Marco Loog

Pattern Recognition Laboratory

TU Delft

Main Collaborators and Coauthors

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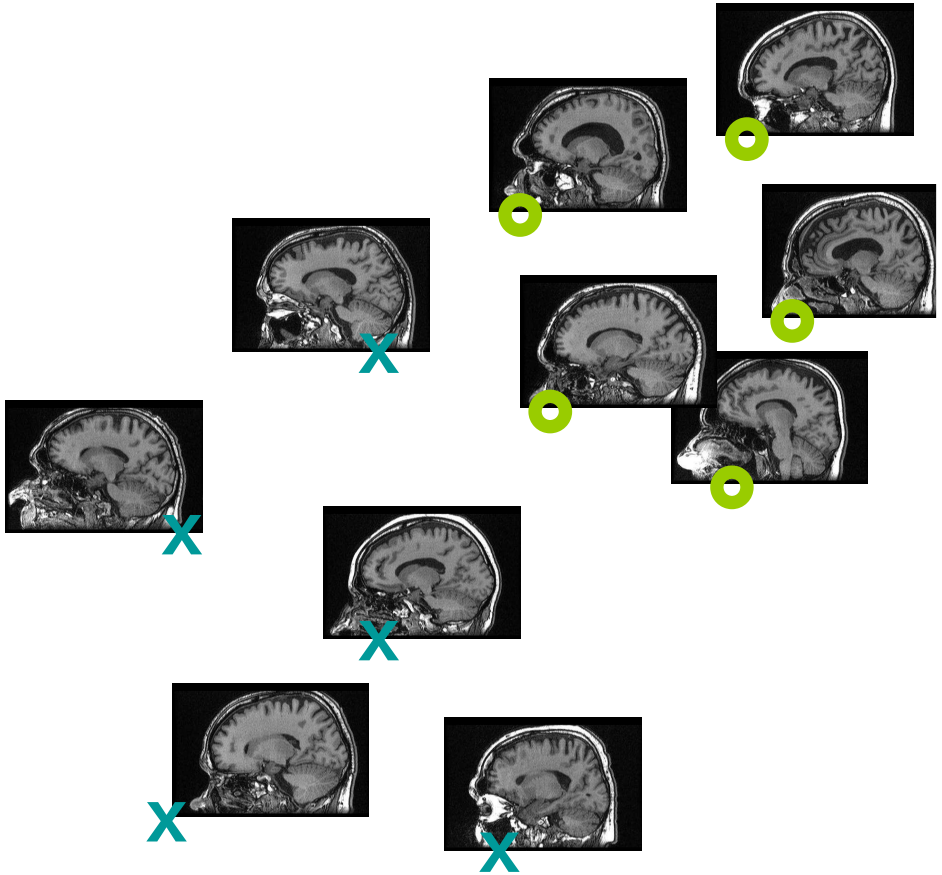
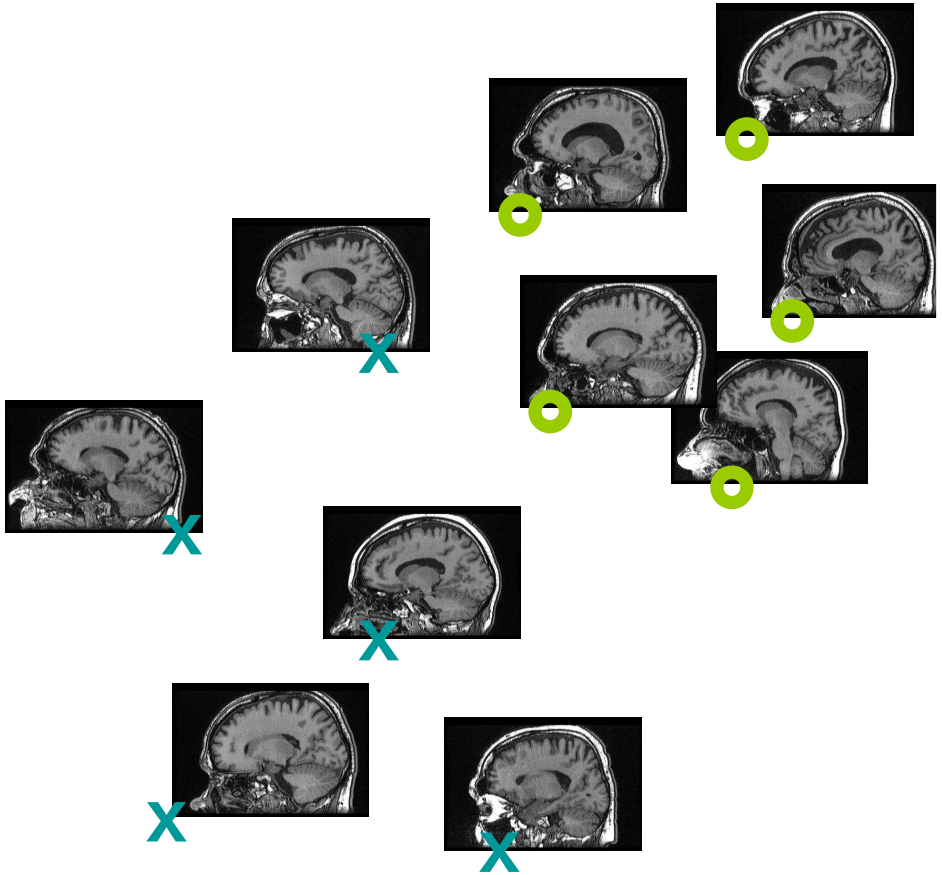
Standard Approach

- Features
  - Hippocampus volume
  - CSF volume
  - Cortex thickness
  - …



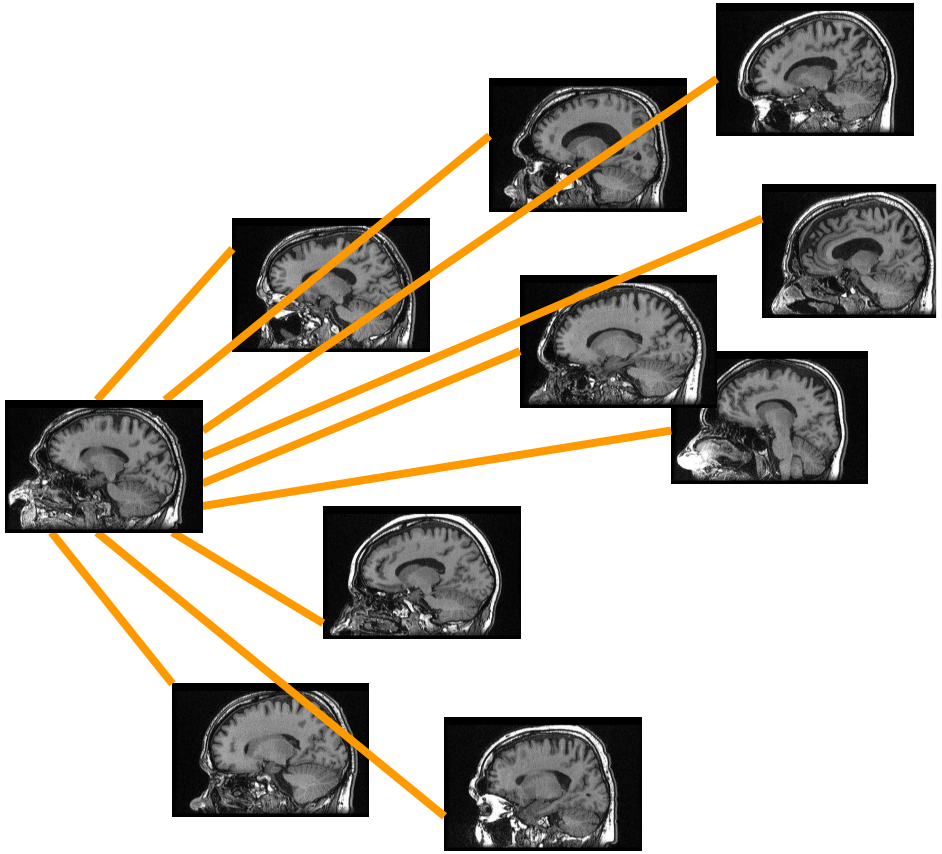
Standard Approach

- Features
  - Hippocampus volume
  - CSF volume
  - Cortex thickness
  - …
- Morphological changes

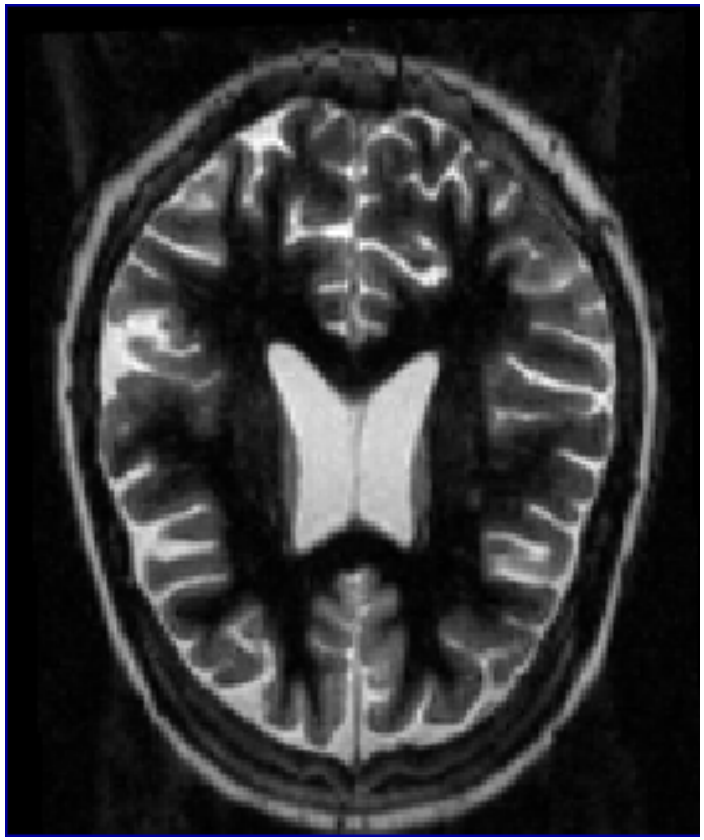


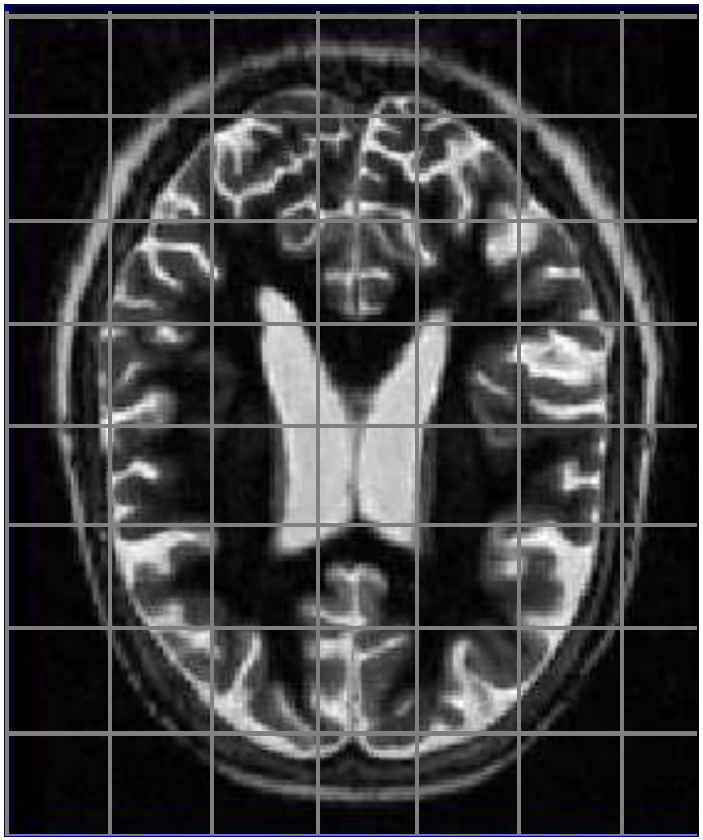
Dissimilarity Approach

- Many brain structures related to dementia
- Whole-brain pairwise comparisons
- Similar anatomy implies small distance

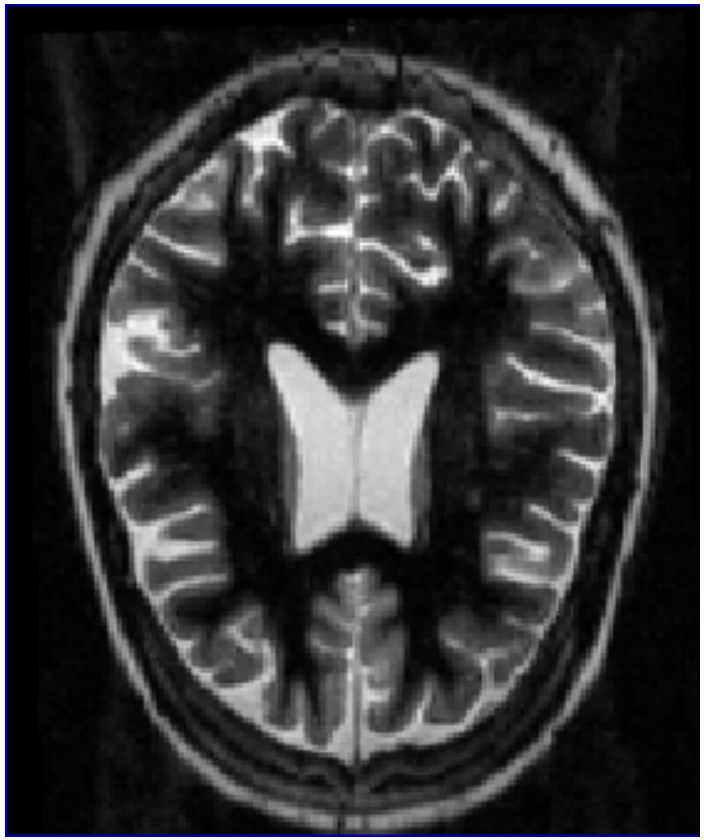


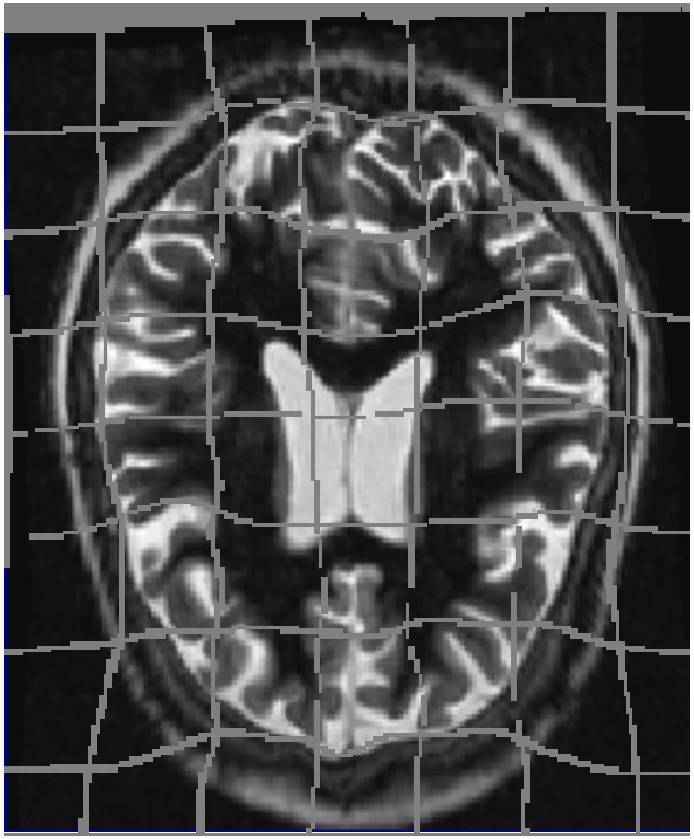
Registration-based Dissimilarity



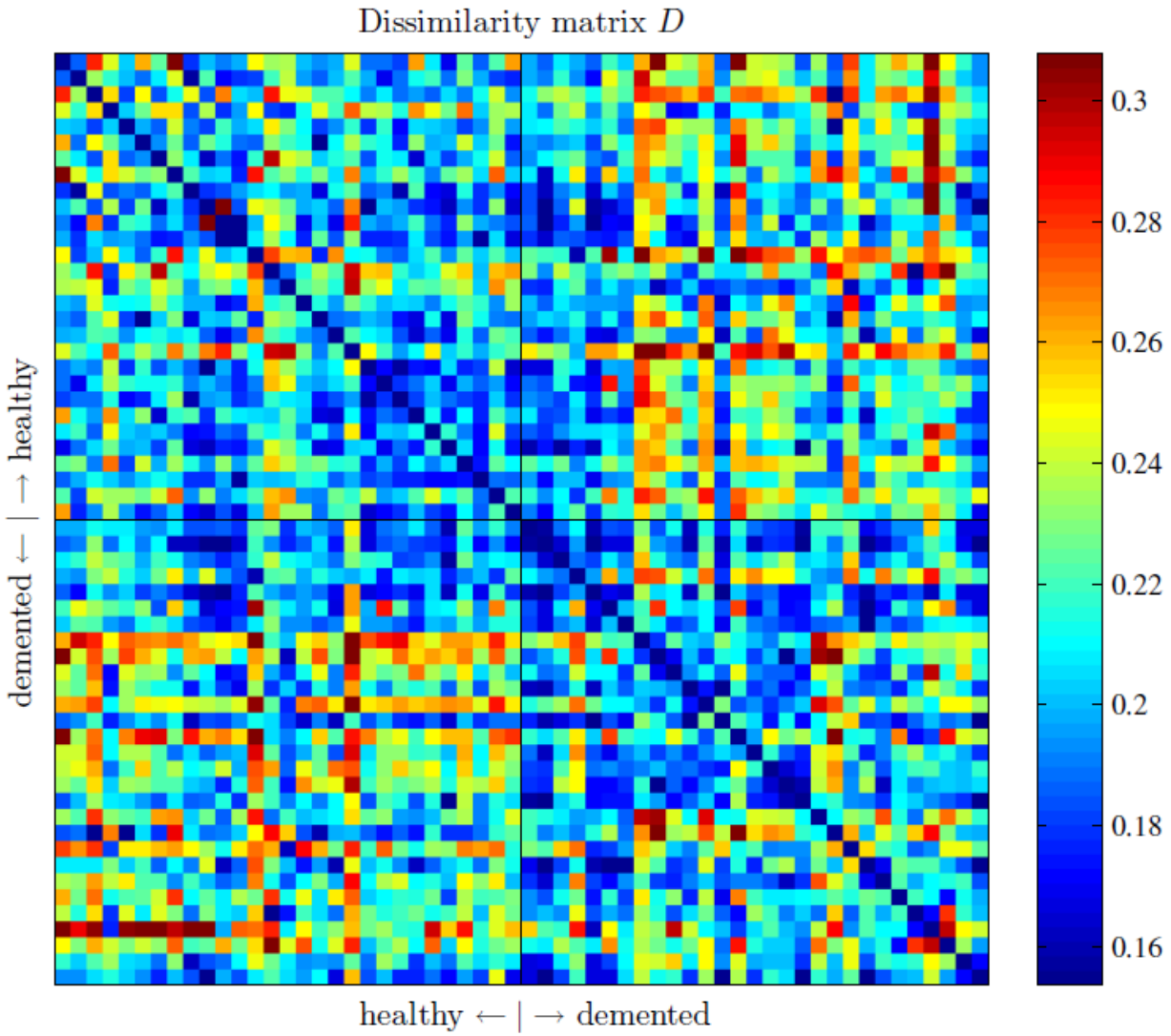


Registration-based Dissimilarity





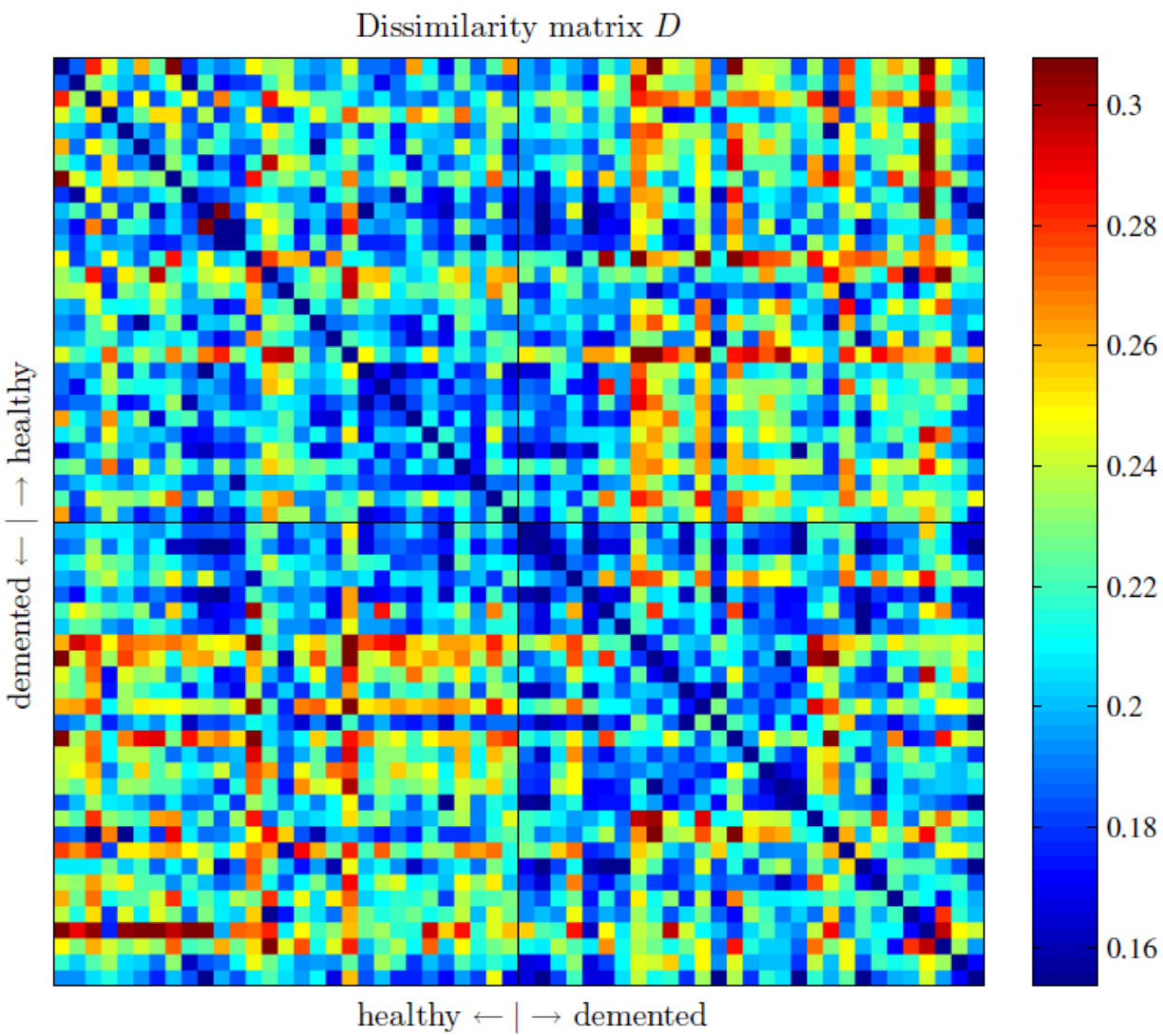
Symm std log det J

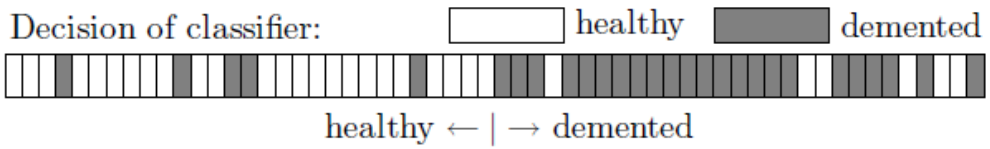


Data & Classifier

- 3D MR brain data of Rotterdam Scan Study
  - 490 subjects : all healthy when scanned
  - 5 years later : 29 subjects developed clinical symptoms of dementia
  - Selected 29 age and gender matched controls that remained healthy
- NMC in dissimilarity space

Results





Error rate : 0.19

Leave one out estimate

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Discussion

- Slight improvement over right hippocampus volume : error rate of 0.22
- Combining of classification results

- Overall error rates higher in some similar studies : prognostic vs. diagnostic

More Discussion

- Symm std log det J? Symm?

- kNN gave similar performance
- Various other simple classifiers [1NN, Fisher, regularized LDA, QDA, etc.] gave clearly worse results

- How to exploit knowledge that we are dealing with dissimilarity features?

Reference

- Klein, Loog, et al., *Early Diagnosis of Dementia Based on Intersubject Whole-Brain Dissimilarities*, International Symposium on Biomedical Imaging, 2010