ADHD fMRI Classification

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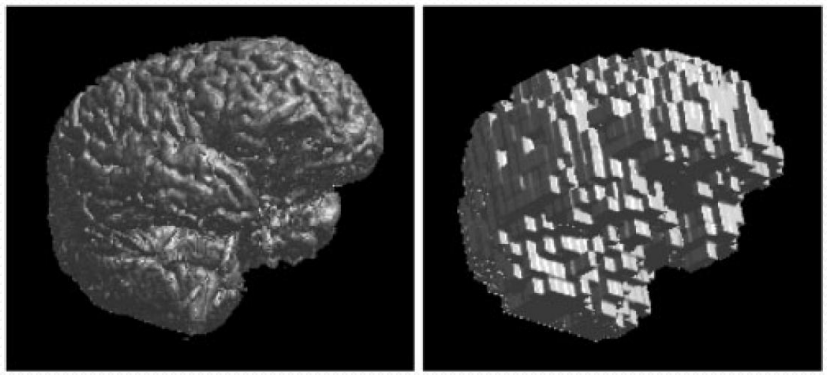
The Goal

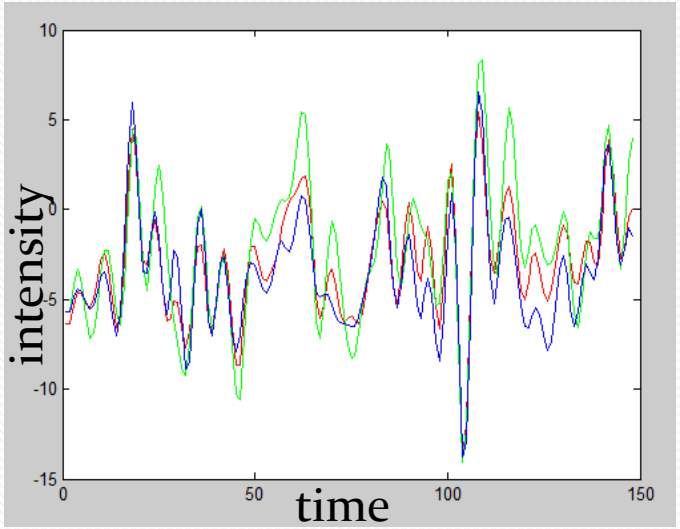
- Classify: ADHD or normal
  - Subtypes: hyperactive, inattentive, or both
- Given: 776 resting-state fMRI scans (ages 7-21)
  - 491 normal brains
  - 285 ADHD brains
  - Additional information: age, gender, diagnosis, handedness, IQ, medication status

What We Have

- Time series of 125,000 voxels in the brain
  - Higher blood oxygen level (i.e. activity in brain)→ higher intensity in the image

Voxels





Approaches

- Network approach
  - Study the relationship between a seed region and all other voxels
- Concordance approach
  - Cluster and analyze voxels that are behaving in a concordantly
    - Frequency, cluster size, cluster location, standard deviation, etc.
  - Variation: analyze voxels that are most different from their neighbors

Bag of Words Approach

- 1. Find n key time series via k-means
- 2. Given a test brain, make a histogram
  - n key time series → n bins
  - How many times does each key time series occur in the brain?
- 3. Feed the histogram into an SVM

Result: 77%

Variation on BOW Approach

- Find key player by extracting the most concordant regions in each brain
  - How will a different set of key time series affect the detection rate?
- Still working on it!