Brain Racer

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Problem Description
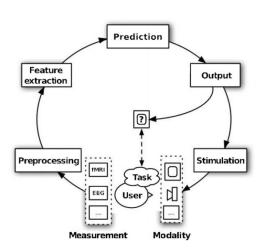
Cybathlon: robust zero training classifier

Foreseen challenges

- Covariate shift (Bickel et al., 2009)
    - between
    - within
- EEG-performance in general (actual movement (Blokland et al., under review))
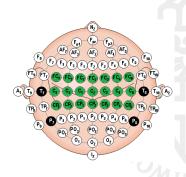- Online classification

BCI cycle

Preprocessing + Feature Extraction

- Preprocessing
  - Channel selection
  - Spatial filter
  - Detrending
  - Windowing
- Feature Extraction
  - Welch's method
  - μ and β frequencies

Classification Pipeline

- KMeans
- Multivariate Gaussian EM
- PCA
- Logistic Regression

Performance?

Classification Pipeline

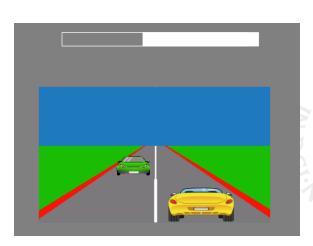- KMeans
- Multivariate Gaussian EM
- PCA
- Logistic Regression

Classification at chance level $\rightarrow$ plan B: ERSP classifier with adaptive LR.

Stimulation

Pipeline

Experiment Pipeline

| Introduction | sendEvent: start | wait 250ms for class | animate | pause 3 sec |

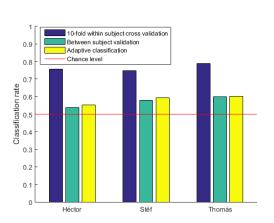| getEvent: start | collect 2 sec data | sendEvent: class |
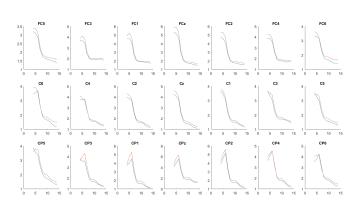
Class distinctiveness

2 ways of validating

- Between: Trained on 2 $\rightarrow$ tested on 1
- Within: Cross validated on each subject

Results

Take Home Message

- Adaptive approach produced slightly better results
- More subjects and sessions needed to build prior