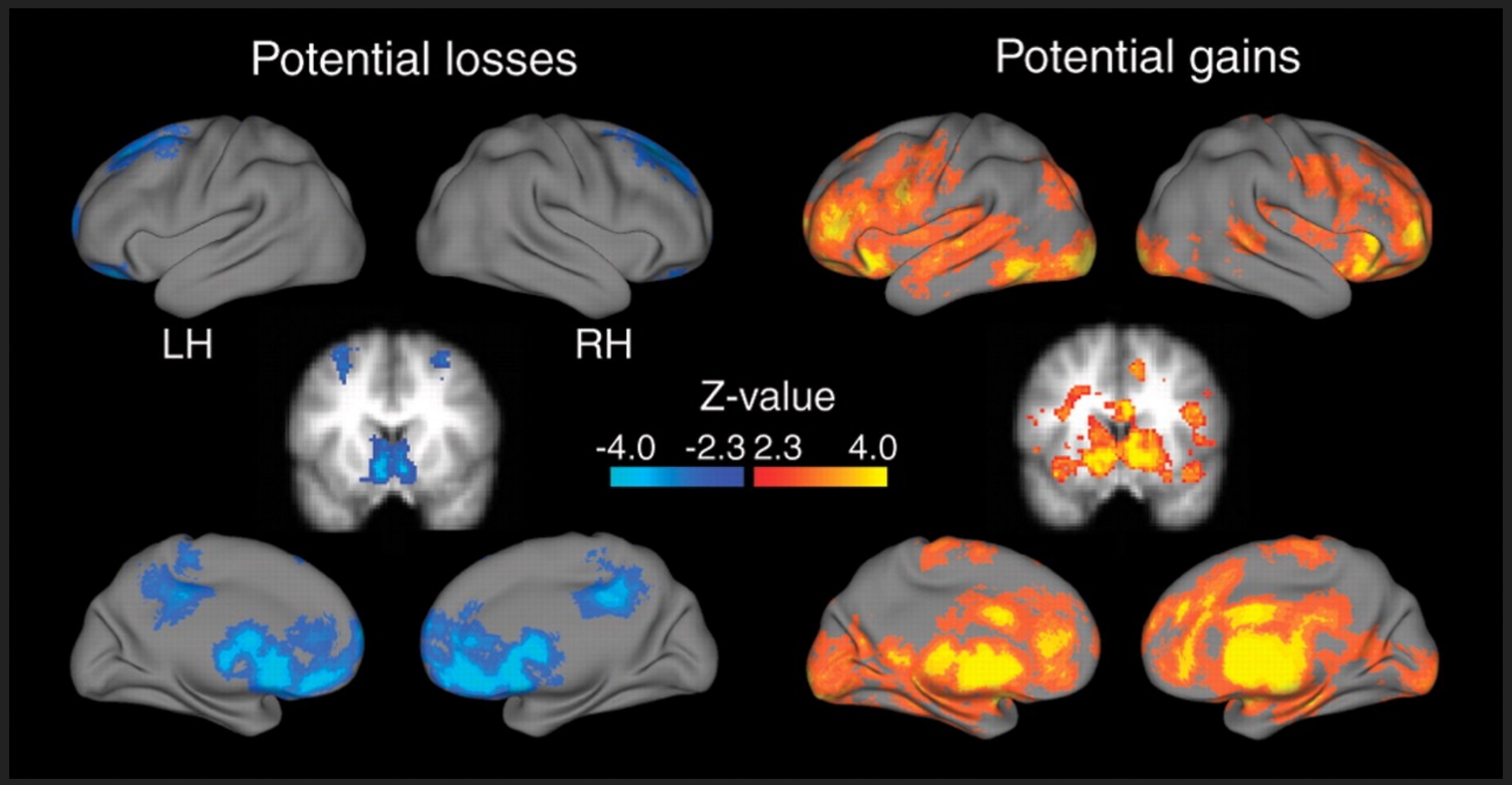


VICTOR KONG KAREN LI ANNA LIU ERIC QIN SOPHIA XIA

PROJECT DELTA

BACKGROUND

The Paper

- From OpenFMRI.org (ds005)
- “The Neural Basis of Loss Aversion in Decision Making”
- Sabrina M. Tom et al. (2007) in Science

The Data

- 16 subjects, 1 task per subject, 3 runs per task
- Examine neural systems that process decision utility with fMRI data
- Task:
  - Subjects offered 50/50 wager
  - Varying potential gains/losses
  - Prompted for decision to accept or decline

COMPLETING AND/OR IN PROGRESS

Data Fetching and Preprocessing

- Download from OpenFMRI.org and decompress
- Plot to explore potentially useful information
- Drawing summary statistics from plotted data
- Smoothing seasonal noise

Initial Analysis

- Hypothesis testing
- Convolution
- Logistic Regression
- Linear regression
  - Multiple and single regression with stimulus

OUR PLAN

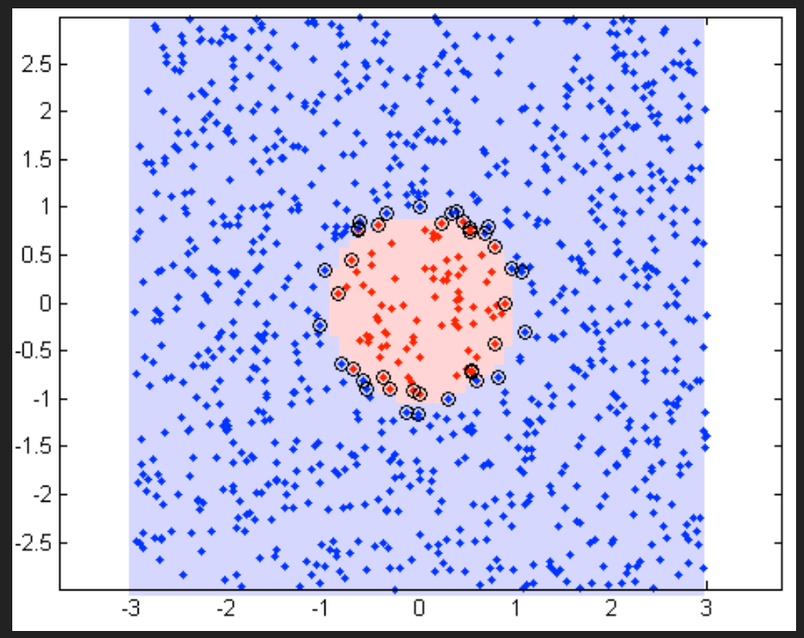
Goal

- To reproduce methods as well as adding our own thoughts into it
- Using other methods that may or may not come to the same conclusion

Methods and Analyses to Perform

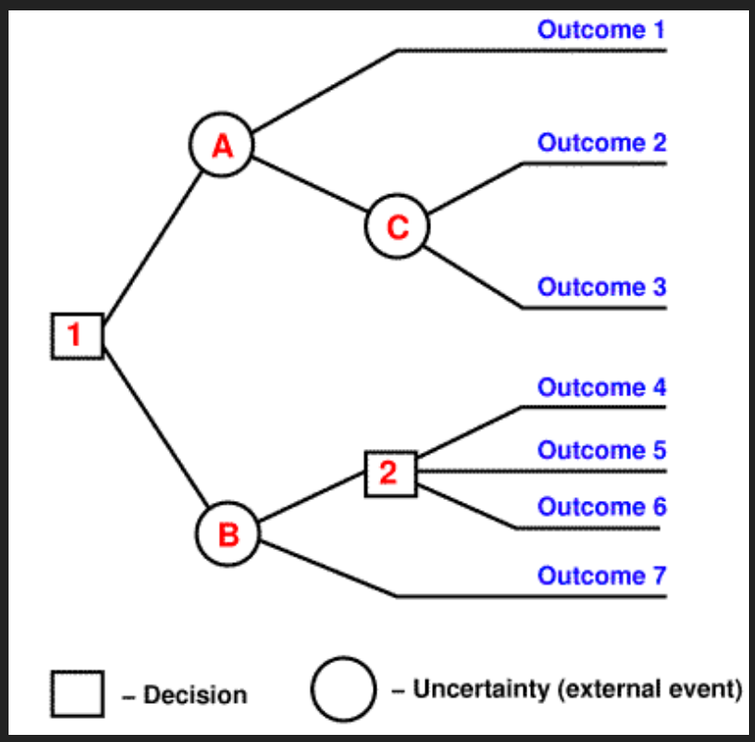
- Hypothesis tests
- Linear regression, Logistic regression, Correlation analysis
- Robust regression analysis, Principle component analysis

OUR PLAN



Methods and Analyses to Perform (cont'd)

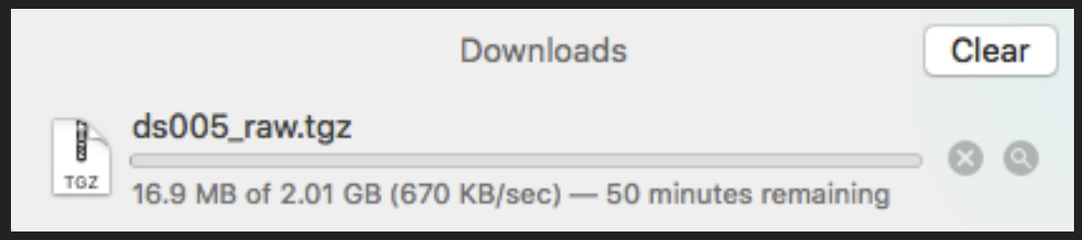
- Support vector machines
  - Process: draw boundaries between clusters
  - Classify brain parts:
    - Parts (de)activate most when making decisions?
    - Parts are active given a good/bad/obvious/etc. wager?
    - Are these parts the same or different?
- Decision trees
  - Process: analyze inputs consecutively
    - Models human decision-making well
  - MANY questions:
    - What results from combinations of parts activating?
    - What results from combinations of gains/losses?
    - What parts activate given combinations of gains/losses?



OUR PLAN

- Simplification steps
- Issues we have discussed
- Methods of validating models
  - t-tests
  - RSS
  - Cross-validation

OUR PROCESS



Most Difficult Parts of the Project

- Size of data
  - Spent much time deciphering format
  - What we need and don't need
- Writing tests for functions
  - Lack small piece of data that we know all about
  - Can improvise for simple functions only

Issues Working as a Team

- Difficult for all to meet together
- Different styles of coding and documenting
- Difficult to communicate what we want to do
  - Don't tell each other what we plan to do
- Organizing GitHub repository

OUR PROCESS

Most Useful Parts of the Class

- Linear modelling
- Correlation per voxel

Least Helpful Parts of the Class

- Comparison to R
- Mathematical writing

What We Need to Accomplish in the Project

Potential Topics to Cover in Future

- More linear regression, ANOVA, Principle component analysis
- Machine learning (classification, regression, cross-validation)
- Permutation tests (bootstrap)
- Software tools (Git, Python)