NeuroKit2: A Python Toolbox for Neurophysiological Signal Processing

Dominique Makowski [1,*], Tam Pham [1], Zen J. Lau [1], Jan C. Brammer [2], Hung Pham [3], Francois Lesspinasse [4], Christopher Sch"olzel [5], & S.H. Annabel Chen [1, 6, 7]

[1] School of Social Sciences, Nanyang Technological University, Singapore

[2] ???

[3] ???

[4] ???

[5] ???

[6] Centre for Research and Development in Learning, Nanyang Technological University, Singapore

[7] Lee Kong Chian School of Medicine, Nanyang Technological University, Singapore

Author Note

* Correspondence concerning this article should be addressed to Dominique Makowski (HSS 04-18, 48 Nanyang Avenue, Singapore; dmakowski@ntu.edu.sg).

Abstract

The NeuroKit2 toolbox is an open-source Python package aimed at providing users with comprehensive and flexible functionality in neurophysiological signal processing. It developed from a collaborative project aimed at offering programming ease for both novice and advanced users to perform elaborate analyses of electrocardiogram (ECG), respiratory (RSP), electrodermal activity (EDA), and electromyography (EMG) data. It comprises of a consistent set of user-friendly, high-level functions that implements an all-in-one cleaning, preprocessing, and processing pipeline with sensible defaults. At the same time, greater flexibility and parametric control can be achieved by using Neurokit2's mid-level functions to build a custom analysis pipeline. (talk about novelty?)

Keywords: neurophysiology, ECG, EDA, EMG, RSP

Word count:

NeuroKit2: A Python Toolbox for Neurophysiological Signal Processing

The field of cognitive neuroscience and psychology is increasingly relying on neurophysiological methods. One of the reason is that such approaches often offer low monetary cost (especially compared with other imaging techniques, such as MRI) and high user convenience (e.g., portability). At the same time, the fields of signal processing and computational data science are strongly growing, tackling issues and limitations, and pushing the horizon of possibilities and opportunities. However, as these methods are often not easily accessible and user-friendly, neurophysiological data processing remains a challenge for many researchers without a formal programming training.

NeuroKit2 aims at addressing this gap by offering a free and user-friendly solution for neurophysiological data processing. It is an open-source Python package, developed in a collaborative environment that continues to welcome contributors from different countries and fields. Historically, NeuroKit2 is the re-forged successor NeuroKit (https://github.com/neuropsychology/NeuroKit.py), a PhD side project that ended attracting a lot of users and success (236 GitHub stars as of 13-03-2020). The new version takes on its best features and design choices, and re-implements them in a professional and well-thaught way. It aims at being 1) accessible, 2) well-documented, 3) cutting-edge and 4) powerful.

Design Philosophy

Organization

Examples

Conflict of Interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

Acknowledgements

All the contributors (https://neurokit2.readthedocs.io/credits.html) that reported bugs, and the users.

53 **References**