A Cloud-Based Framework for Organizing and Analyzing fNIRS Datasets

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Functional near-infrared spectroscopy (fNIRS) is a fast, safe and non-invasive neuroimaging technique that uses interaction between light and matter to study the brain and neural activity. Currently, fNIRS researchers use various available databases to store and share the data. In this project, we propose a cloud-based user interface that helps users in organizing their data and sharing methods in a standardized format. This framework utilizes a proposed fNIRS-BIDS data structure based on the Brain Imaging Data Structure (BIDS). This project includes the design and development of a front-end user interface along with the back-end Python packages for handling shared near infrared spectroscopy format (SNIRF) file and fNIRS-BIDS folders to be used in the cloud-based framework. A mock-up is developed with Figma to illustrate the functionalities and the accessibility of the user interface. The mock-up and the package is passed to BU Software & Application Innovation Lab for prototyping. The Python packages were thoroughly reviewed and currently maintained by the software engineers in the BU Neurophotonics Center. This development process provides grounds for implementing the standardized folder structure and processing pipelines that direct users in organizing their fNIRS datasets. Furthermore, this provides the foundation for implementation such as incorporating data quality metrics for immediate data feedback for the users. The long-term goal is to establish a standard platform that facilitates data sharing and quality assurance for fNIRS users.