June 12th, 2024

Daniel Birman, PhD  
Washington Research Foundation Postdoctoral Fellow

International Brain Laboratory & Department of Biological Structure  
University of Washington  
  
Please find enclosed our manuscript “Interactive data exploration websites for large-scale electrophysiology”, which we would like to submit for consideration at eLife as a Tools and Resources article in the Short Report format.

Neuroscience datasets have massively increased in scale over the past five years with the arrival of large-scale data collection, including our platform projects at the International Brain Laboratory (e.g. our [behavioral project](https://elifesciences.org/articles/63711) and [brain-wide map](https://www.biorxiv.org/content/10.1101/2023.07.04.547681) project). Dedicated research software engineers make it possible to pre-process, store, and analyze these massive datasets and access them through data archives, standardized data formats (e.g. NWB), and application programming interfaces. Despite these efforts, relatively little attention and resources have been put toward supporting data exploration. Among the difficulties researchers often cite with archives like DANDI, CRCNS, and OpenNeuro are that the user interface present datasets as simple lists of files with no interactive tools for exploration.

Here we present two data exploration websites that allow researchers to interactively discover the large-scale data acquired by the IBL. Both websites are developed on modular architectures so that outside users can also re-use the skeleton of the code for their own datasets, whether large or small. Our Data website affords users the ability to easily discover the session-level, trial-level, and individual neuron-level properties of the brain-wide map dataset, while the Atlas website acts as a kind of interactive figure. In fact, individual static figures in the brain-wide map paper directly link to interactive versions of the same data on the atlas website, for example, going to [this link](https://atlas.internationalbrainlab.org/?alias=bwm_stimulus) will load the stimulus response across brain areas. This level of interactive access to such a large dataset is useful not just for exploration but also for quality control and introducing new researchers to the data during outreach events. We’re even seeing neuroscience educators using our websites in their classrooms. Taken together, our websites set a benchmark for data exploration with large-scale datasets while also providing the tools needed so that other researchers can meet that benchmark.

We would like to suggest the following reviewers: Adam Tyson (UCL), Russ Poldrack (Stanford), Jeremy Magland (Flatiron Institute).

Sincerely,

A close up of a sign

Description automatically generated  
Daniel Birman­

A screenshot of a computer

Description automatically generated

Screenshot of the Data website, accessible at <https://viz.internationalbrainlab.org/app>. The search bar for selecting regions is visible, showing how Brain-wide map insertions can be filtered for probes going through particular regions. Other figures on the website show overviews of the data in each session, trial, and neuron recorded. Dropdown menus allow users to quickly switch between sessions, trials, and neurons to explore the dataset in depth.