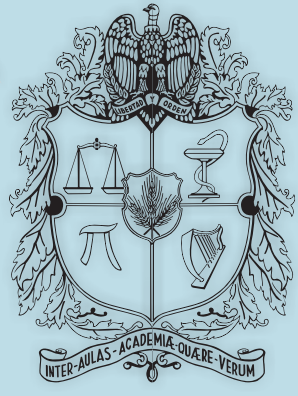


SUPER-RESOLUTION OF BRAIN MR IMAGES: A SPARSE REPRESENTATION APPROACH

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Abstract

Spatial resolution of Magnetic Resonance (MR) imaging is limited by diverse physical, technological and patient safety considerations. These factors together affect the precision of brain tissue segmentations, producing voxel misclassifications and distorting morphometry results. This work presents the application of sparse representations to generate high-resolution versions of brain MR images, by mixing up high and low frequency information with prior knowledge.

Methodology

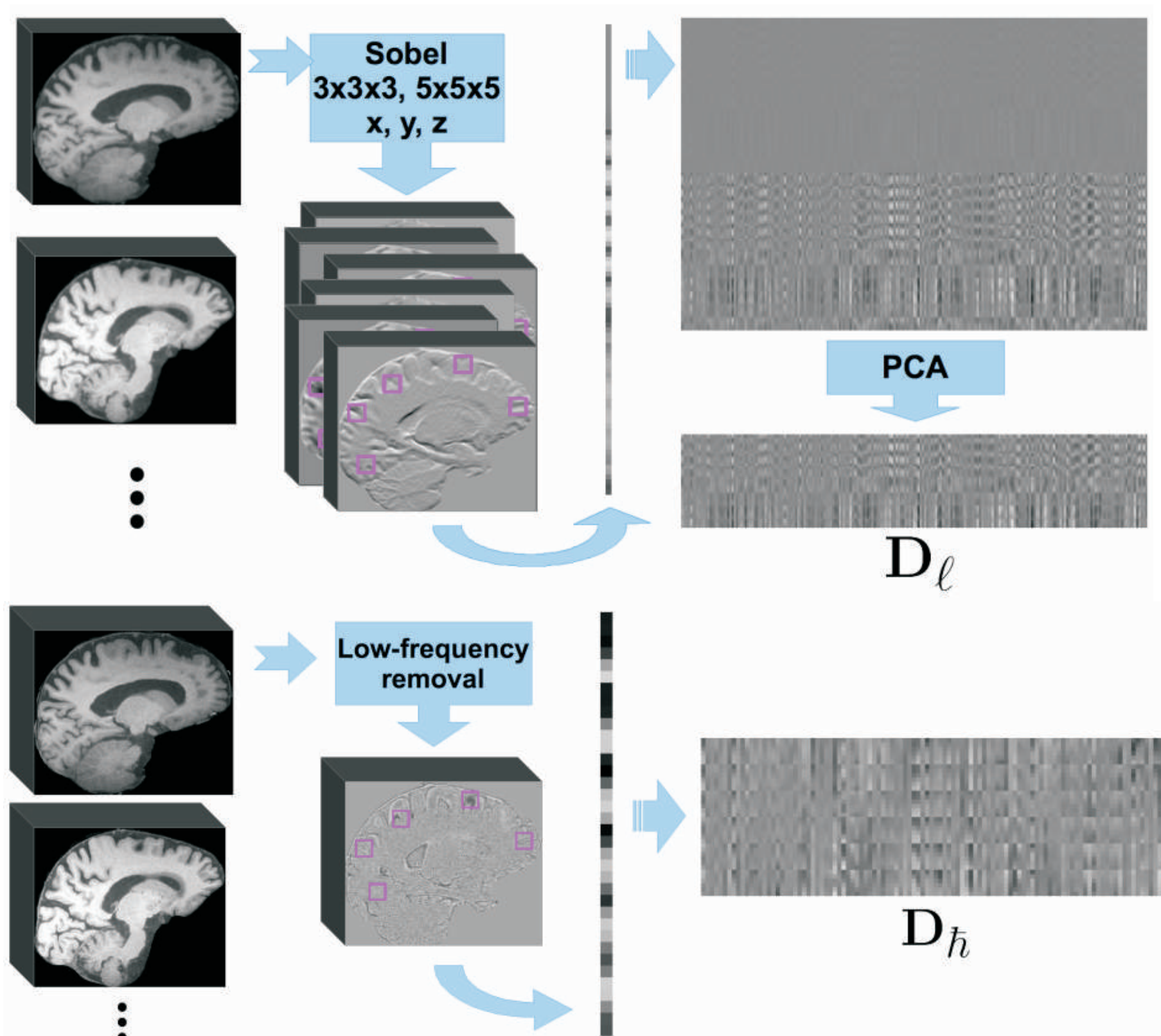
Goal

Super-resolution from sparsity, in two stages, built upon [1],[2].



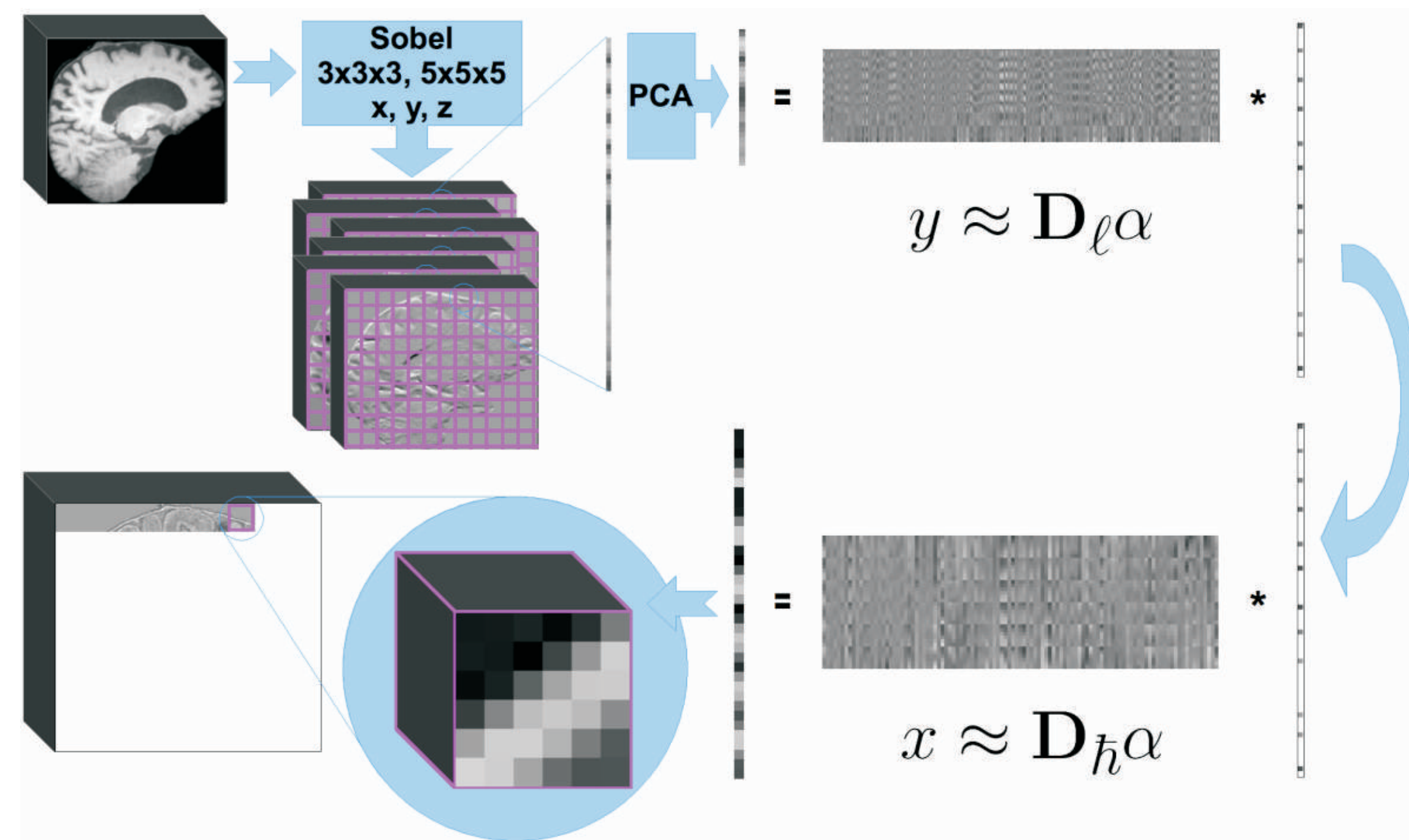
Training

Low-resolution dictionary
High-resolution dictionary



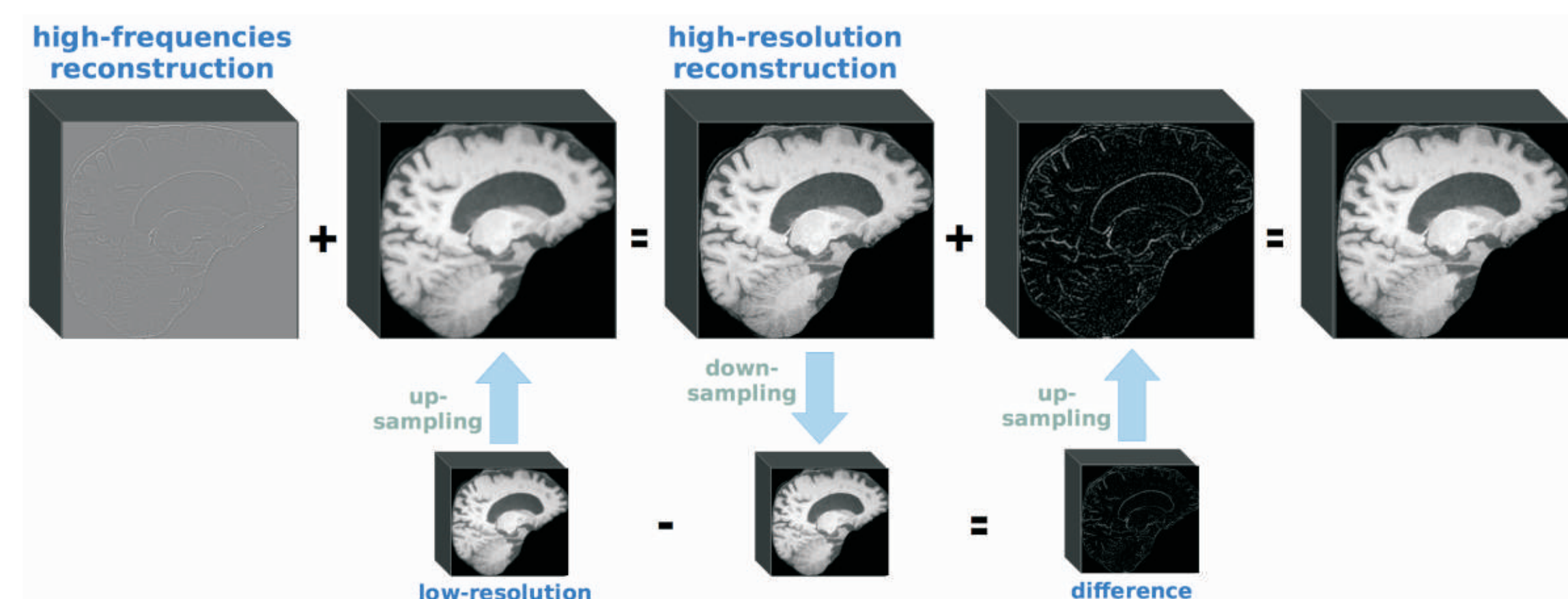
Local reconstruction

Stage 2a



Regularization

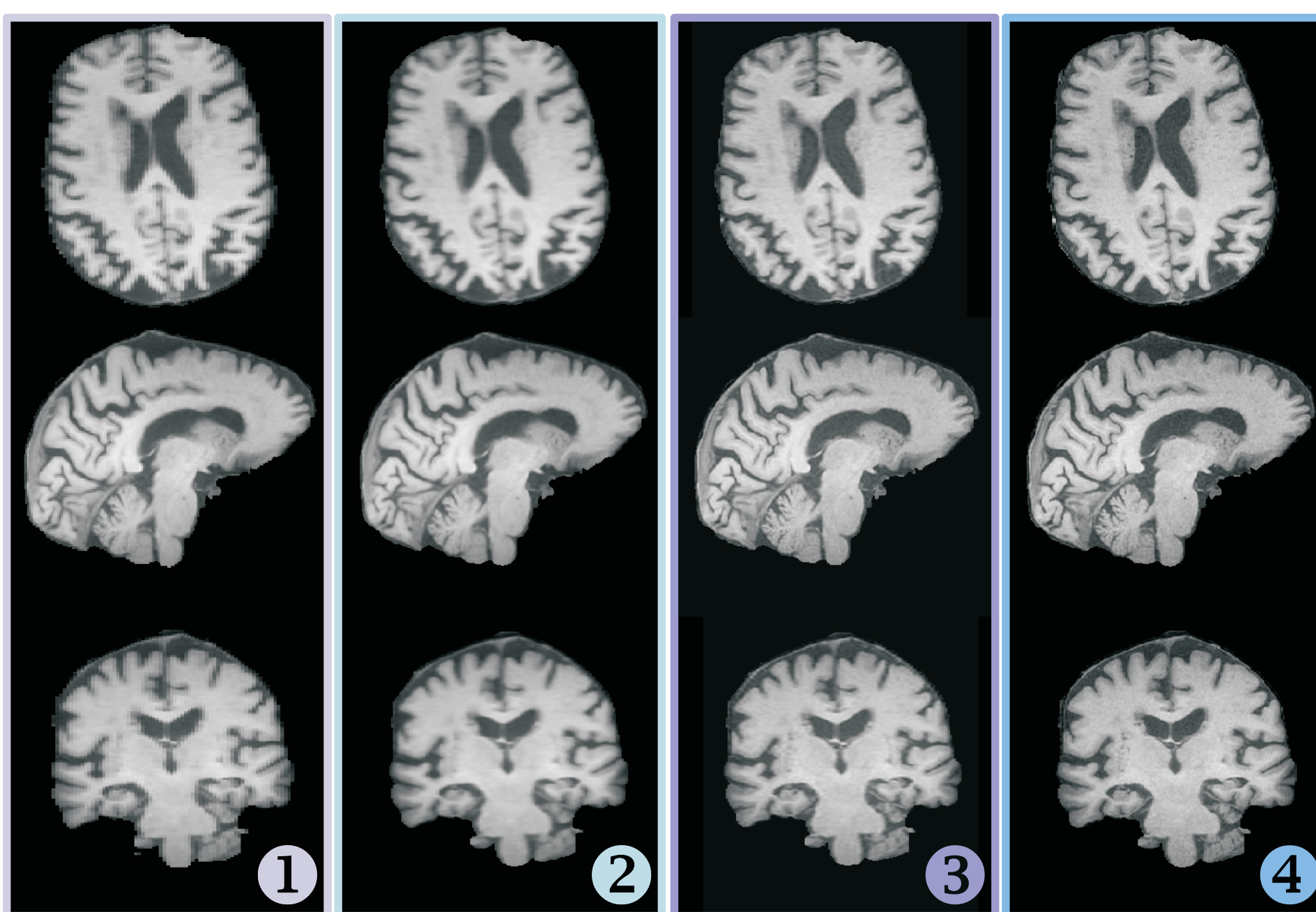
Stage 2b



Preliminary Results

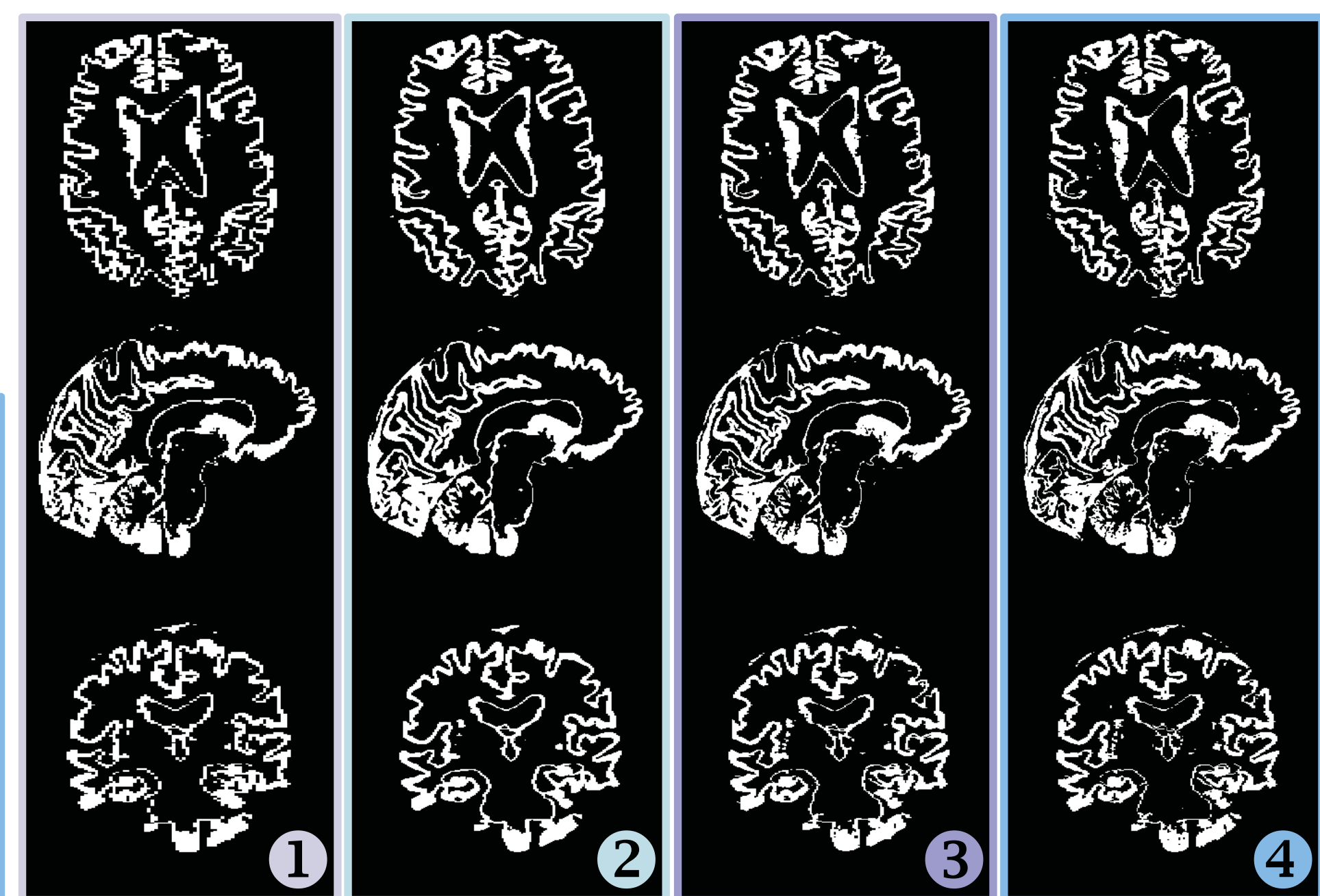
29 T1w brain
MR Images

Average
RMSE: 4.17 (-68%)
PSNR: 36dB (+41%)



29 gray matter
segmentations

Average overlap
0.85 (+11%)



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References

- [1] Yang J., Wright J., Huang T.S., Ma Y. *Image super-resolution via sparse representation*. IEEE Transactions on Image Processing 19(11), 2010, pp. 2861-2873.
- [2] Zeyde R., Elad M., Protter M. *On Single Image Scale-Up using Sparse-Representations*. Curves & Surfaces, Avignon-France, June 24-30, 2010.