Resource Summary Report

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BCILAB

RRID:SCR_007013
Type: Tool

Proper Citation

BCILAB (RRID:SCR_007013)

Resource Information

URL: http://sccn.ucsd.edu/wiki/BCILAB

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Description: Open Source MATLAB toolbox and EEGLAB plugin for the design, prototyping, testing, experimentation with, and evaluation of Brain-Computer Interfaces (BCIs), and other systems in the same computational framework. It facilitates the design and development of new methods for cognitive state estimation and their use in both offline data analysis and real-time applications. BCILAB includes an easily extensible collection of currently over 100 methods from the literature (covering signal processing, machine learning and BCI-specific methods). Aside from supporting advanced BCI research, a special aim of BCILAB is to facilitate the adoption of machine learning and advanced statistical modeling for functional neuroimaging purposes in tandem with the EEGLAB platform. The toolbox offers multiple different interfaces which link to the same backend functionality, including a GUI, scripting support (MATLAB-based), APIs for real-time processing, and a variety of extension component interfaces. MATLAB programming is not strictly necessary, as most BCILAB features can be accessed from the GUI, although it is required for batch scripting and custom extensions. The strength of MATLAB-based software lies in its resources for leading-edge scientific computing, as well as in the good support for rapid prototyping, but BCI systems developed in it can be used for real-time out-of-lab experimentation, and can in principle be deployed without the need for a MATLAB license. However, due to the complexity and overhead of the MATLAB environment, the system is best used as a research platform, and not as a product development environment -- end-user software is ideally re-implemented in a compiled language, after a suitable approach has been identified and extensively tested. The process of identifying and testing an approach involves more than just computation, but also data exploration and investigation - an area which is helped by the deep integration with the EEGLAB platform. In the future, this integration will be further strengthened, bringing rich statistical learning and signal processing into routine EEG analysis workflows. The toolbox has been developed by C. Kothe at the Swartz Center, inspired by the preceding PhyPA BCI toolbox created by C. Kothe and T. Zander at the Chair for Human-Machine Systems, Berlin Institute of Technology.

Abbreviations: BCILAB

Resource Type: software resource, source code

Keywords: brain-computer interface, discriminant analysis, temporal integration, matlab, eeg, meg, electrocorticography, statistical operation, temporal transformation, signal processing, machine learning

Availability: GNU General Public License

Resource Name: BCILAB

Resource ID: SCR_007013

Alternate IDs: nlx_153810

Alternate URLs: http://www.nitrc.org/projects/bcilab

Record Creation Time: 20220129T080239+0000

Record Last Update: 20260725T191326+0000

Ratings and Alerts

No rating or validation information has been found for BCILAB.

No alerts have been found for BCILAB.

Data and Source Information

Source: SciCrunch Registry

Usage and Citation Metrics

We found 22 mentions in open access literature.

Listed below are recent publications. The full list is available at nidm-terms .

Caspar EA, et al. (2021) How using brain-machine interfaces influences the human sense of agency. PloS one, 16(1), e0245191.

Hofmann SM, et al. (2021) Decoding subjective emotional arousal from EEG during an immersive virtual reality experience. eLife, 10.

Trambaiolli LR, et al. (2021) Subject-independent decoding of affective states using functional near-infrared spectroscopy. PloS one, 16(1), e0244840.

Stevens CE, et al. (2020) Classifying creativity: Applying machine learning techniques to divergent thinking EEG data. NeuroImage, 219, 116990.

Davidson MJ, et al. (2020) The SSVEP tracks attention, not consciousness, during perceptual filling-in. eLife, 9.

Brandmeyer T, et al. (2020) Closed-Loop Frontal Midline?? Neurofeedback: A Novel Approach for Training Focused-Attention Meditation. Frontiers in human neuroscience, 14, 246.

Klaproth OW, et al. (2020) Tracing Pilots' Situation Assessment by Neuroadaptive Cognitive Modeling. Frontiers in neuroscience, 14, 795.

Spychala N, et al. (2019) Exploring Self-Paced Embodiable Neurofeedback for Post-stroke Motor Rehabilitation. Frontiers in human neuroscience, 13, 461.

Zhang X, et al. (2018) Combining Mental Training and Physical Training With Goal-Oriented Protocols in Stroke Rehabilitation: A Feasibility Case Study. Frontiers in human neuroscience, 12, 125.

Trambaiolli LR, et al. (2018) Predicting affective valence using cortical hemodynamic signals. Scientific reports, 8(1), 5406.

Kosmyna N, et al. (2018) Attending to Visual Stimuli versus Performing Visual Imagery as a Control Strategy for EEG-based Brain-Computer Interfaces. Scientific reports, 8(1), 13222.

Courellis H, et al. (2017) EEG-Based Quantification of Cortical Current Density and Dynamic Causal Connectivity Generalized across Subjects Performing BCI-Monitored Cognitive Tasks. Frontiers in neuroscience, 11, 180.

Tavakolan M, et al. (2017) Classifying three imaginary states of the same upper extremity using time-domain features. PloS one, 12(3), e0174161.

Zander TO, et al. (2017) Evaluation of a Dry EEG System for Application of Passive Brain-Computer Interfaces in Autonomous Driving. Frontiers in human neuroscience, 11, 78.

Enriquez-Geppert S, et al. (2017) EEG-Neurofeedback as a Tool to Modulate Cognition and Behavior: A Review Tutorial. Frontiers in human neuroscience, 11, 51.

Braun N, et al. (2016) Embodied neurofeedback with an anthropomorphic robotic hand. Scientific reports, 6, 37696.

Caywood MS, et al. (2016) Gaussian Process Regression for Predictive But Interpretable Machine Learning Models: An Example of Predicting Mental Workload across Tasks. Frontiers in human neuroscience, 10, 647.

Debener S, et al. (2015) Unobtrusive ambulatory EEG using a smartphone and flexible printed electrodes around the ear. Scientific reports, 5, 16743.

Elnady AM, et al. (2015) A Single-Session Preliminary Evaluation of an Affordable BCI-Controlled Arm Exoskeleton and Motor-Proprioception Platform. Frontiers in human neuroscience, 9, 168.

Rozado D, et al. (2015) Improving the performance of an EEG-based motor imagery brain computer interface using task evoked changes in pupil diameter. PloS one, 10(3), e0121262.