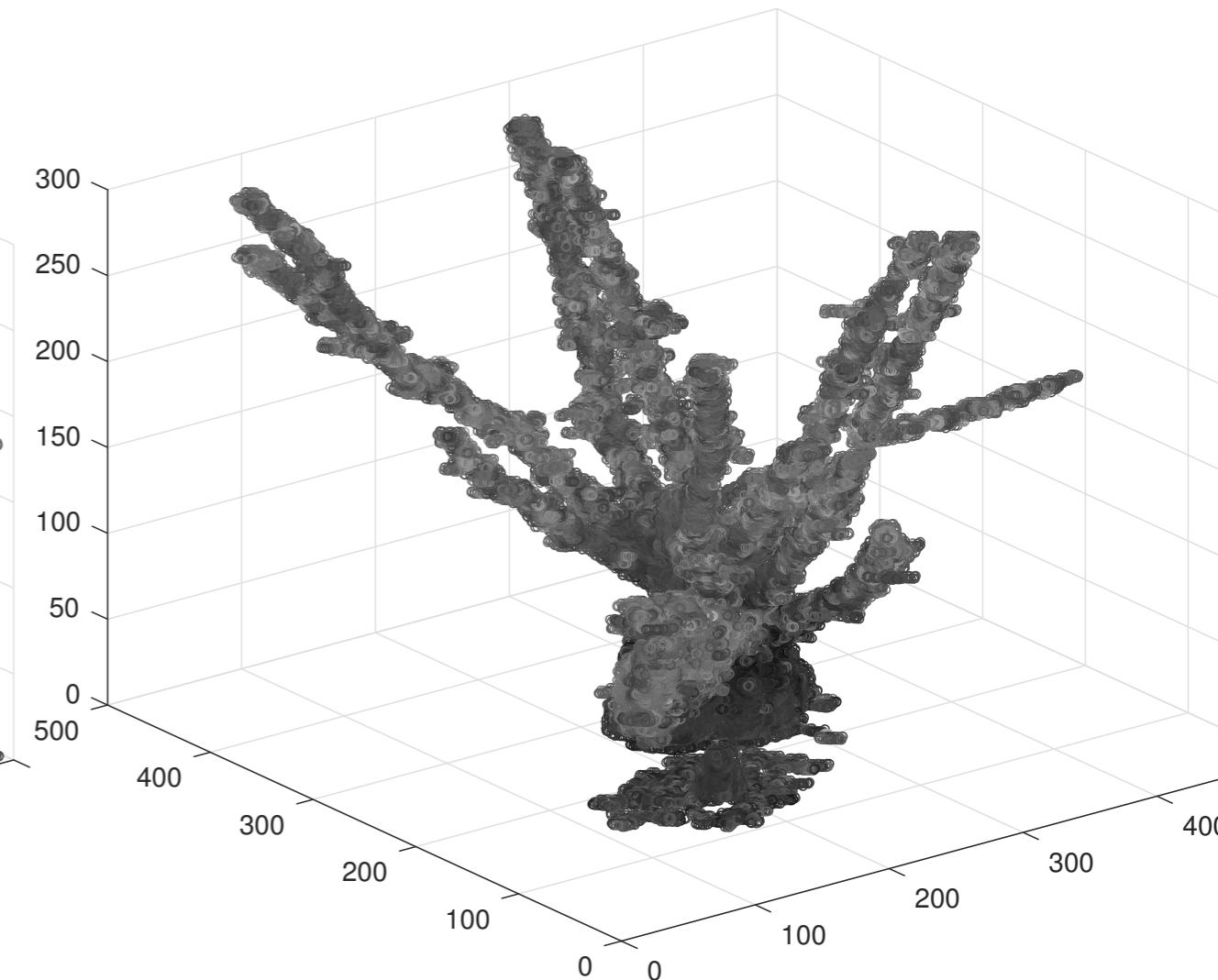
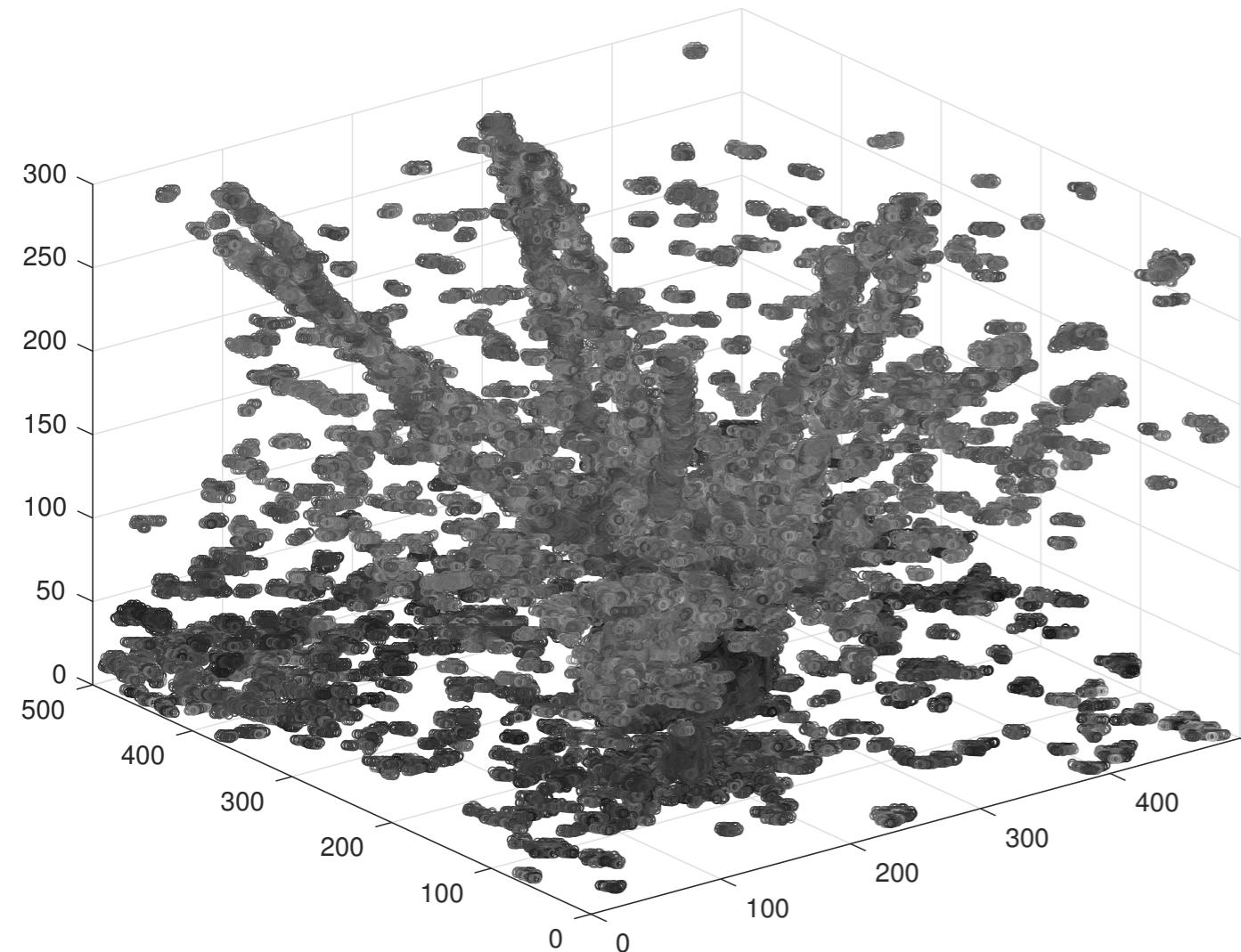
Post-processing

(we want to remove detected blops that are not part of the roots)



Post-processing

(we want to remove detected blops that are not part of the roots)



Video

It works pretty good for the three days



Only the thresholding parameters in the first slice were adopted (takes 1 min)

Conclusion

- We created a root detection algorithm that seems to work fairly well
- there are tons of free parameters that have to be adopted by user input
- ‘cleaning’ of result afterwards might be necessary

