

# 1 Intracranial Vessel Segmentation in 3D High Resolution T1 Black-Blood MRI

## 1.1 Supplemental Data 1

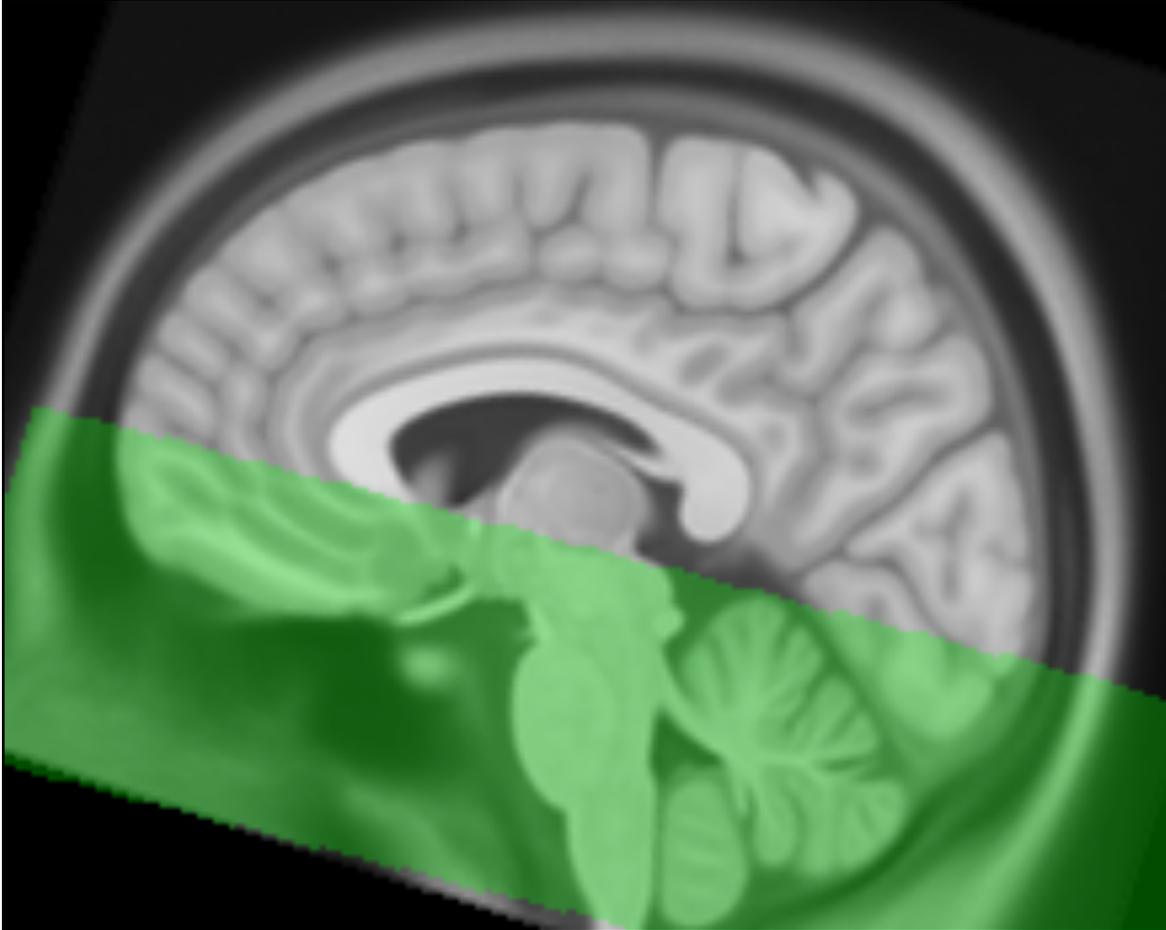


Figure 1: Cropped volume in MNI-Space for training

## 1.2 Supplemental Data 2

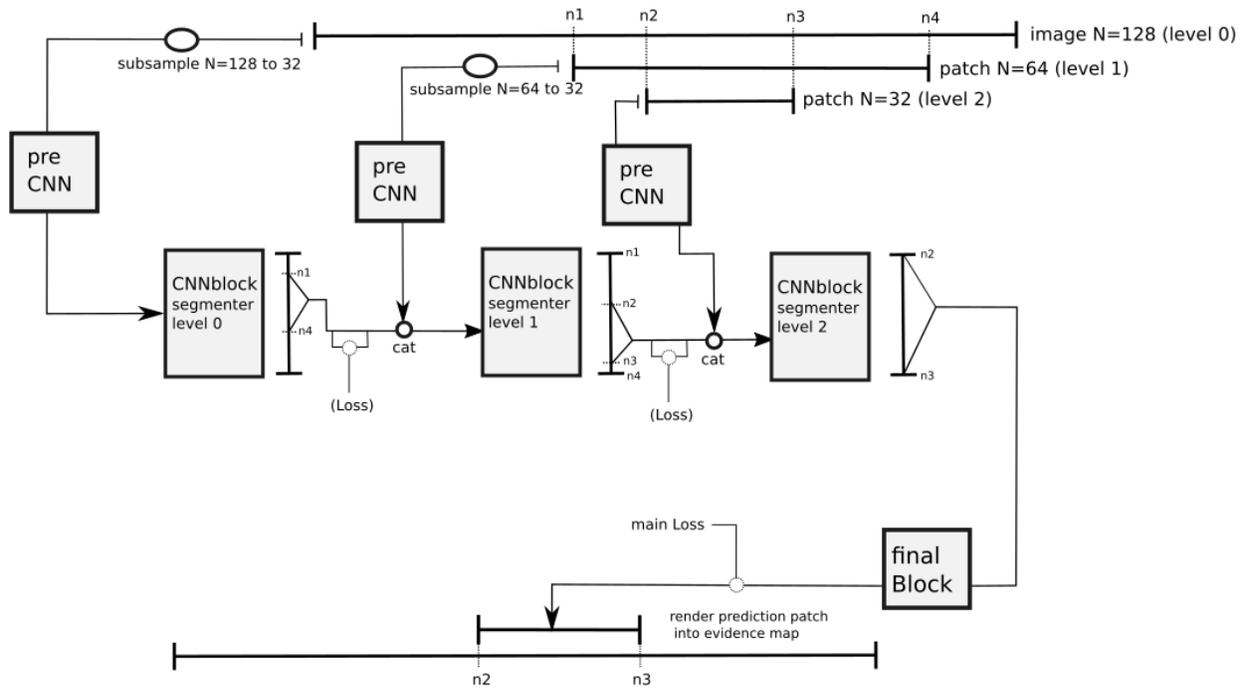


Figure 2: Schematic representation of the used CNN and the data-flow within the model. In this example a 3-scale network is represented. The segmentation task is carried out in the CNNblock segmenters. Preprocessing steps (which may be CNN-based) can be done in the pre-CNN blocks if needed. These were not used in our model

### 1.3 Supplemental Data 3

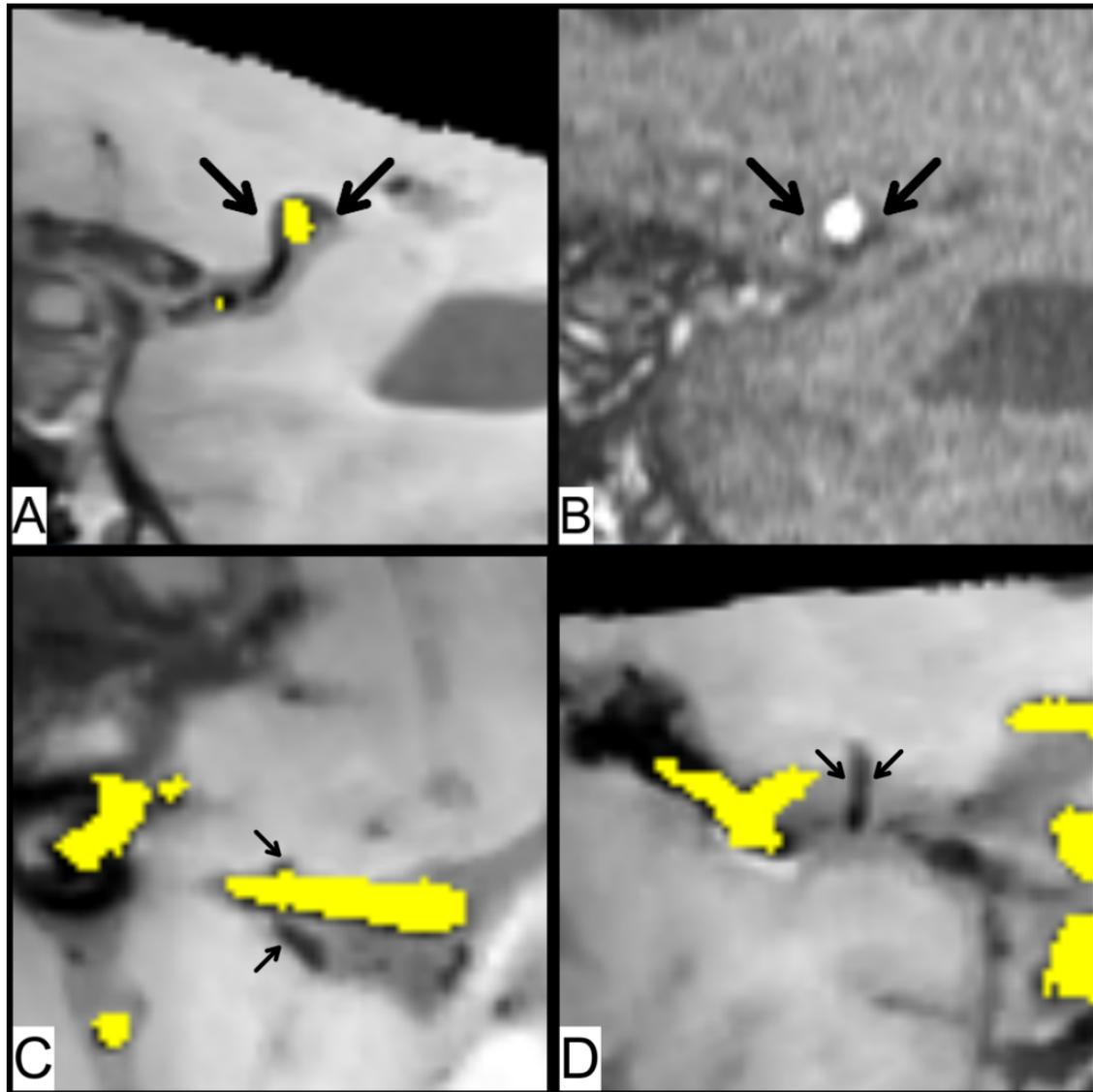


Figure 3: Correct differentiation between cerebral arteries and veins. a: sagittal oblique BBMRI reconstruction, b: corresponding TOF-MRA reconstruction, c: axial oblique and d: coronal oblique reconstructions of BBMRI showing a middle cerebral vein running in close proximity to the M1 segment of the right middle cerebral artery. Images show a true positive and true negative segmentation of the artery and vein respectively.

## 1.4 Supplemental Data 4

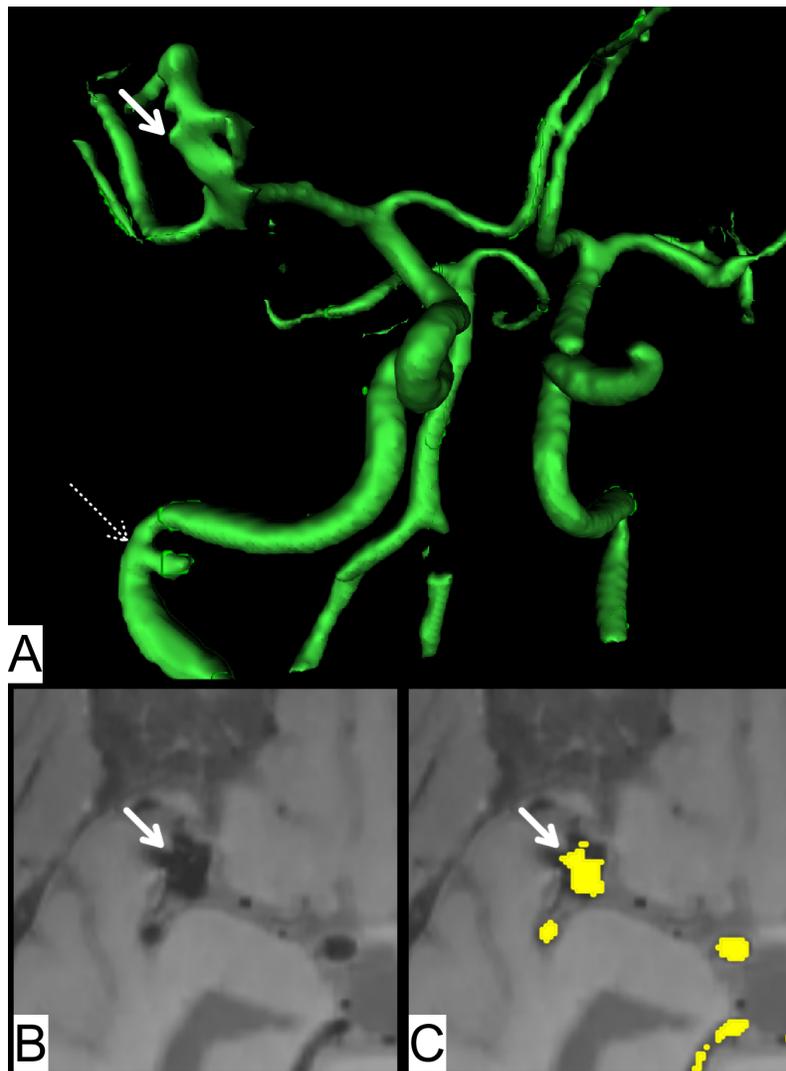


Figure 4: Exmaples of false positive segmentation in a test subject. a: 3D-rendered image showing false positive results at the right middle cerebral artery bifurcation (thick arrow) in an artefact due to an aneurysm clip and at the distal cervical segment of the right internal carotid artery (thin dotted arrow) due to neighboring low signal of the skull base. b and c: corresponding axial images BBMRI of the right middle cerebral artery bifurcation. c: with superimposed prediction results.

## 1.5 Supplemental Data 5

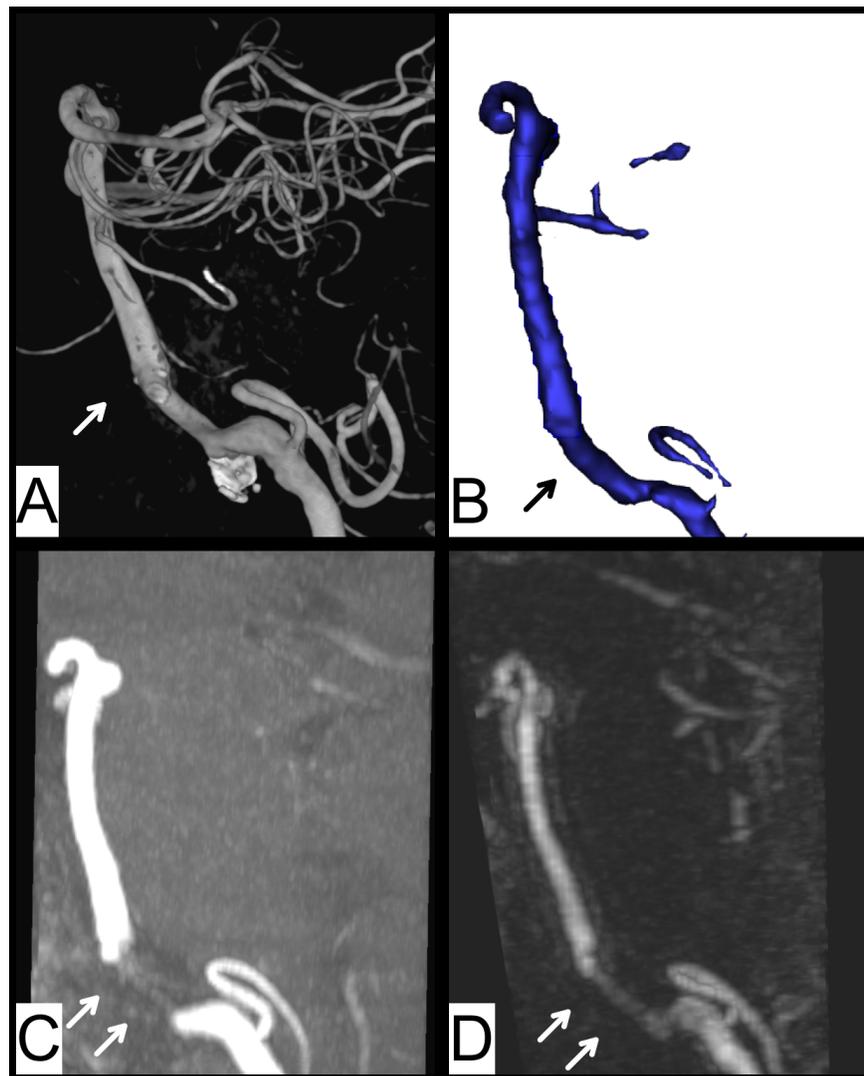


Figure 5: Correct identification of the vessel lumen following stenting of a ruptured dissecting aneurysm of the right vertebral artery in a test subject. a: 3D render of rotational digital subtraction angiography in lateral oblique projection following stent assisted coiling (arrow: distal stent markers). b: Volume render of the BB-CSSPACE model prediction. c: TOF-MRA and d: contrast enhanced MRA showing typical flow signal loss within the stent (arrows).

## 1.6 Supplemental Data 6

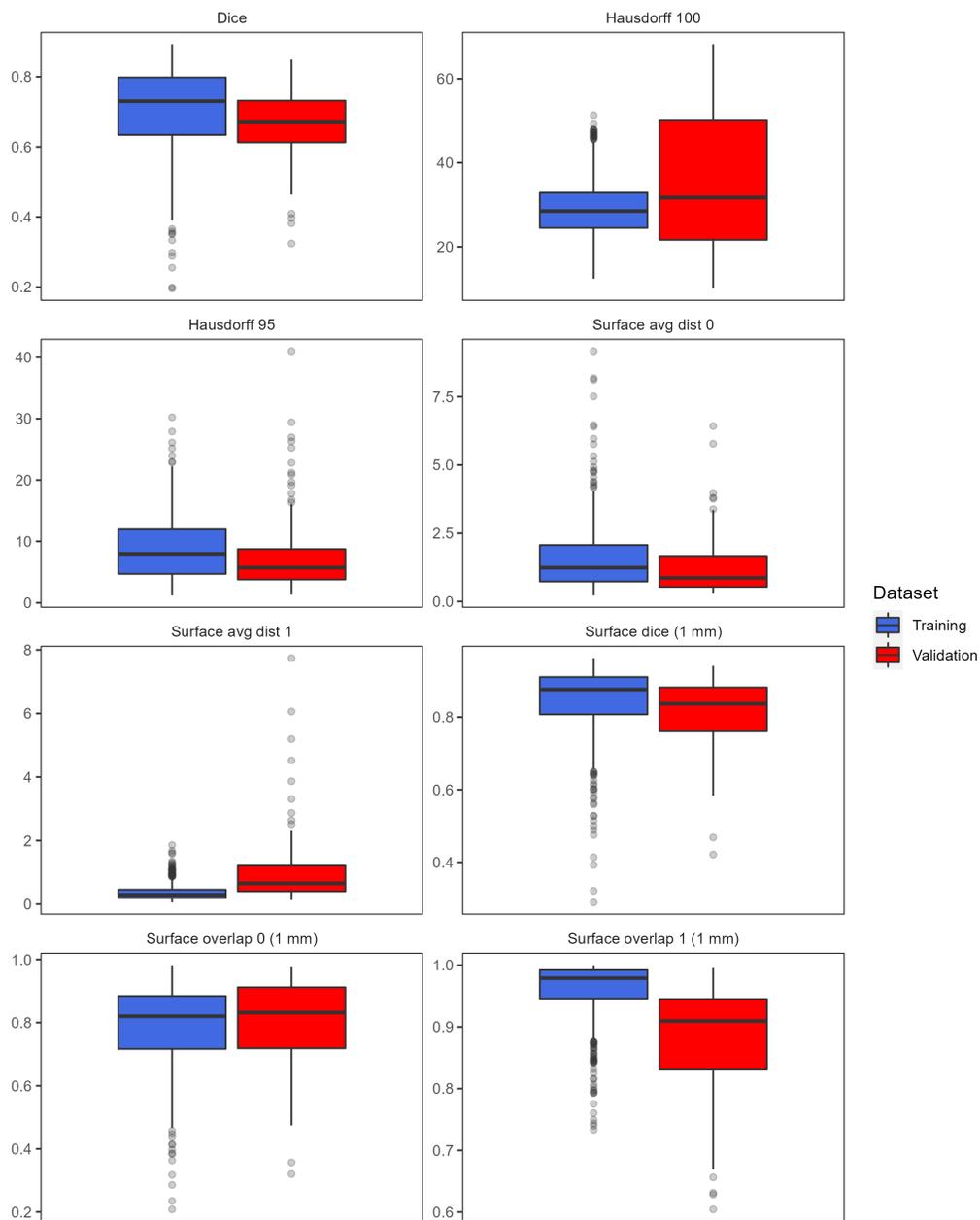


Figure 6: Box plot of the metrics of all included patients

## 1.7 Supplemental Data 7

Evaluation of the similarity metrics of the training and testing datasets.

Metric	Train Dataset	Test Dataset
Dice <sup>a</sup>	0.77	0.72
Surface dice (1 mm) <sup>a</sup>	0.88	0.87
Surface overlap 0 (1 mm) <sup>a</sup>	0.81	0.84
Surface overlap 1 (1 mm) <sup>a</sup>	0.98	0.91
Hausdorff 100 <sup>b</sup>	27.19	29.45
Hausdorff 95 <sup>b</sup>	6.64	5.30
Surface avg dist 0 <sup>b</sup>	1.15	0.94
Surface avg dist 1 <sup>b</sup>	0.24	0.53
<sup>a</sup> Fraction in range 0-1, higher is better		
<sup>b</sup> Distance in mm, lower is better.		