# Graph-Based Neural Reconstruction from Skeletonized 3D Networks

## *Supplemental Material*

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## 1 Skeletonization

### 1.1 Volume Downsampling

### 1.2 Node Generation

### 1.3 Edge Generation

## 2 Merge Classification

### 2.1 Network Architecture

We tested various architectures before deciding on the one we present in the paper. Each architecture uses VGG-style blocks (i.e. two convolutions of size $3 \times 3 \times 3$ followed by a max-pooling layer) [1]. For the first two layers the max-pooling is anisotropic with reduction only in the $x$ and $y$ dimensions. The number of filters starts at 16 for the first block and doubles in each subsequent block. Our architectures vary in the input size and number of layers. In all instances we extract a $1200\,\mathrm{nm}^3$ region of interest and map the extracted voxels to the given input size. These input sizes correspond to specific output sizes from the last VGG block.

| Depth | Input Size | No. Parameters | Output Size | Accuracy | Precision | Recall |
|---|---|---|---|---|---|---|
| 3 | (3, 18, 52, 52) | 1,101,553 | (64, 3, 3, 3) | | | |
| 3 | (3, 20, 60, 60) | 2,313,969 | (64, 4, 4, 4) | | | |
| 3 | (3, 22, 68, 68) | 4,312,817 | (64, 5, 5, 5) | | | |
| 3 | (3, 24, 76, 76) | 7,294,705 | (64, 6, 6, 6) | | | |
| 3 | (3, 26, 84, 84) | 11,456,241 | (64, 7, 7, 8) | | | |
| 3 | (3, 28, 92, 92) | 16,994,033 | (64, 8, 7, 8) | | | |
| 3 | (3, 30, 100, 100) | 24,104,689 | (64, 9, 9, 9) | | | |
| 4 | (3, 28, 92, 92) | 1,404,913 | (128, 2, 2, 2) | | | |
| 4 | (3, 32, 108, 108) | 2,650,097 | (128, 3, 3, 3) | | | |

**Table 1.** The results of various network architectures trained on the Kasthuri data.

## References

1. Chatfield, K., Simonyan, K., Vedaldi, A., Zisserman, A.: Return of the devil in the details: Delving deep into convolutional nets. arXiv preprint arXiv:1405.3531 (2014)