Brain-Age and Cognitive Disorder Prediction from MRI-Images

CSE472 : Term Project

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Datasets

- **ADNI (Alzheimer's Disease Neuroimaging Initiative)**
  - T1-MRI Images (3D, 2D-sliced), 1.5T
    - 1-3 years follow-up, 2500+ samples
    - Cognitive Normal, Alzheimer's Disease, Minor Cognitive Impairment
  - T1-MRI Images (3D, 2D-sliced), 3T
    - 1-2 years follow-up, 2000+ samples)
    - Cognitive Normal, Minor Cognitive Impairment
- **GSP (The Brain Genomics Superstruct Project)**
  - T1-MRI Images (3D, 2D-sliced), 1.5T (1500+ samples, 60+ with follow-up)

Problem Definition

- To predict brain-age from MRI Images
- To classify cognitive status from MRI Images
- Correlation between ‘brain age-gap’ and cognitive disorders
- To classify cognitive status from ‘brain age-gap’
- (**Potential future exploration**): Learn patterns in subjects whose cognitive status deteriorates with age, to predict disorders in advance

Existing Architectures to Explore

- TSAN (Two-Stage Age Network)
- 3D-ResNet (Feature extraction with Attention)
- CNN-MLP (Joo et al.)
- Pyment (3D CNN, pretrained)
- DeepBrainNet (2D CNN on ImageNet)