

A Comparison of Voxel Compression Mapping and Longitudinal Voxel-Based Morphometry

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1 Abstract and Poster References

- Alzheimer's Disease Imaging [1]
- Statistical analysis of Voxel Compression Mapping [2]
- Voxel-Based Morphometry [3]
- Longitudinal VBM with Tied Spatial Normalisation [4]
- Longitudinal VBM using High-Dimensional Warping and Averaging [5]

2 Selected Bibliography

- Description of the cohort from which my data-set was drawn [6]
- SPM5¹ Unified Segmentation and normalisation [7]
- Another longitudinal VBM method, similar to AVG (uses inter-subject modulation) [8]
- Other comparisons of VBM or similar methods [9, 10, 11]
- Useful references on evaluation of SPM results [12, 13]

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References

1. N. C. Fox and J. M. Schott, "Imaging cerebral atrophy: normal ageing to Alzheimer's disease." *Lancet*, vol. 363, no. 9406, pp. 392–394, Jan 2004. [Online]. Available: [http://dx.doi.org/10.1016/S0140-6736\(04\)15441-X](http://dx.doi.org/10.1016/S0140-6736(04)15441-X)
2. R. I. Scahill, J. M. Schott, J. M. Stevens, M. N. Rossor, and N. C. Fox, "Mapping the evolution of regional atrophy in Alzheimer's disease: unbiased analysis of fluid-registered serial MRI." *Proc Natl Acad Sci USA*, vol. 99, no. 7, pp. 4703–4707, Apr 2002. [Online]. Available: <http://dx.doi.org/10.1073/pnas.052587399>
3. J. Ashburner and K. J. Friston, "Voxel-based morphometry—the methods." *Neuroimage*, vol. 11, no. 6 Pt 1, pp. 805–821, Jun. 2000. [Online]. Available: <http://dx.doi.org/10.1006/nimg.2000.0582>
4. B. Draganski, C. Gaser, V. Busch, G. Schuierer, U. Bogdahn, and A. May, "Neuroplasticity: changes in grey matter induced by training." *Nature*, vol. 427, no. 6972, pp. 311–312, Jan 2004. [Online]. Available: <http://dx.doi.org/10.1038/427311a>
5. G. Chételat, B. Landeau, F. Eustache, F. Mézènge, F. Viader, V. de la Sayette, B. Desgranges, and J.-C. Baron, "Using voxel-based morphometry to map the structural changes associated with rapid conversion in MCI: a longitudinal MRI study." *Neuroimage*, vol. 27, no. 4, pp. 934–946, Oct 2005. [Online]. Available: <http://dx.doi.org/10.1016/j.neuroimage.2005.05.015>
6. J. M. Schott, S. L. Price, C. Frost, J. L. Whitwell, M. N. Rossor, and N. C. Fox, "Measuring atrophy in Alzheimer disease: a serial MRI study over 6 and 12 months." *Neurology*, vol. 65, no. 1, pp. 119–124, Jul 2005. [Online]. Available: <http://dx.doi.org/10.1212/01.wnl.0000167542.89697.0f>
7. J. Ashburner and K. J. Friston, "Unified segmentation." *Neuroimage*, vol. 26, no. 3, pp. 839–851, Jul. 2005. [Online]. Available: <http://dx.doi.org/10.1016/j.neuroimage.2005.02.018>
8. C. M. Kipps, A. J. Duggins, N. Mahant, L. Gomes, J. Ashburner, and E. A. McCusker, "Progression of structural neuropathology in preclinical Huntington's disease: a tensor based morphometry study." *J Neurol Neurosurg Psychiatry*, vol. 76, no. 5, pp. 650–655, May 2005. [Online]. Available: <http://dx.doi.org/10.1136/jnnp.2004.047993>

¹<http://www.fil.ion.ucl.ac.uk/spm/>

9. C. Davatzikos, A. Genc, D. Xu, and S. M. Resnick, "Voxel-based morphometry using the RAVENS maps: methods and validation using simulated longitudinal atrophy." *Neuroimage*, vol. 14, no. 6, pp. 1361–1369, Dec 2001. [Online]. Available: <http://dx.doi.org/10.1006/nimg.2001.0937>
10. S. S. Keller, M. Wilke, U. C. Wieshmann, V. A. Sluming, and N. Roberts, "Comparison of standard and optimized voxel-based morphometry for analysis of brain changes associated with temporal lobe epilepsy." *Neuroimage*, vol. 23, no. 3, pp. 860–868, Nov 2004. [Online]. Available: <http://dx.doi.org/10.1016/j.neuroimage.2004.07.030>
11. M. L. Senjem, J. L. Gunter, M. M. Shiung, R. C. Petersen, and C. R. Jack, "Comparison of different methodological implementations of voxel-based morphometry in neurodegenerative disease." *Neuroimage*, vol. 26, no. 2, pp. 600–608, Jun 2005. [Online]. Available: <http://dx.doi.org/10.1016/j.neuroimage.2005.02.005>
12. N. Lange, S. C. Strother, J. R. Anderson, F. A. Nielsen, A. P. Holmes, T. Kolenda, R. Savoy, and L. K. Hansen, "Plurality and resemblance in fMRI data analysis." *Neuroimage*, vol. 10, no. 3 Pt 1, pp. 282–303, Sep 1999. [Online]. Available: <http://dx.doi.org/10.1006/nimg.1999.0472>
13. T. L. Jernigan, A. C. Gamst, C. Fennema-Notestine, and A. L. Ostergaard, "More "mapping" in brain mapping: statistical comparison of effects." *Hum Brain Mapp*, vol. 19, no. 2, pp. 90–95, Jun 2003. [Online]. Available: <http://dx.doi.org/10.1002/hbm.10108>