

Supplementary Material

1079 Tables

Model	TP %	FP %	FN %
IDT	33.0	14.3	52.7
StarDist 1-0	35.6	7.9	56.5
U-Net 1-0	36.4	50.4	13.2
U-Net 1-64	49.8	15.7	34.5

Supplementary Tab. 1 Proportion of true positives, false positives and false negatives per model.

Feature	Description
Volume	Volume of an event
Intensity _{max}	Maximum $\Delta F/F_0$ of the entire event
Intensity _{mean}	Mean $\Delta F/F_0$ of the entire event
Duration	Length in time of the event
Aspect	Aspect ratio of the event calculated as $\frac{\text{minor}}{\text{major}}$
Solidity	Solidity of an event
Intensity _{int}	The integration of the averaged intensity profile in time of an event
Frequency	Number of events at the event (x,y) location

Supplementary Tab. 2 Shape and intensity features of events. Most features are extracted by using regionprops from Scikit-Image⁷⁶.

Feature	minimum	maximum
Volume (Voxels)	112	6777
Intensity _{max}	1.04	5.55
Intensity _{mean}	0.45	1.03
Duration	4	10
Aspect	0.16	0.49
Solidity	0.73	0.89
Intensity _{int}	0.96	3.37
Frequency	0	13

Supplementary Tab. 3 Values used to normalize the features in Figure 5p,h

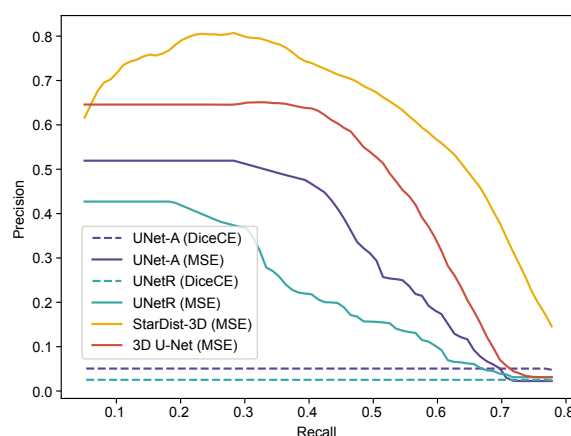
	3D U-Net	StarDist-3D
PU ratio	Average Precision	
1-0	0.39 ± 0.06	0.50 ± 0.03
1-1	0.44 ± 0.08	0.48 ± 0.03
1-2	0.46 ± 0.07	0.52 ± 0.04
1-4	0.49 ± 0.08	0.34 ± 0.04
1-8	0.51 ± 0.09	0.53 ± 0.04
1-16	0.56 ± 0.12	0.49 ± 0.04
1-32	0.58 ± 0.10	0.52 ± 0.04
1-64	0.59 ± 0.08	0.40 ± 0.04
1-128	0.51 ± 0.11	0.45 ± 0.03
1-256	0.54 ± 0.07	0.46 ± 0.03

Supplementary Tab. 4 Average precision of the different models averaged over 25 effective seeds with standard deviation shown. In bold is the top performing model (3D U-Net with PU ratio of 1-64).

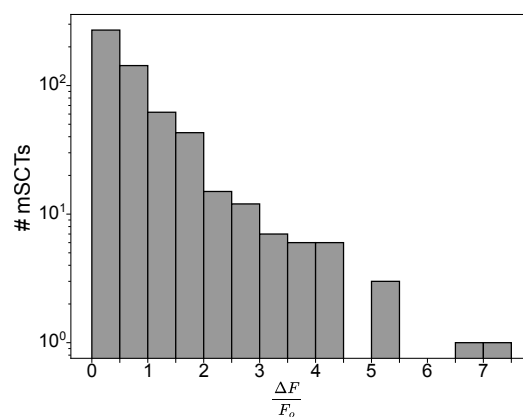
Hyper-parameter	Value
min_sample_split	2
max_depth	5
class_weight	balanced

Supplementary Tab. 5 Hyper-parameters of the Decision Tree Classifier that were used to classify the type of events (R_b vs. S, R_a vs. N, and N vs. S).

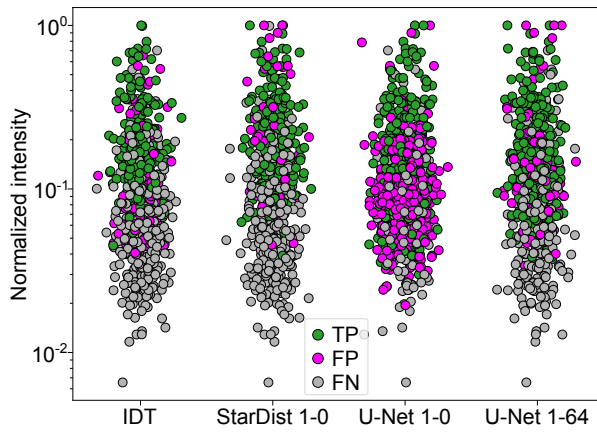
Figures



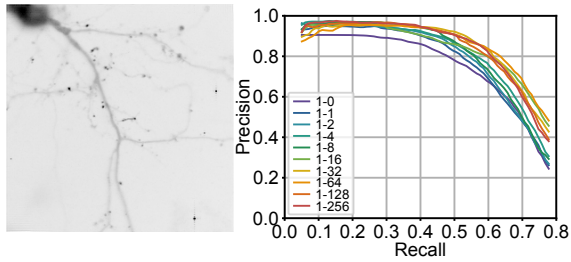
Supplementary Fig. 1 Detection performance of all deep neural networks trained on the 1-0 PU configuration.



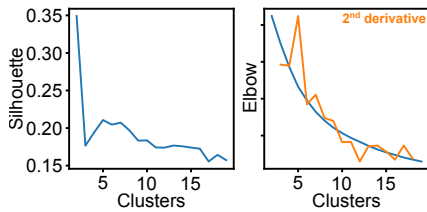
Supplementary Fig. 2 Histogram of the number of ground truth MSCTs as a function of their $\Delta F/F_0$.



Supplementary Fig. 3 Events detected by the models plotted as a function of their intensity and their detection type (True Positive, False Positive or False Negative).



Supplementary Fig. 4 Detection performance of 3D U-Net on out-of-distribution data. (left) Maximal projection of Ca^{2+} movie. (right) Precision-recall curves for the different PU ratios.



Supplementary Fig. 5 Silhouette and Elbow score as a function of the number of clusters from k -means for the segmentation of mSCTs in the cLTP condition. For the Elbow method, the 2nd is presented to show the highest deflection point. Both methods agree for 5 clusters.