Supplementary Materials for 'Context Aware Spatio-temporal Cell Tracking In Densely Packed Multilayer Tissues'

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Contents

In this supplementary, we provide the raw confocal images that are used for generating spatio-temporal tracking results in Fig. 9 of the main manuscript.

We also provide a detailed analysis of the results obtained by using the Watershed segmentation algorithm on confocal images of variying SNRs. For high SNR and low SNR example images, we provide the Gaussian blurred images, h-minima transformation and Watershed segmentation results for optimal values of 'h' and some other bad (non-optimal) 'h' values to show the effect of optimal h-minima selection.

*Corresponding author
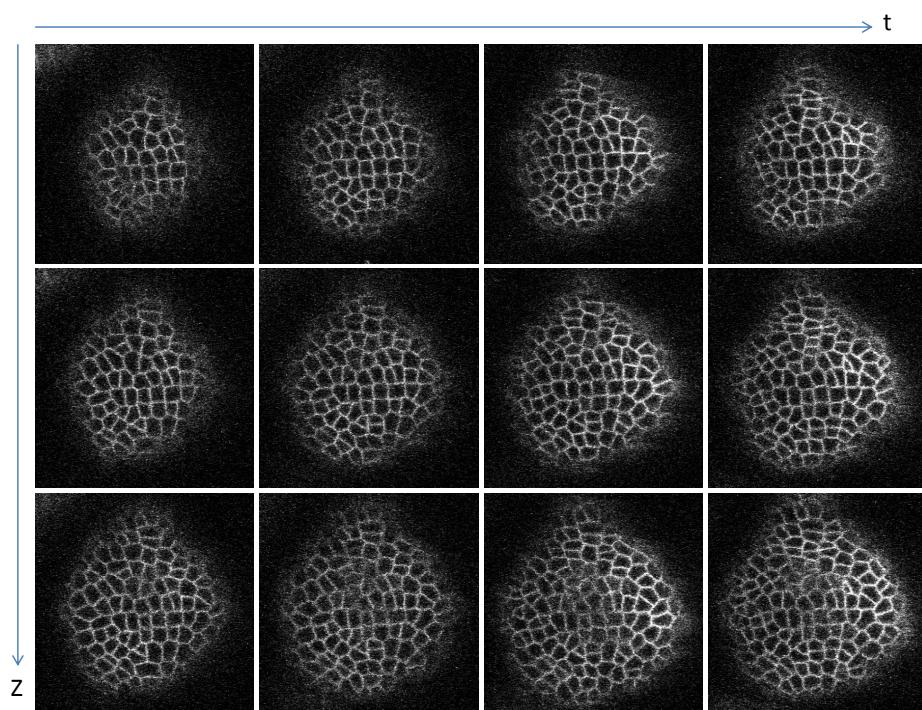*Email address:* amitrc@ee.ucr.edu (Amit K. Roy-Chowdhury)

Figure 1: Raw confocal images corresponding to the tracking results in Fig. 9 of the main manuscript.

Example of Watershed segmentation on good quality images

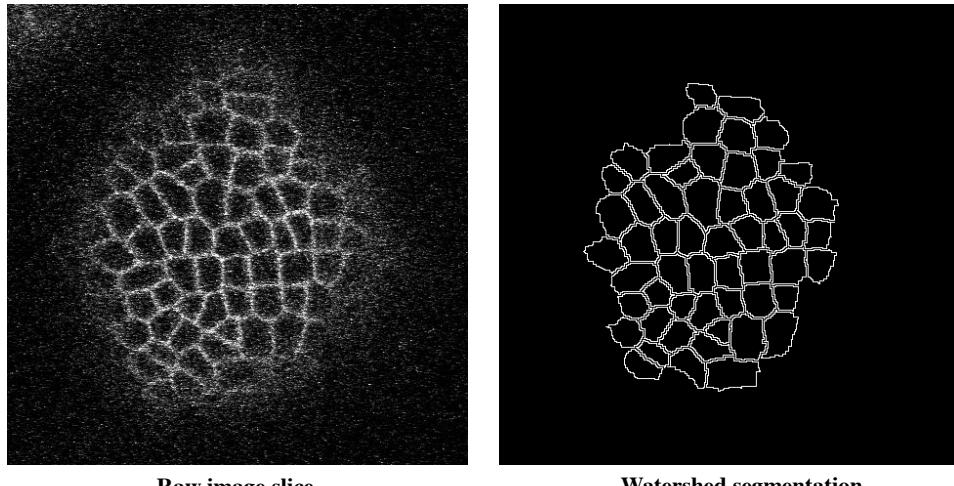|	
Raw image slice	**Watershed segmentation**

Figure 2: A confocal image slice with good quality (good contrast on the edges, high SNR) is segmented using the segmentation method proposed in [24]. The segmentation is near perfect.

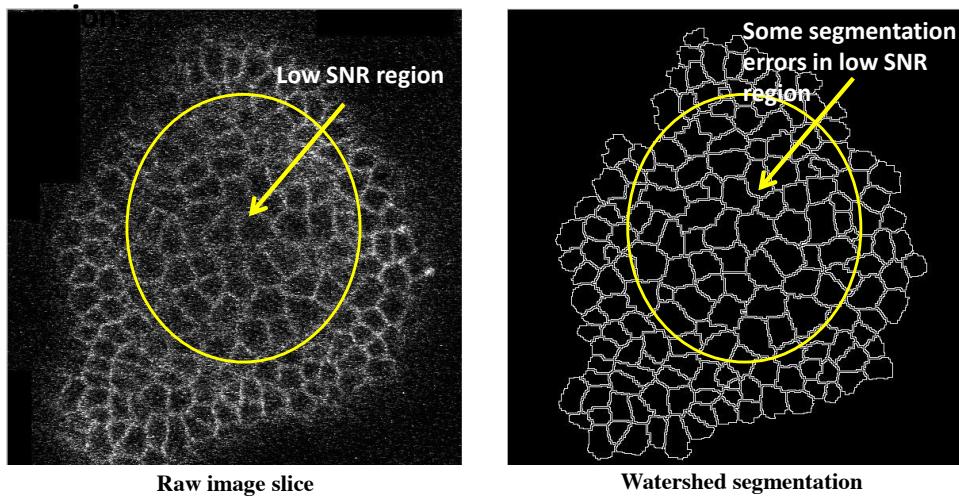**Example 1 of Watershed segmentation on low SNR image regions**

Low SNR region

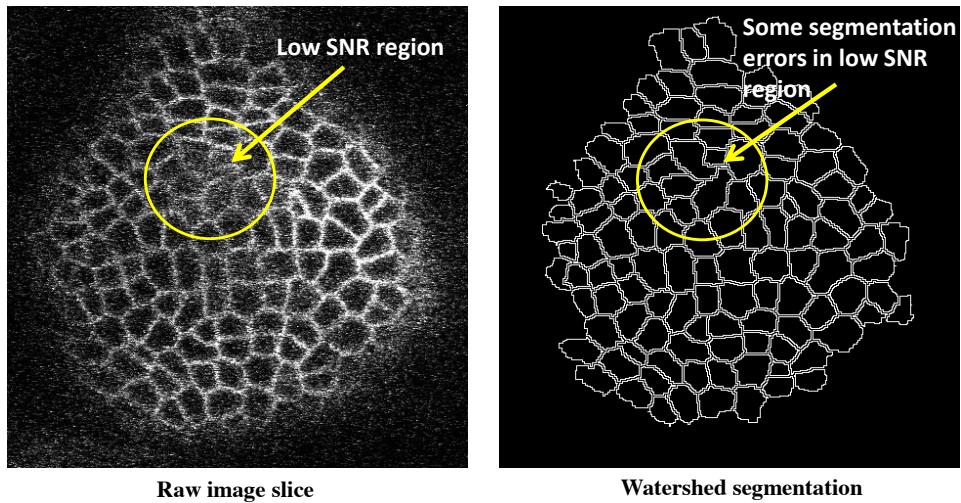Some segmentation
errors in low SNR
region

Raw image slice

Watershed segmentation

Figure 3: Watershed segmentation results on confocal image slices containing low SNR regions (shown within the circle). The results within the circle are slightly worse than that outside the circle (better quality regions). However, segmentation performances on both these regions are overall very satisfactory.

Example 2 of Watershed segmentation on low SNR image region

Low SNR region

Some segmentation errors in low SNR region

Raw image slice

Watershed segmentation

Figure 4: A second example of Watershed segmentation results on confocal image slices containing low SNR regions (shown within the circle).
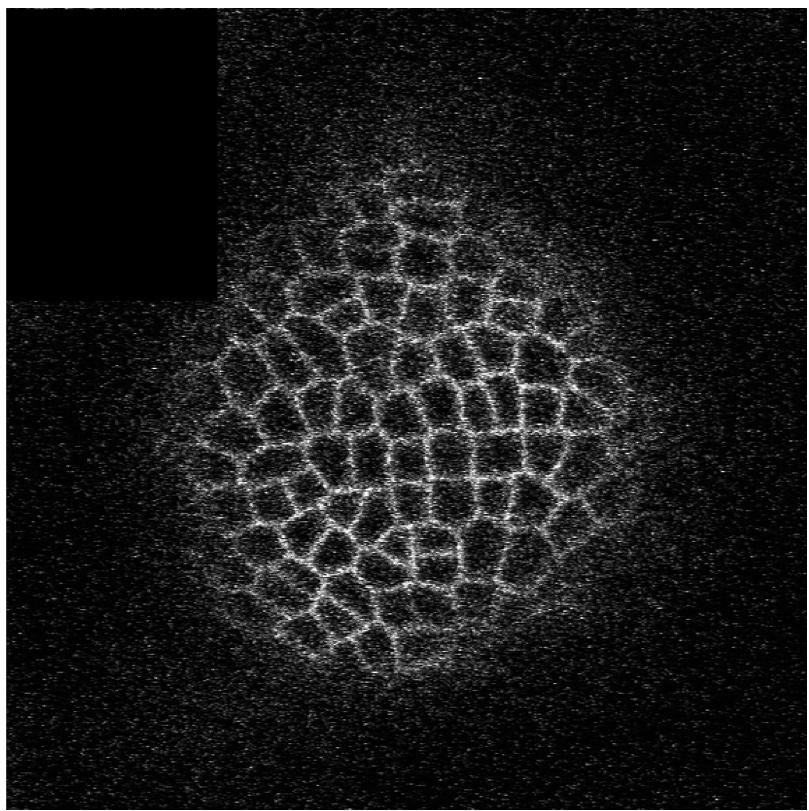
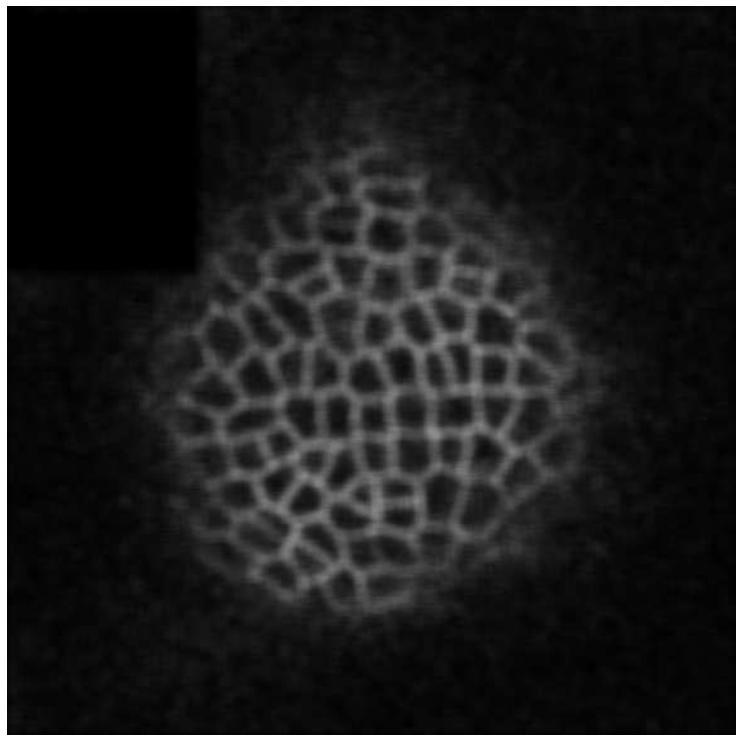Figure 5: A confocal raw image with good SNR.

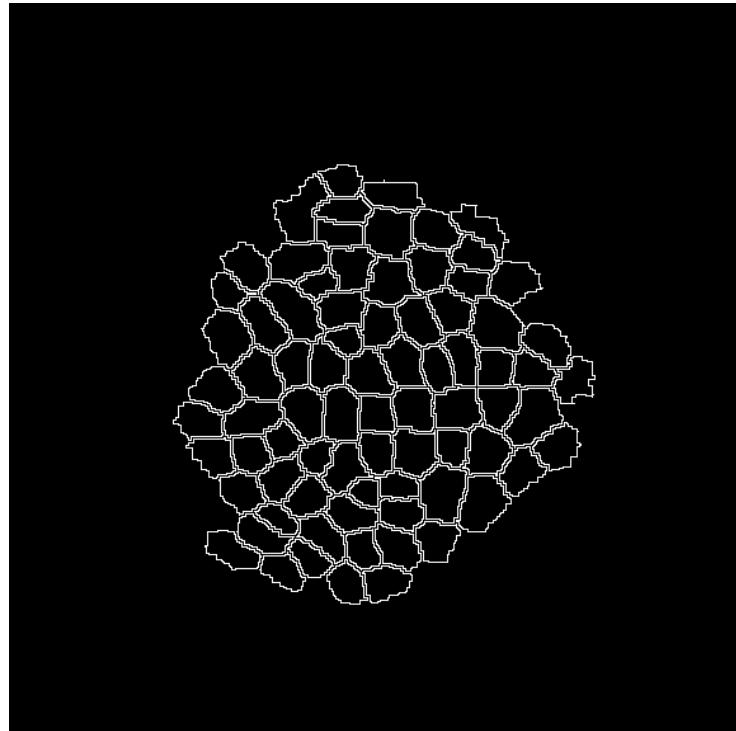Figure 6: Gaussian blurred high SNR image (Supplementary Fig.5).

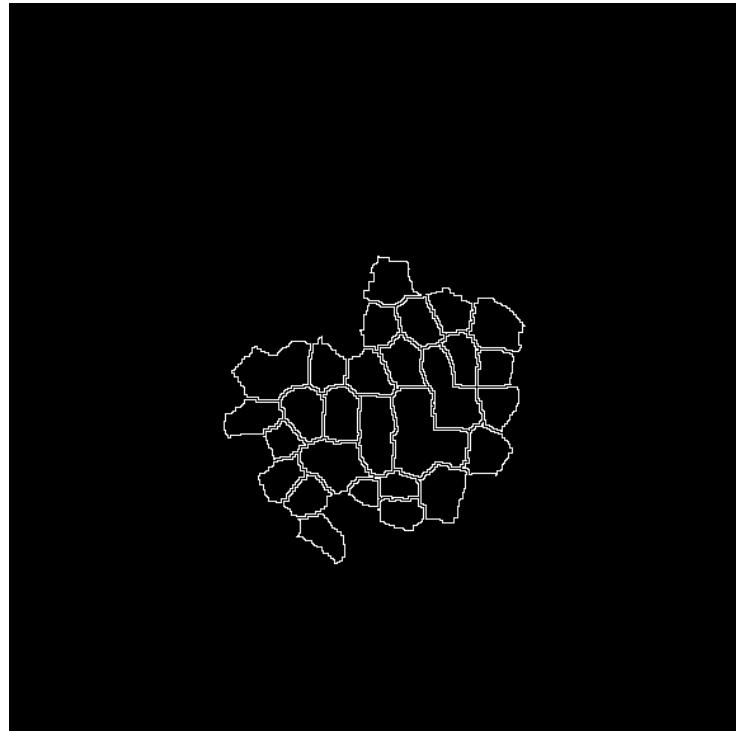Figure 7: Segmentation results after h-minima transformation on Supplementary Fig.6 using optimal 'h'.

Figure 8: Segmentation results after h-minima transformation on Supplementary Fig.6 using a bad 'h' (non-optimal).
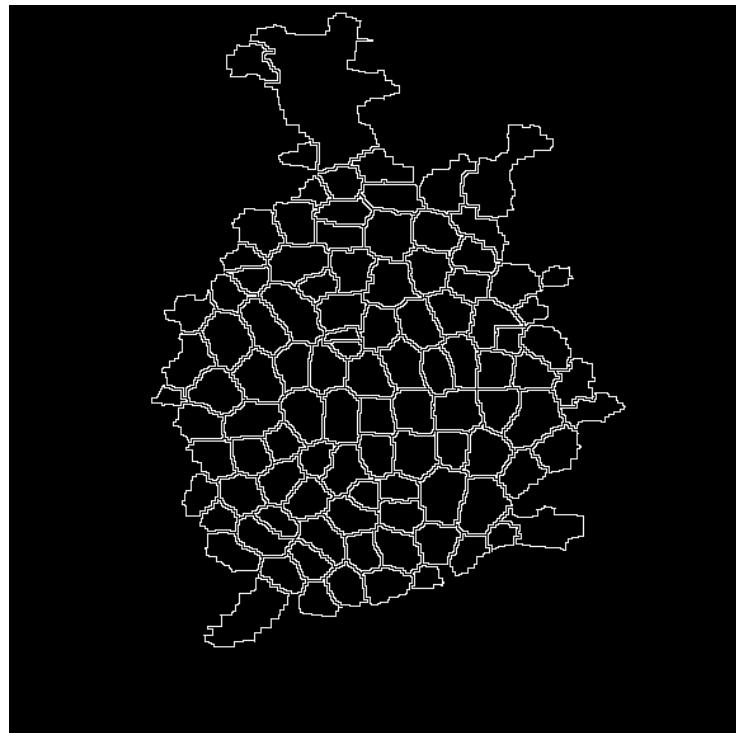
Figure 9: Segmentation results after h-minima transformation on Supplementary Fig.6 using another bad 'h' (non-optimal).
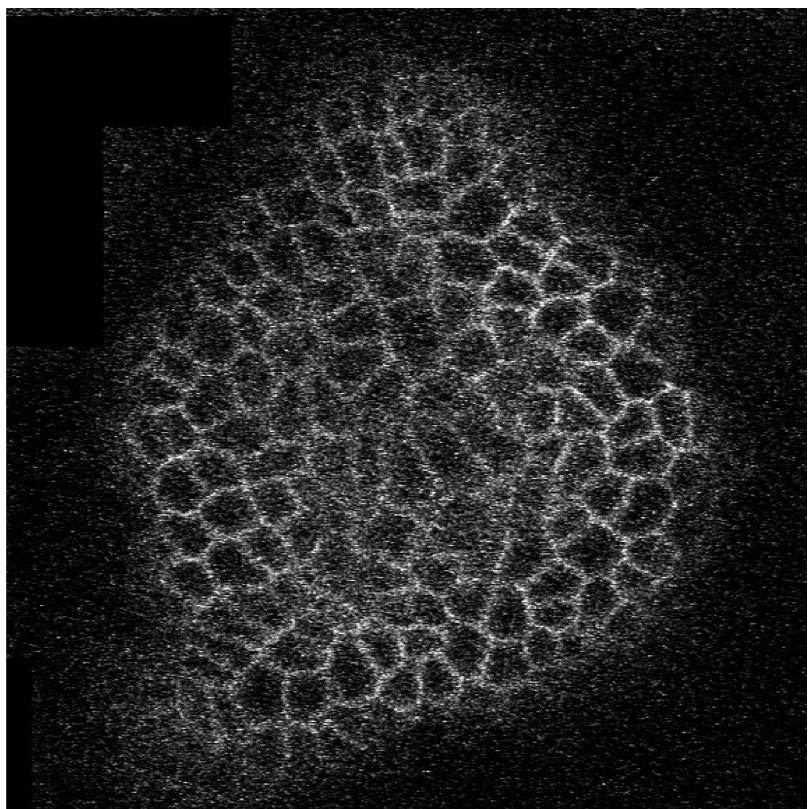
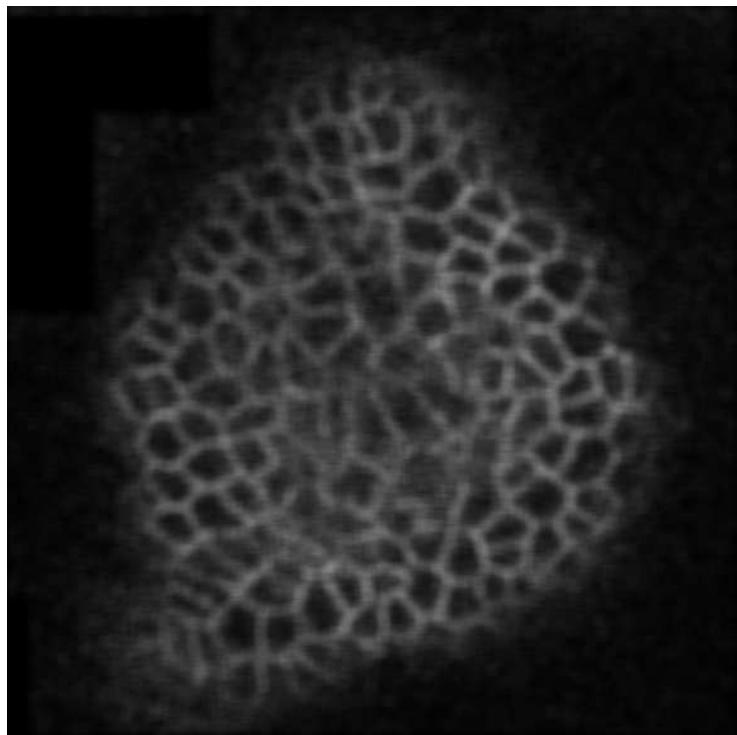Figure 10: A confocal raw image containing low SNR regions.

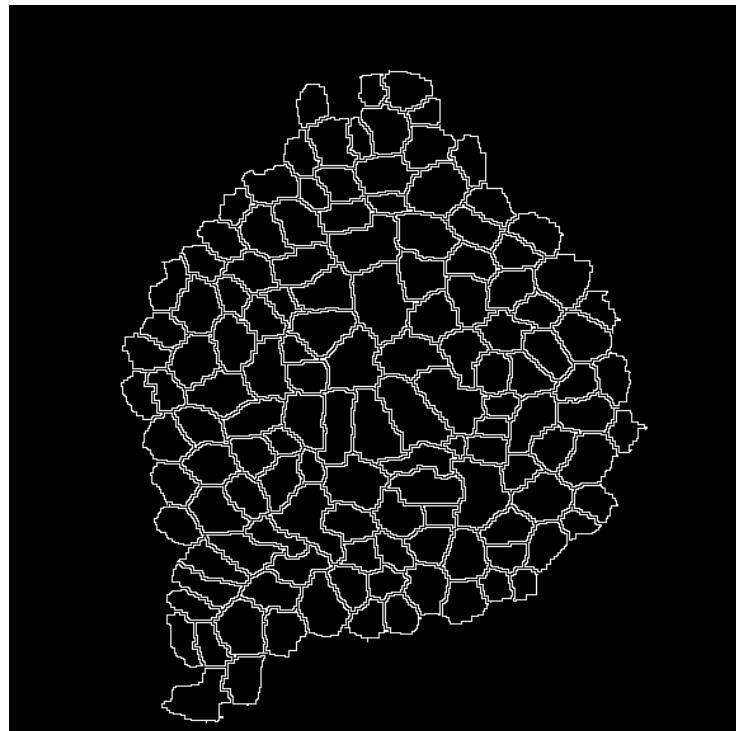Figure 11: Gaussian blurred low SNR image (Supplementary Fig.10).

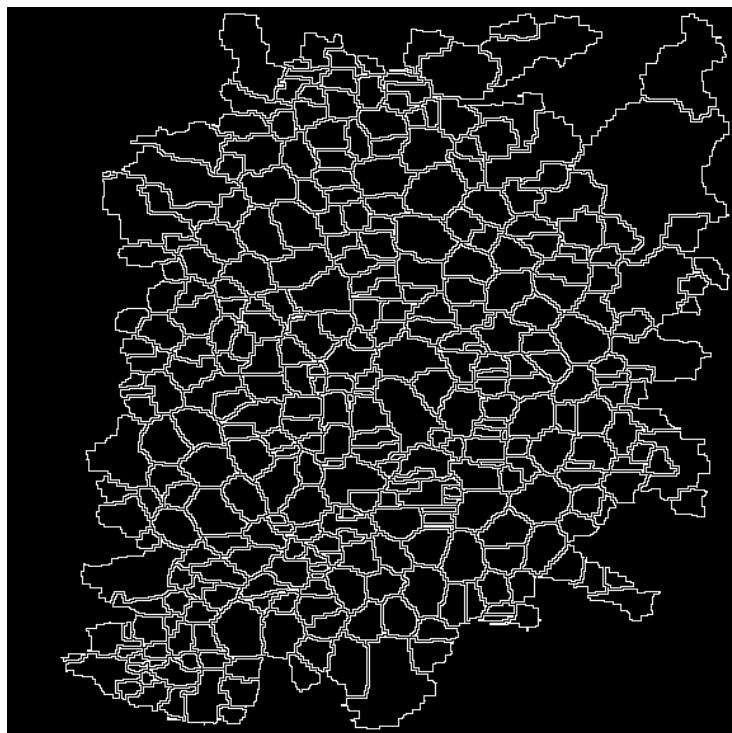Figure 12: Segmentation results after h-minima transformation on Supplementary Fig.11 using optimal 'h'.

Figure 13: Segmentation results after h-minima transformation on Supplementary Fig.11 using a bad 'h' (non-optimal).
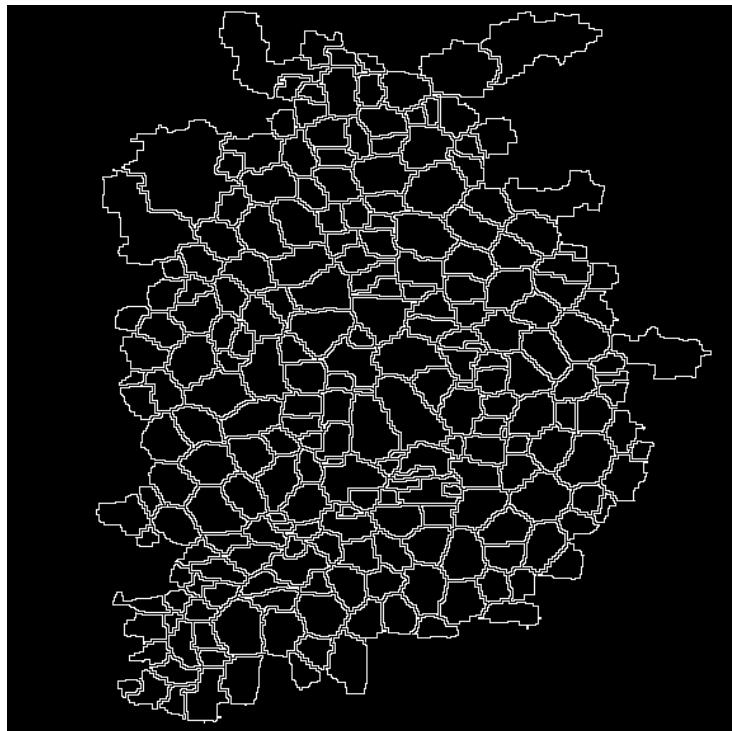
Figure 14: Segmentation results after h-minima transformation on Supplementary Fig.11 using another bad 'h' (non-optimal).