Introduction

Texture analysis is a mathematical method used to analyse spatial patterns in an image (T1w MRI), such as smoothness, randomness and heterogeneity (Wearn et al., 2023)

- Healthy tissues have a smooth and homogenous texture
- Diseased tissue have a rougher texture - identified in an MRI by greater variation in gray scale values (pixel intensities) - higher texture score.

Some evidence that changes in texture is progressive and precedes alterations in brain region volumes.

Findings

1) Study Aims

- Some Methodological focus – TA optimization
- Distinct Study Groups – which describe different stages in Alzheimer’s Disease (AD) progression
  - AD vs MCI vs N – most common (n = 23)
  - AD vs Lewy Body dementia

2) Population sources

- Recruitment source = 9 Own, 21 ADNI dataset and 6 OASIS
- Benefit = Large sample size and more neuroimaging research opportunity
- Disadvantage = database protocol dictates research direction, compounding of errors, ADNI cohort generalizability problems

3) Region of Interests (ROI)

- 18 studies sampled from whole brain, 14 studies focused on Hippocampus, and other ROI (CC, Entorhinal cortex)
- Studies focusing on Medial temporal lobe higher accuracy
- Combining ROI produces higher accuracy
- Other MTL regions?

4) Texture analysis Technique

- Gray-Level Co-occurrence Matrix (GLCM) – most common (n = 21)
- GLCM calculates how often pairs of pixel with specific values and in a specified spatial relationship occur in an image,

Method

Structured literature review

Records Identified through database search (n = 239)
- PubMed (n = 64)
- Web of Science Core Collection (n = 175)

Duplicates removed (n = 108)

Record screened (n = 130)
- Excluded after title and abstract screening (n = 97)
- Doesn’t Predict/Classify or examine group differences in AD (n = 13)
- Not AD (n = 26)
- Not T1 MRI (n = 23)
- Not texture analysis (n = 30)
- Review (n = 7)

Full text screened (n = 36)

Articles include in the structured review (n ≥ 35)

4. Predicting Alzheimer’s disease conversion

- 8 studies focused on predicting MCI to AD conversion - all used ADNI
- 3 sampled from whole brain, 5 focused on hippocampus, and 2 of these also included other regions.
- Texture tends to out perform Volume measures
- Texture might correlate with cognition
- Texture has some potential as part of AD predictor model

Our study

- We are using the T1-W MRI collected by the Dementia prevention clinics (NZ-DPRC) to examine test textures ability to classify subjects and predict AD conversion
- Research gap we are addressing:
  - Examining texture in Subjective cognitive decline (SCD) group
  - Using a Non-ANDI, NZ cohort of participants
  - Examining other MTL region: Hippocampus, entorhinal, perirhinal and parahippocampal