

Signal processing and Analysis of human brain potentials Milestone 2

Identification of canonical neural events during continuous gameplay of an 8-bit style video game

- **Research Question:** Can canonical neural activities be identified in uncontrolled continuous EEG data?

Preprocessing

- Subject Cleaning
- Re-referencing, interpolating bad electrodes
- Remove 6 most ventral electrodes
- Event epoching, segment data around key events
- Filter bad channels and epochs using FASTER
- Filter blinks and eye movement with ICA
- High-pass & Low-pass filters, baseline correction
- Time-frequency analysis
- Normalization & ITPC Calculation

Statistical Analysis

- t-tests between exemplar & video game events
- Compute LASSO regression weights
- Double-cross validation for training and validation
- Transfer LASSO weights
- Evaluate by computing transfer biases

Preprocessing

- Subject Cleaning
- Re-referencing, interpolating bad electrodes
- Remove electrodes based on Kurtosis
- Event epoching, segment data around key events
- (skip FASTER?)
- Also filter muscle artifacts with ICA (ICLabel?)
- High-pass & Low-pass filters, baseline correction
- Time-frequency analysis
- Normalization & ITPC Calculation

Statistical Analysis

- t-tests between exemplar & video game events
- Compute Elastic net regression (?)
- More modern classifiers e.g. EEGNet CNN (??)
- Double-cross validation for training and validation
- Transfer learned weights
- Evaluate by computing transfer biases