Identifying Alzheimer patients based on the analysis of graphs constructed from resting state fMRI data

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Project overview

What?

Classifying AD/MCI/Control individuals based on resting state fMRI-data

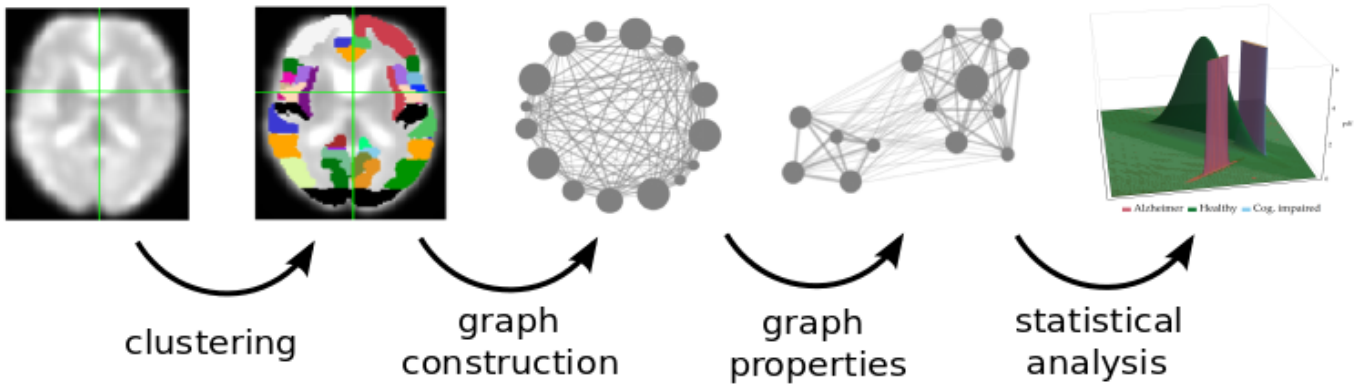
Why?

Expanding reportoire of AD diagnosis tools

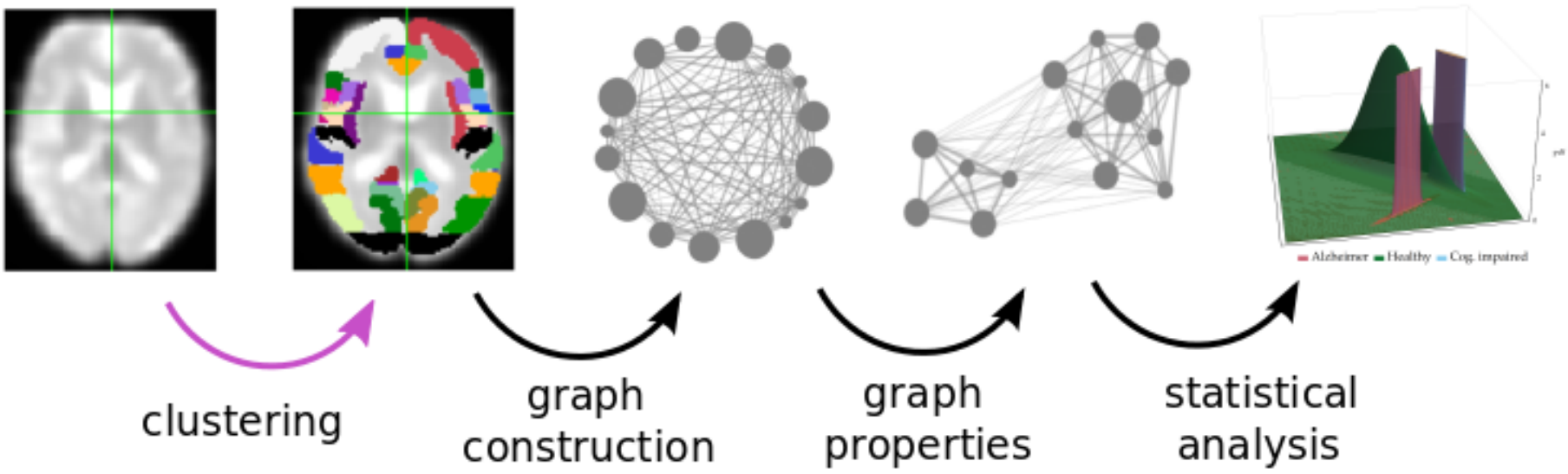
How?

Comparing properties of graphs derived from resting state fMRI data

Investigating different methods of graph construction

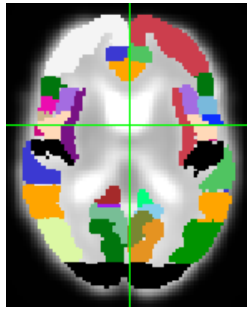


Clustering


clustering
graph construction
graph properties
statistical analysis

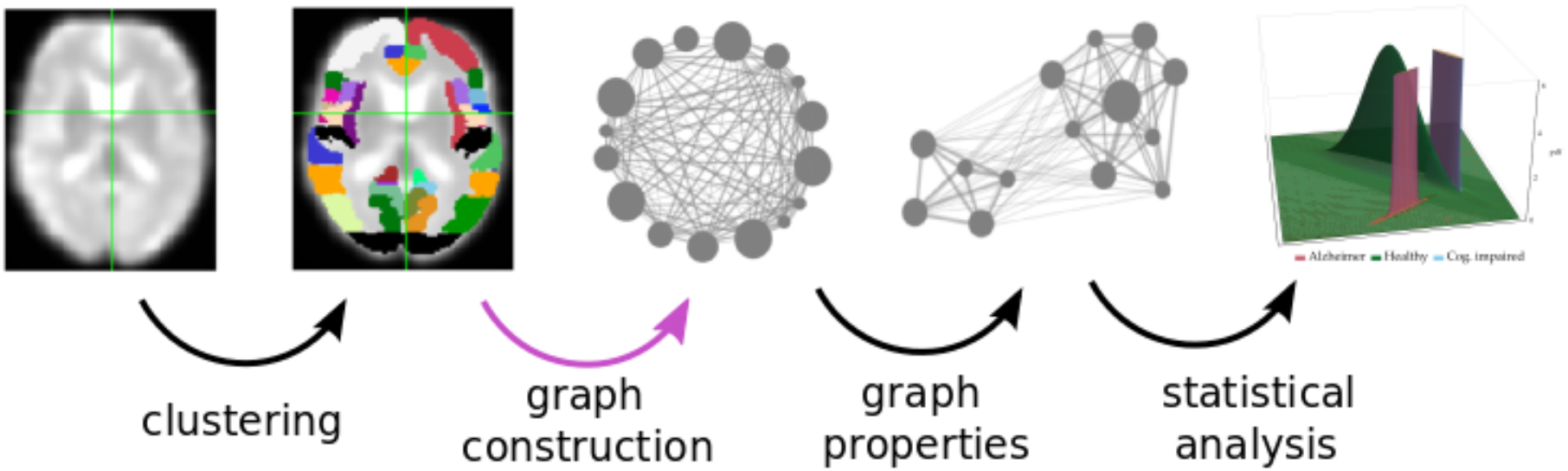
Clustering

- based on a structural **atlas**
  - mapping of individual brains to standard brain
  - same number of nodes for all individual graphsboxes-beaver
  - functional inhomogeneous signal



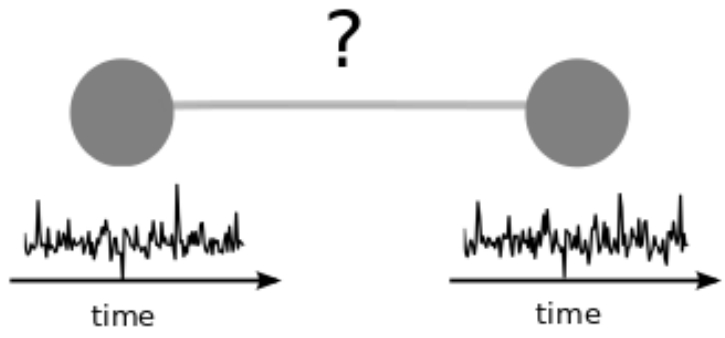
- **activity-driven**
  - region growing and selection, ward clustering
  - different number of nodes for individual graphs
  - functional homogeneous signal

Graph construction

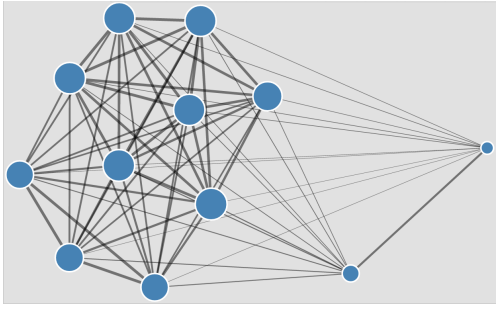


Graph construction

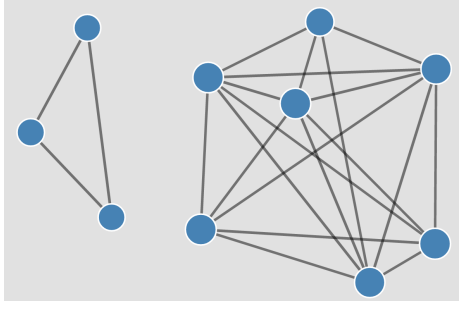
- how to measure functional connectivity?
  - time/frequency based
  - mode-based/model free
  - linear/non-linear



- thresholding graphs on different levels

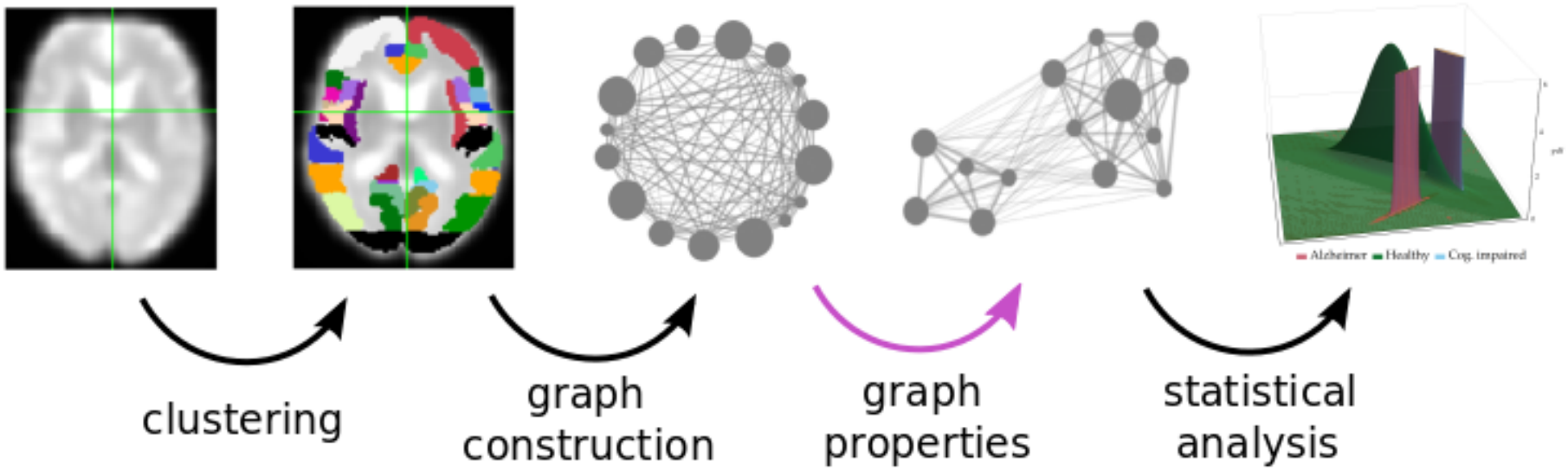


full graph



thresholded graph

Graph properties

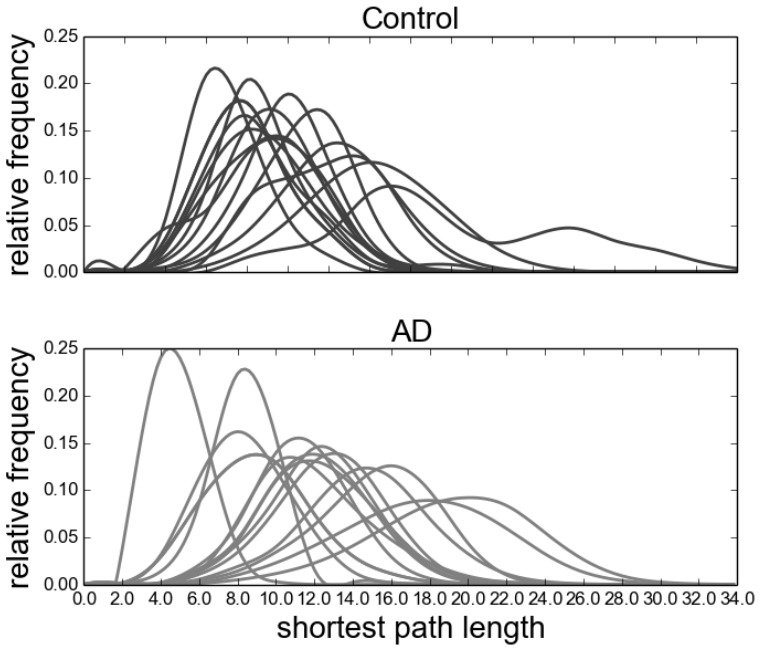


Graph properties

- various graph properties:

  e.g weighted degree, shortest path, clustering coefficient, modularity

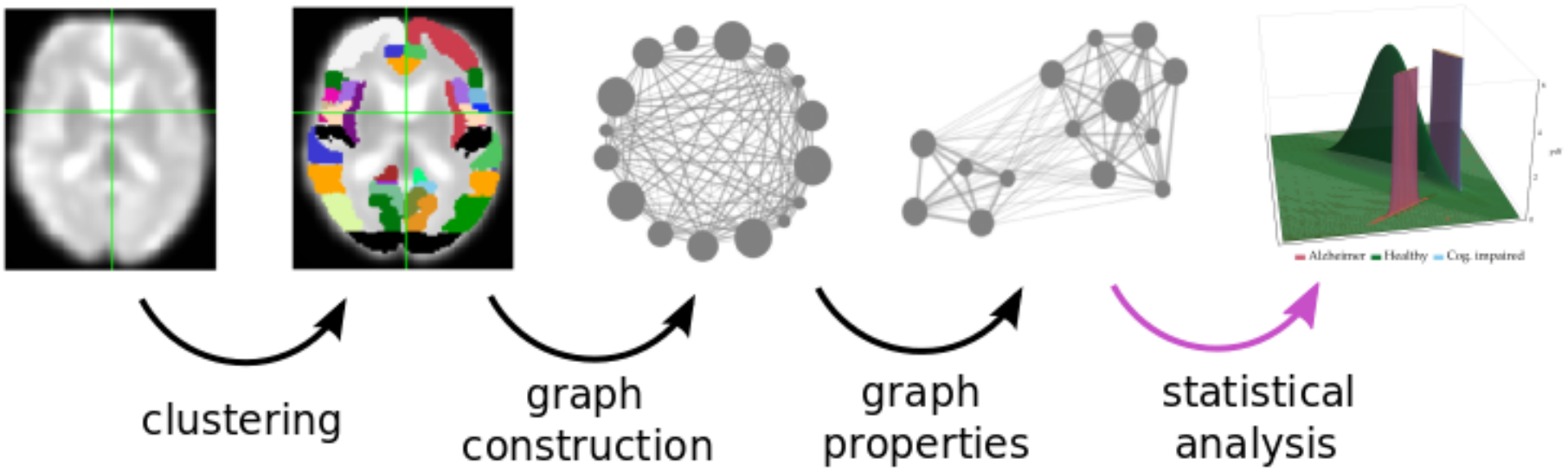
- huge diversity in distributions of graph properties across individuals



- first four moments used for statistical analysis

  (mean, variance, skewness, kurtosis)

Statistical analysis



Statistical analysis