Introduction to Modern Brain-Computer Interface Design

Overview

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Swartz Center for Computational Neuroscience

- Makers of open-source analysis tools:
  - EEGLAB (and plugins, e.g., MPT, NFT, AMICA)
  - BCILAB
  - SIFT
  - MoBILAB

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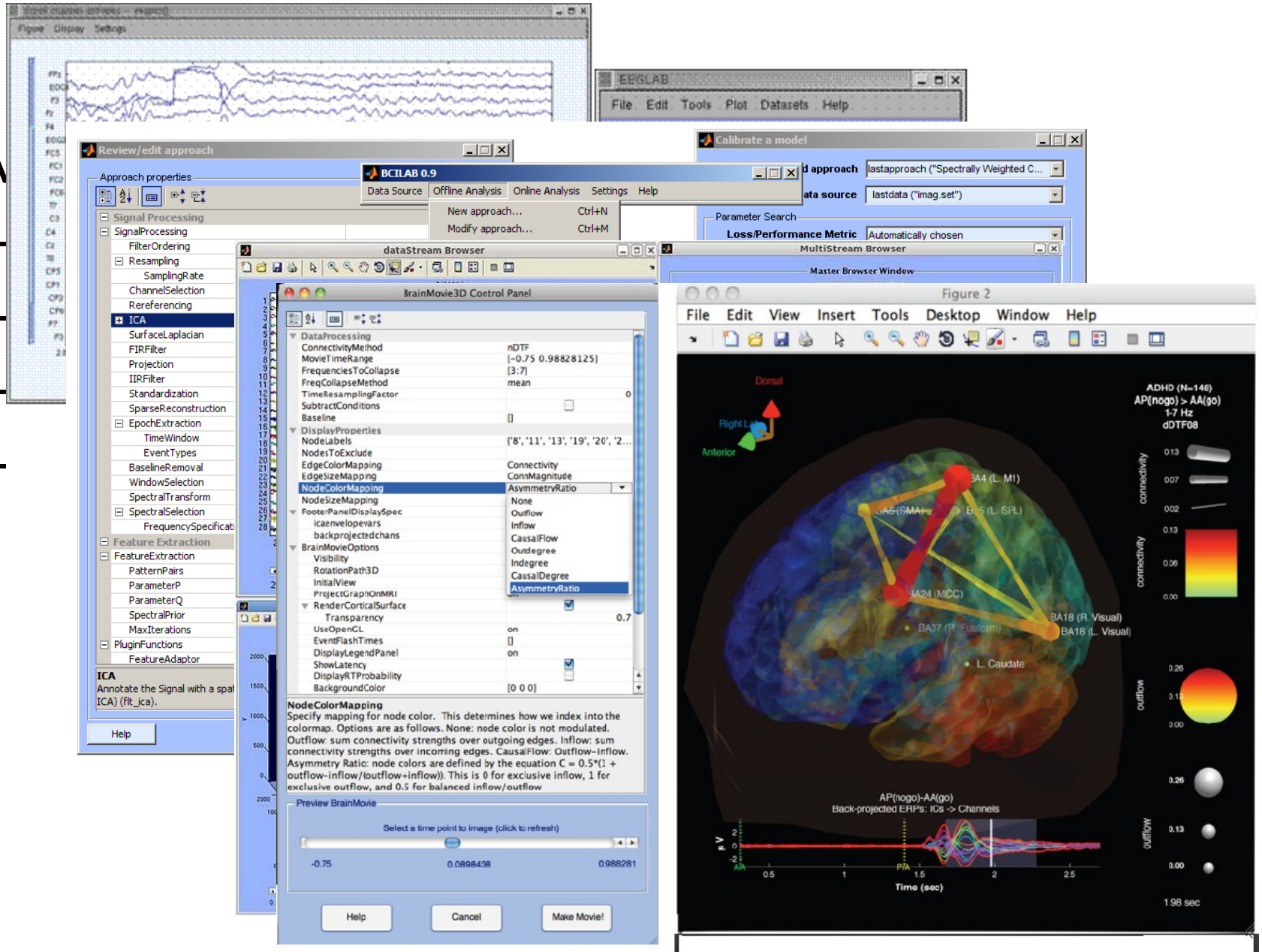

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- Makers of open-source analysis tools:
  - EEGLAB (and plugins, e.g., MPT, NFT, AMICA)
  - BCILAB
  - SIFT
  - MoBILAB
- Now also makers of open-source real-time experimentation tools:
  - Lab Streaming Layer (LSL)
  - SNAP (stimulus presentation)

Course Prerequisites

- Linear Algebra
- Fundamentals of Programming
- Coding Experience with MATLAB

Course Overview

- Part I: Introduction to BCI Design
- Part II: The BCILAB Toolbox
- Part III: Handling Complex Brain Processes

Part I: Introduction to BCI Design

- Lecture 1: Introduction
- Demo 1: The Lab Streaming Layer
- Lecture 2: EEG Basics
- Lecture 3: Signal Processing in BCIs
- Lecture 4: Adaptivity and Machine Learning
- Lecture 5: ERP Processing
- Exercise 1: Implementing ERP-based BCIs

Part II: The BCILAB Toolbox

- Lecture 6: BCILAB Toolbox Anatomy
- Demo 2: BCILAB GUI Walkthrough
- Exercise 2: ERP Analysis in BCILAB

Part III: Handling Complex Brain Processes

- Lecture 7: Oscillatory Processes
- Exercise 3: Implementing CSP-based BCIs
- Lecture 8: Optimization-based Approaches
- Lecture 9: BCILAB Scripting and Plugins
- Exercise 4: Scripting Online Analyses in BCILAB
- Exercise 5: Scripting Offline Analyses in BCILAB
- Lecture 10: Neuroscience Aspects and Outlook


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Questions?