1 Supplementary material

1.1 Network architecture

Table 1. Architecture of the UNet model used for RS-UNet and DE-UNet.

Bl.		**# Kernels**		**Act. f**	**KS**	**St**	**BN**	**DO**	**Cat**
		In	**Out**						
DB1	Co	1	10	ReLU	(5,5,5)	(1,1,1)	Yes	No	
	Co	10	10	ReLU	(5,5,5)	(1,1,1)	Yes	Yes	
DB2	Mp				(2,2,2)	(2,2,2)			
	Co	10	20	ReLU	(5,5,5)	(1,1,1)	Yes	No	
	Co	20	20	ReLU	(5,5,5)	(1,1,1)	Yes	Yes	
DB3	Mp				(2,2,2)	(2,2,2)			
	Co	20	40	ReLU	(5,5,5)	(1,1,1)	Yes	No	
	Co	40	40	ReLU	(5,5,5)	(1,1,1)	Yes	Yes	
DB4	Mp				(2,2,2)	(2,2,2)			
	Co	40	80	ReLU	(5,5,5)	(1,1,1)	Yes	No	
	Co	80	80	ReLU	(5,5,5)	(1,1,1)	Yes	Yes	
C5	Mp				(2,2,2)	(2,2,2)			
	Co	80	160	ReLU	(5,5,5)	(1,1,1)	Yes	No	
	Co	160	160	ReLU	(5,5,5)	(1,1,1)	Yes	Yes	
UB6	TrCo	160	160		(2,2,2)	(2,2,2)	No	No	DB4
	Co	160	80	ReLU	(5,5,5)	(1,1,1)	Yes	No	
	Co	80	80	ReLU	(5,5,5)	(1,1,1)	Yes	Yes	
UB7	TrCo	80	80		(2,2,2)	(2,2,2)	No	No	DB3
	Co	80	40	ReLU	(5,5,5)	(1,1,1)	Yes	No	
	Co	40	40	ReLU	(5,5,5)	(1,1,1)	Yes	Yes	
UB8	TrCo	40	40		(2,2,2)	(2,2,2)	No	No	DB2
	Co	40	20	ReLU	(5,5,5)	(1,1,1)	Yes	No	
	Co	20	20	ReLU	(5,5,5)	(1,1,1)	Yes	Yes	
UB9	TrCo	20	20		(2,2,2)	(2,2,2)	No	No	DB1
	Co	20	10	ReLU	(5,5,5)	(1,1,1)	Yes	No	
	Co	10	10	ReLU	(5,5,5)	(1,1,1)	Yes	Yes	
	Co	10	2	ReLU	(1,1,1)	(1,1,1)	No	No	

KS: Kernel size. **St:** Stride. **BN:** Batch-Norm. **DO:** Dropout (50%). **Cat** Concatenate. **DB:** Down-block. **CB:** Center-block. **UB:** Up-block.
Co: 3D Convolution layer. **Mp:** 3D Max-Pooling. **TrCo:** 3D Transposed convolution layer.
All models were trained for 350 epochs, using a Batch size of 9.
The AE model is equal to this one but omitting the Concatenate column.

1.2 The ABC method

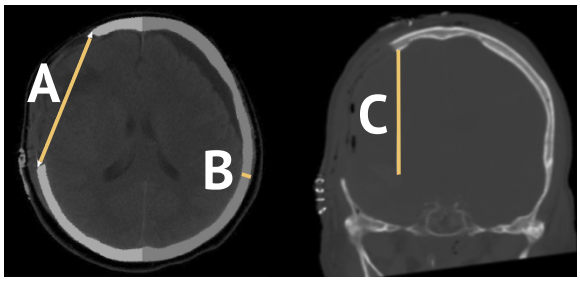

Fig. 1. The manual method proposed in [1] estimates the skull defect (SD) volume $V = ABC$, taking A as the linear distance between corners of the outer table of the SD, B as the maximum thickness measured perpendicularly to A and C the sum of the inter slice distances on which full-thickness SD is visible.

1.3 Skull reconstruction with PCA

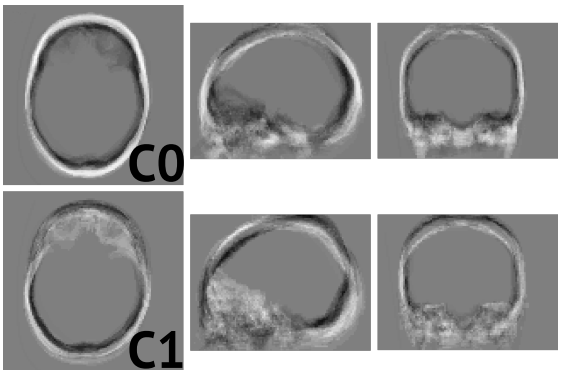

Fig. 2. For this work, the PCA transformation was taken to the training split, which consists in images of patients without DC. The test images are then projected into this space and the inverse transformation is taken for going back to the image space. This image shows the visualization of the first two components.

References

1. Xiao, F., Chiang, I.J., Hsieh, T.M.H., Huang, K.C., Tsai, Y.H., Wong, J.M., Ting, H.W., Liao, C.C.: Estimating postoperative skull defect volume from ct images using the abc method. Clinical Neurology and Neurosurgery **114**(3), 205 – 210 (2012). https://doi.org/https://doi.org/10.1016/j.clineuro.2011.10.003, `http://www.sciencedirect.com/science/article/pii/S0303846711003076`