Supplementary Materials

# Skeleton optimization of neuronal morphology based on three-dimensional shape restrictions

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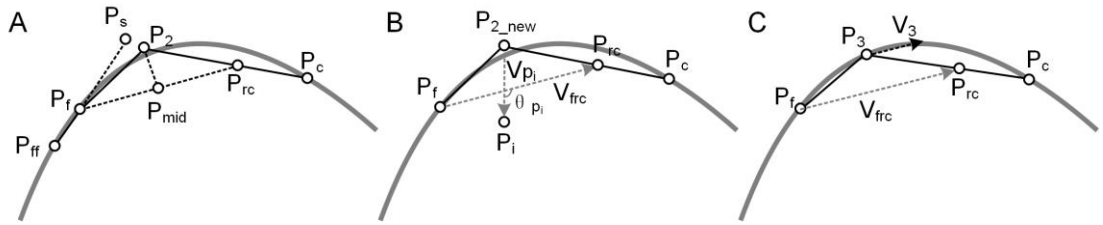


**Figure S1** The topological graph of skeleton points. (A) The topological relationships of points related to the point $P_{2\_new}$. (B) The topological relationships of points related to the new skeleton point, named $P_3$. (C) The topological relationships of the skeleton points related to the neuronal fiber radius estimation.

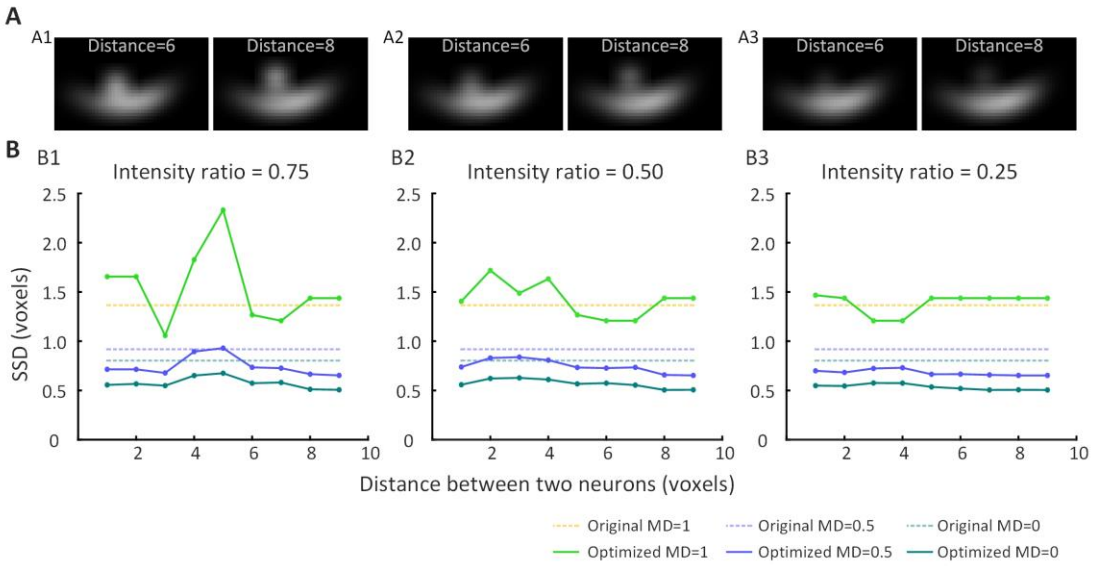


**Figure S2** Quantitative performance of skeleton optimization method on synthetic datasets with different signal intensity. The grayscale of voxels corresponding to the helix curve is set to 255, and the grayscale of the adjacent neuronal voxels is set to 0.75, 0.5 and 0.25 times of 255. (A) The cross sections of synthetic neuron fiber with different signal intensity. A1-A3 correspond to signal intensity of 0.75, 0.5 and 0.25 times of 255 respectively. (B) Skeleton optimization performance on dataset with different signal intensity. B1-B3 correspond to the SSD using signal intensity of 0.75, 0.5 and 0.25 times of 255 respectively. Comparing the SSD in B1, B2 and B3, when the intensity ratio is smaller, the adjacent neuronal fiber is easier to identify, and the SSD score is smaller, which means the method performance is better. Judging from the SSD when minimum distance is set to 1 voxel, the method performance is consistent with the situation shown in the Figure 2 F.

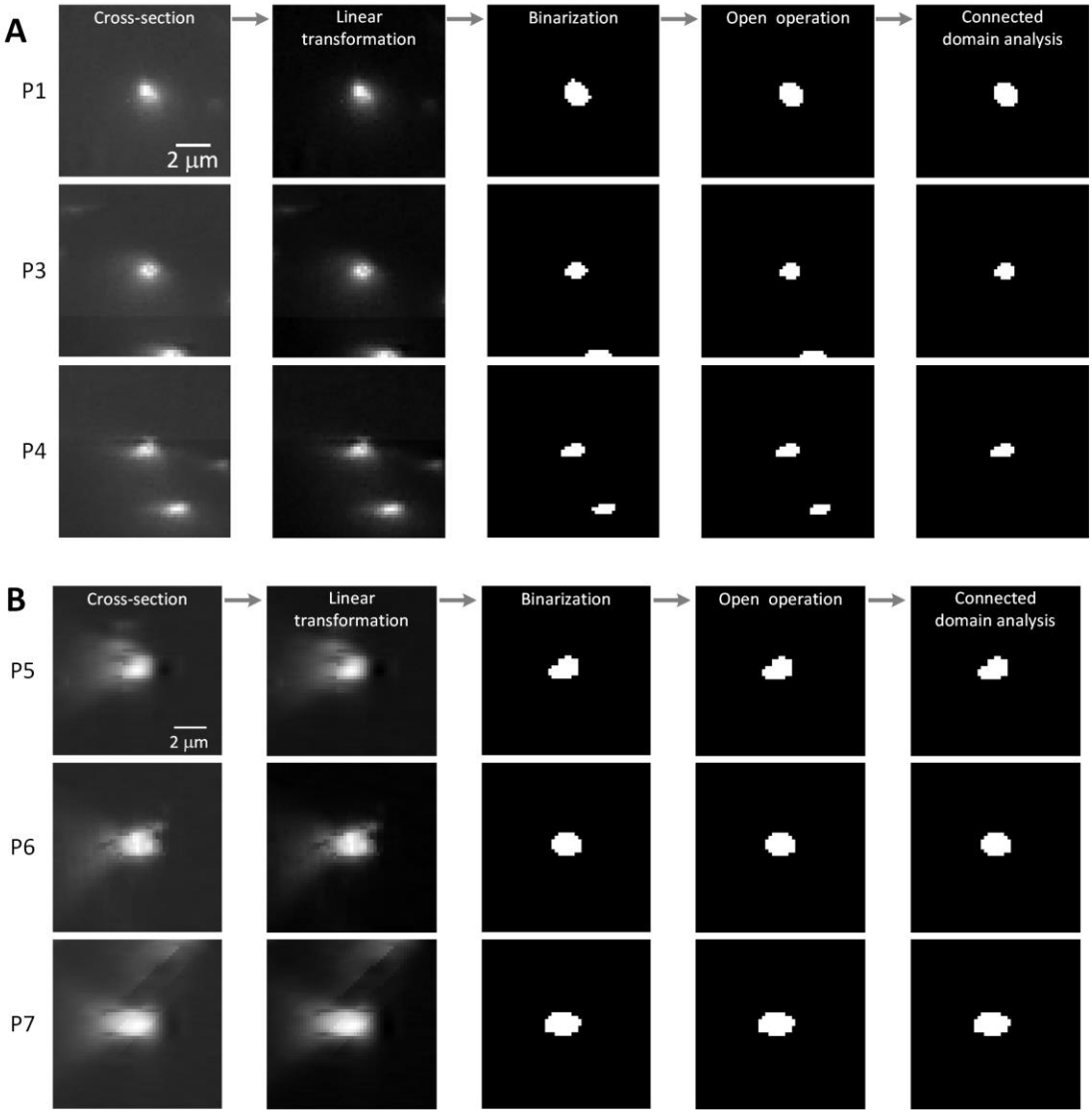


**Figure S3** The cross sections of axonal (A) and dendritic (B) fibers of pyramidal neuron.