709.028
Non-invasive BCIs KU
Exercise #1

Jonas Ditz
Institut of Neural Engineering / BCI Lab

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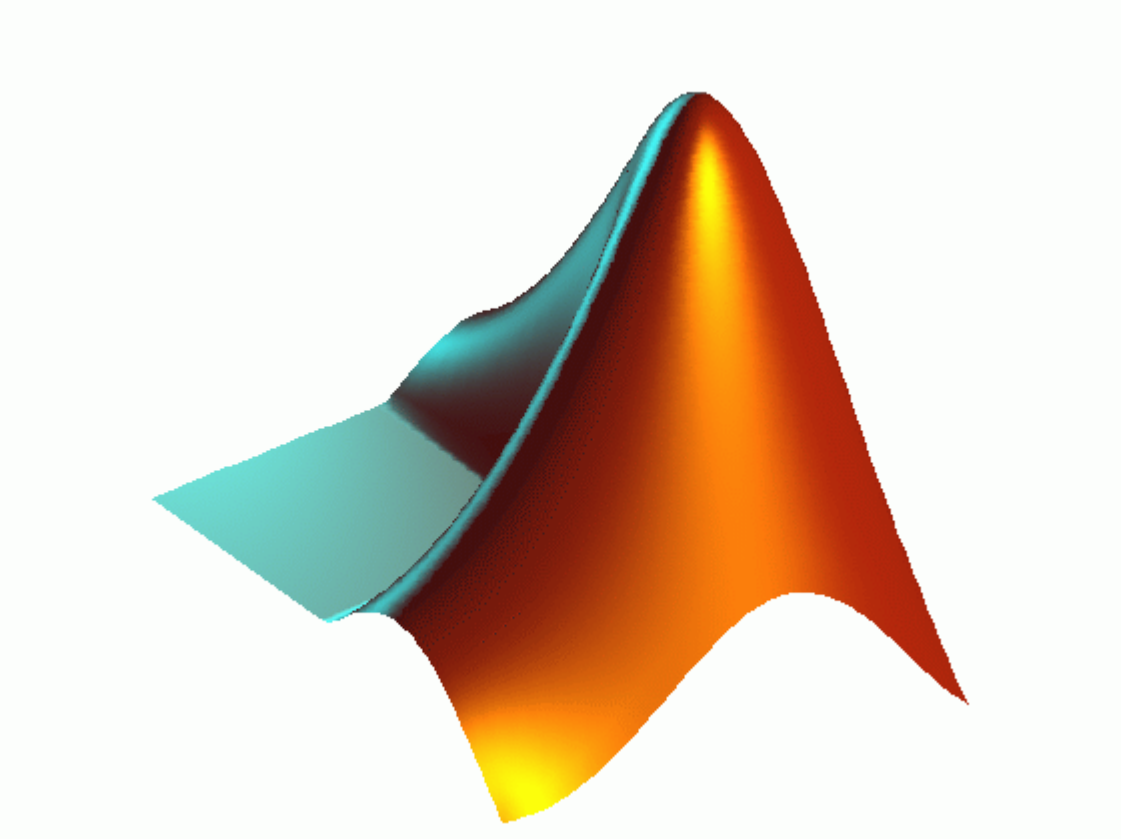
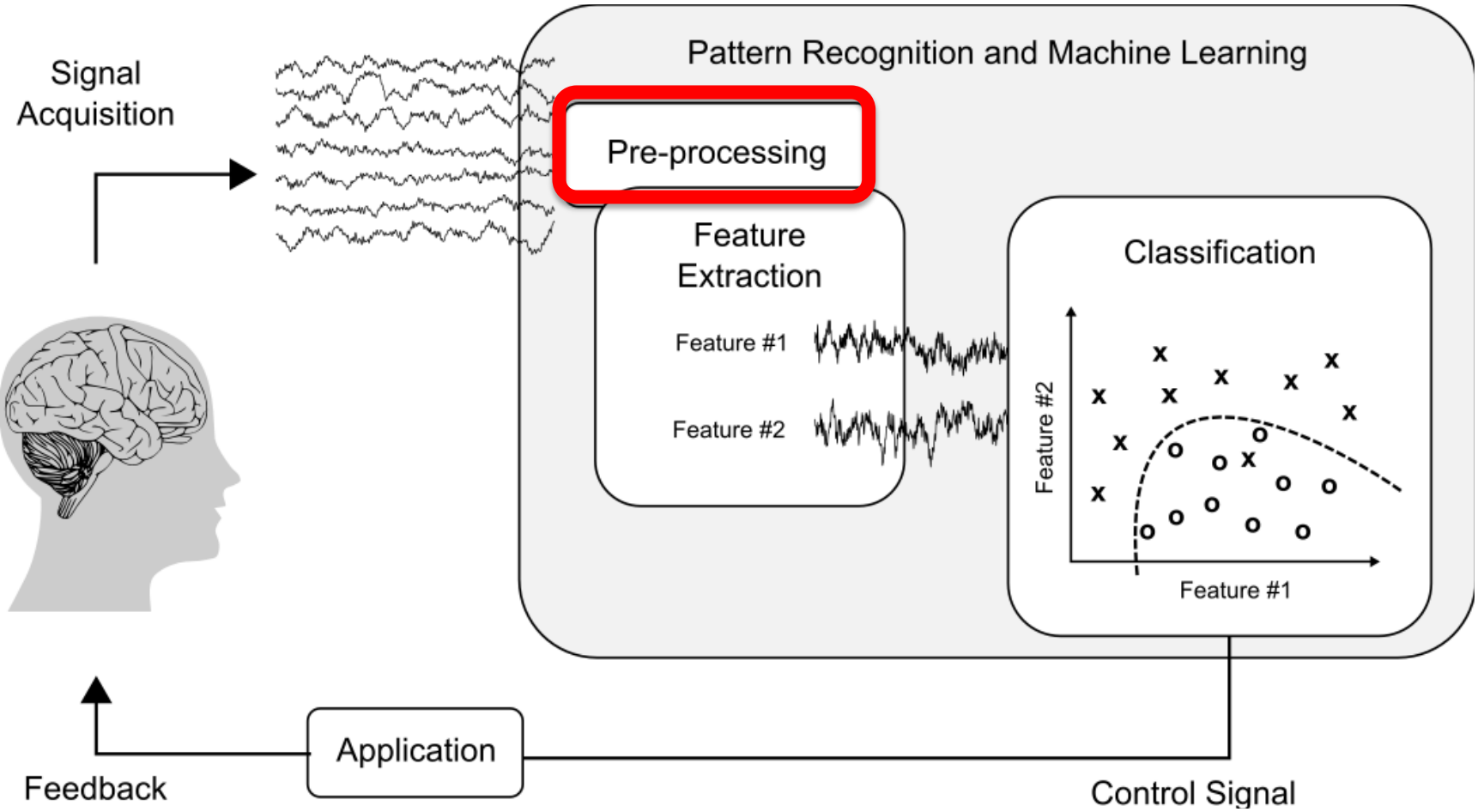
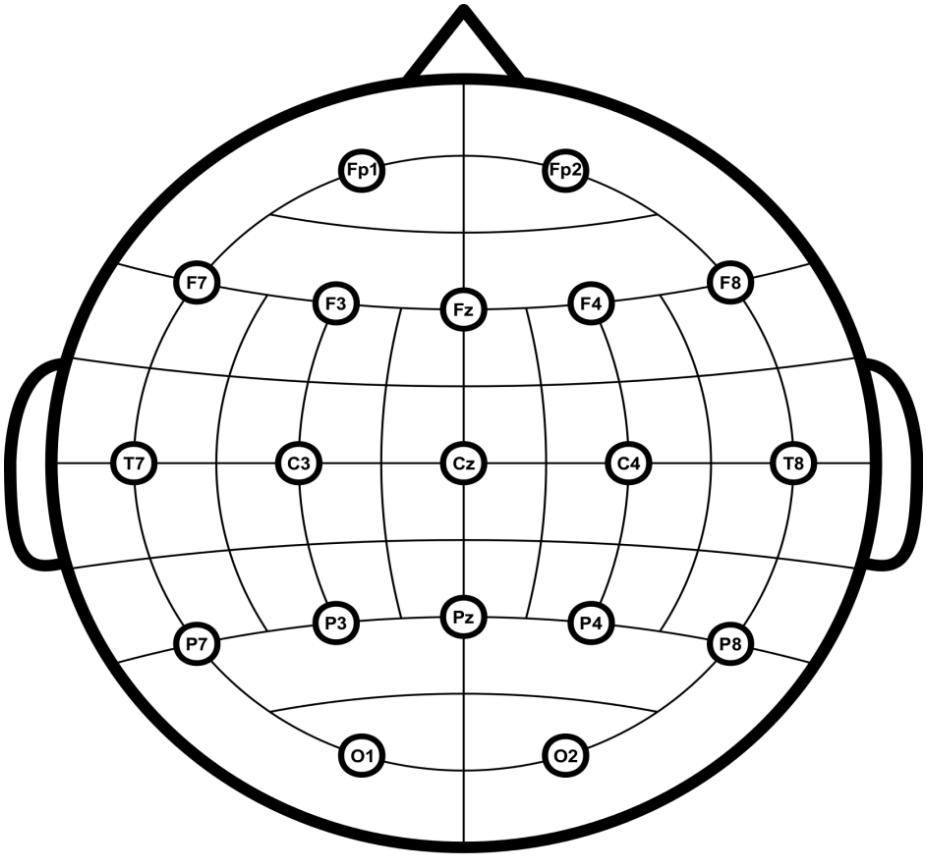
Introduction to Matlab



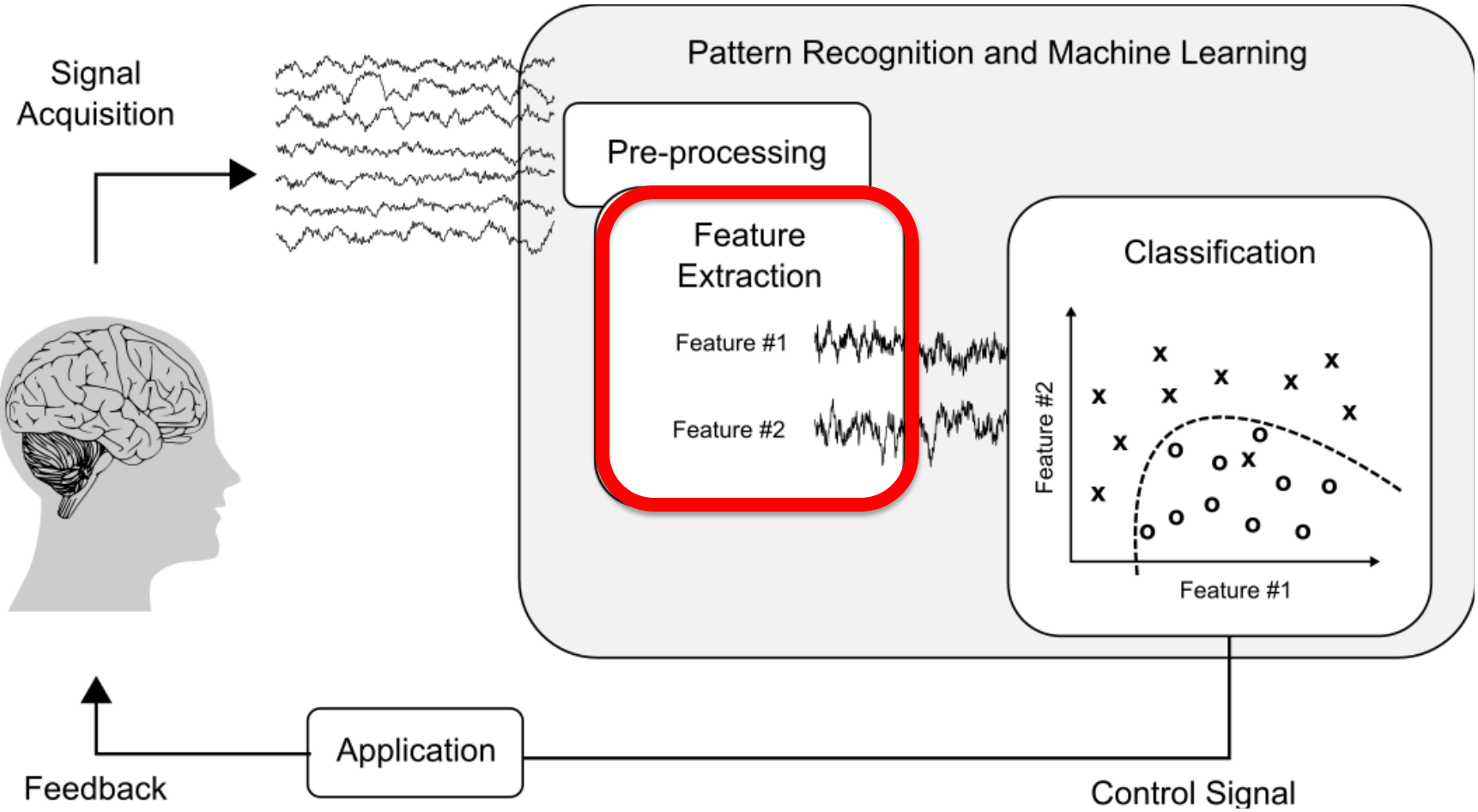
BCI Scheme


Signal Acquisition
Pattern Recognition and Machine Learning
Pre-processing
Feature Extraction
Feature #1
Feature #2
Classification
Feature #2
Feature #1
Application
Feedback
Control Signal

Spatial filter



BCI Scheme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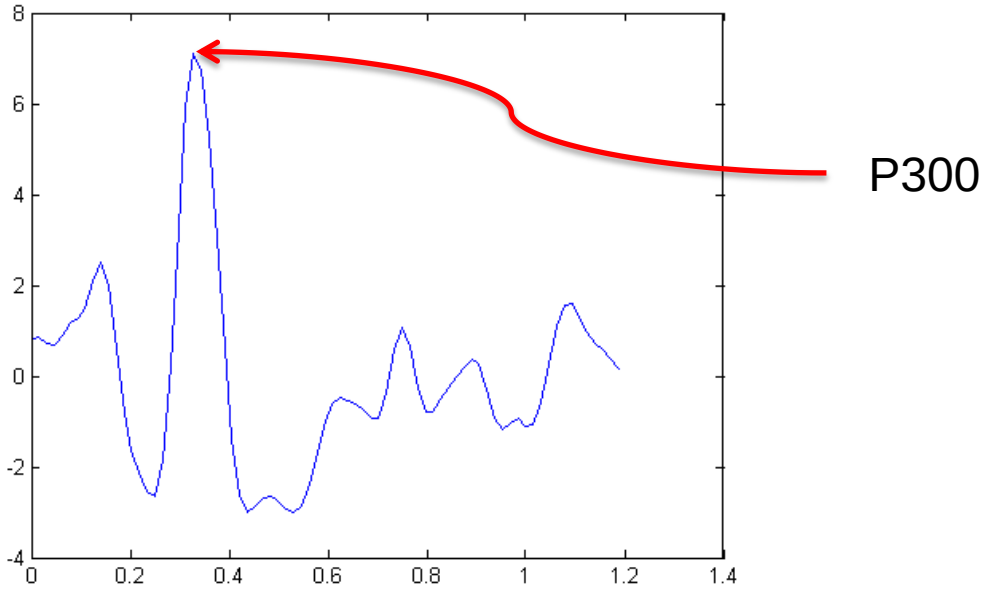
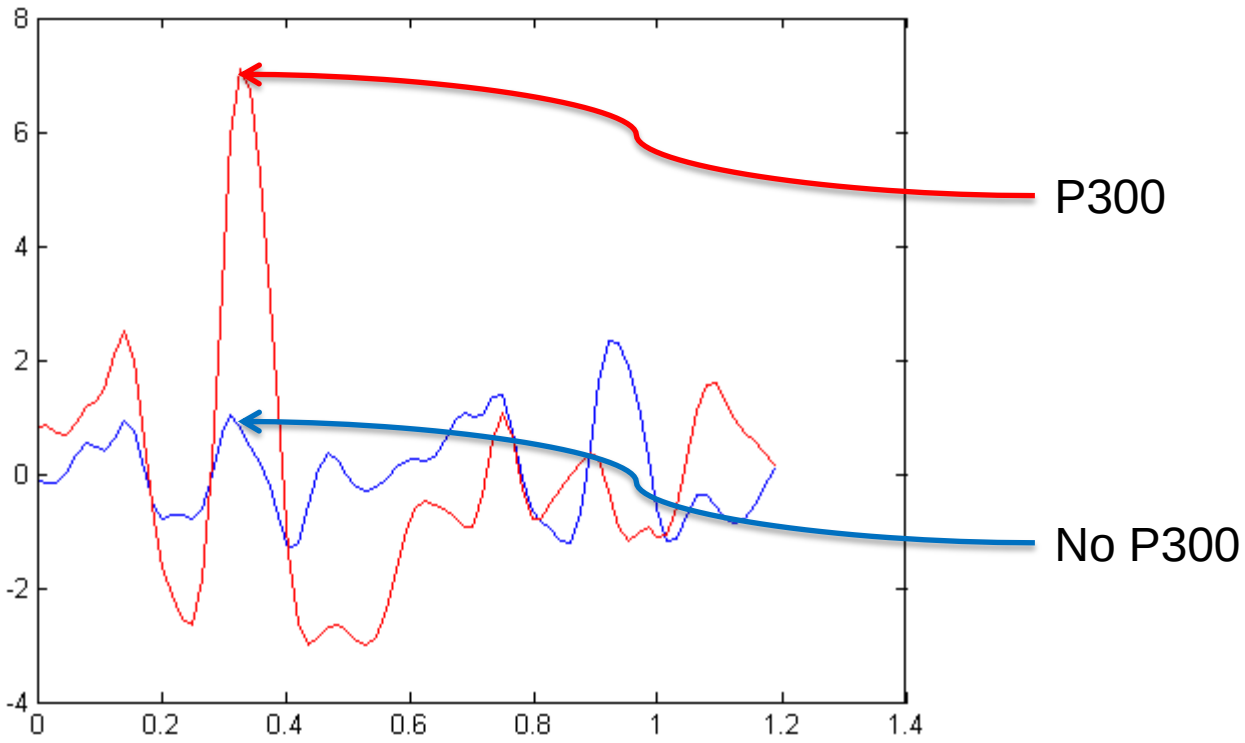
P300

- Positive peak 300ms after an odd rare target stimulus

Here: Beeps at a specified frequency interrupted by rare beeps with a higher frequency



P300: Target vs non-target



P300: Signal-tao-Noise ratio (SNR)

$$SNR[dB] = 10 \cdot log_{10}(N \cdot \frac{P_S}{P_N})$$

$P_S \sim 4.3\ \mu W$ $P_N \sim 75\ \mu W$ $N = 1$

$$SNR[dB] \sim -12\ dB$$

$P_S \sim 4.3\ \mu W$ $P_N \sim 75\ \mu W$ $N = 400$

$$SNR[dB] \sim 14\ dB$$