Progress Report for Project Alpha

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Background

The Paper

- From OpenFMRI.org (ds009)
- "The Generality of Self-Control" (Jessica Cohen, Russell Poldrack)

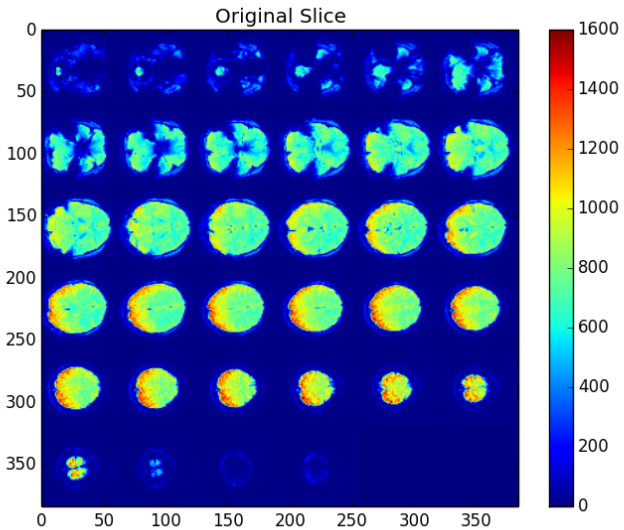
The Data

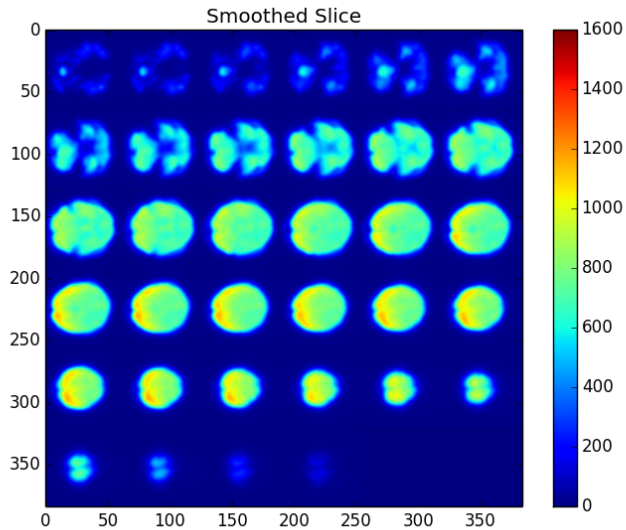
- BART study with event-related neurological stimulus (balloon demo)
- 24 subjects, 3 conditions per subject
  - Condition 1: Inflation
  - Condition 2: Pop Pop
  - Condition 3: Cash out dem monies
- Download, decompress and check hashes of data

Initial analysis

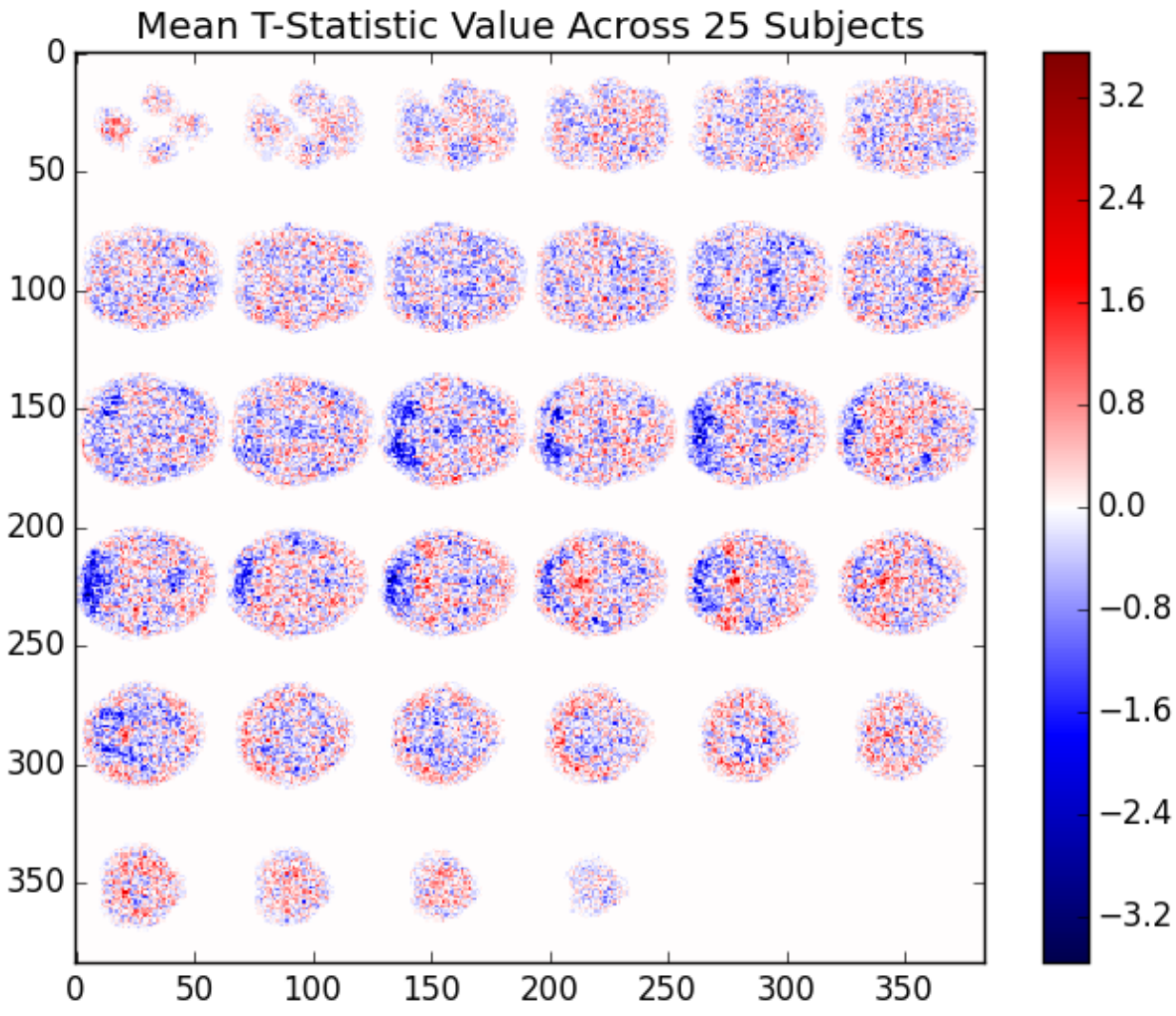
- Convolution: Worked with problems with event-related stimulus model
- Smoothing: Convolution with a Gaussian filter (scipy module)
- Linear regression: Single and multiple regression with stimulus (all conditions and seperate)
- Hypothesis testing: General t-tests on β values, and across suject analysis
- Time series: ARIMA model
- PCA: Modeling against SVD

Before and After Smoothing





Hypothesis Testing Across Subjects



Our Plan

Goal

- Trying to reproduce methods, but it won't all be the same

Issues we have encountered

- Convolution with event-related stimuli
- Approach to multiple subjects
- Scan time problems (large dimensions)
- Validation of performance
- Trying to replicate black box analysis

Our Plan

What we need to accomplish

- Preprocessing:
  - Resampling to correct for when the voxels were actual scanned (time shift)
  - Explore Convolution (3rd time's the charm)
- Analysis:
  - Multiple comparision:
    - Permutation test
    - Random field technique
    - Benjamini-Hoffberg

Comments about our Project

Most difficult aspect of project?

- Direction of project

Success in overcoming these obstacles?

- |————————————————————|
- ^ This successful ^

Most useful parts of class?

- Git workflow

The Project continued

What do we need to successfully complete the project?

- Define better goals, and set an end goal
- Take advantage of pre-existing toolkit
- Tie our analysis and conclusions back to the original paper

Difficulty of making work reproducible?

- Writing tests that maintain our coverage
- Relative paths and making sure nosetests/Makefiles work properly

Potential topics to cover in class in the future

- Coding best practices and style
- Python approach to machine learning (scikit-learn)
- Other popular software tools used in collaboration
- Learning basics of Pandas