Dense Rotation Invariant Brain Pyramids for Automated Human Brain Parcellation

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Abstract: The automatic parcellation of the human brain based on MR imaging is in several areas of high interest. In particular, identifying corresponding brain areas between different subjects is an indispensable prerequisite for any group analysis. But also, simple segmentations into different tissue types is an important preprocessing step. We present a generic framework for describing and automatically parcellating high angular resolution diffusion-weighted magnetic-resonance images (HARDI) of the human brain. Based on an initial training step our approach is capable to segment the images into coarse parcellations or detailed fine grain regions of interest. In contrast to existing model-free methods [SSK+09] we are not only using the raw measurements at each position, but we are also including neighboring measurements in a rotation invariant way.

References

[SSK+09] S. Schnell, D. Saur, B.W. Kreher, J. Hennig, H. Burkhardt, and V.G. Kiselev. Fully automated classification of HARDI in vivo data using a support vector machine. *Neuroimage*, 46:642–651, 2009.

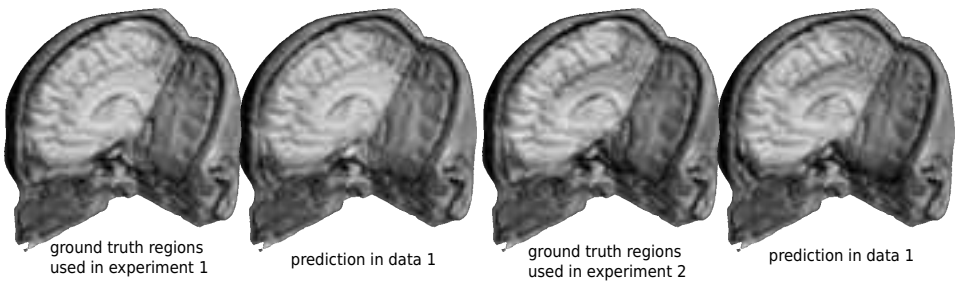

Figure 1: The ground truth regions that we used to train and evaluate our algorithm shown together with our algorithm's regions prediction. We can clearly see that our predictions are much more consistent with the data.