

A Data Management System for Electrophysiological Data Analysis

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Recent advances in both electrophysiological recording techniques and hardware capabilities have enabled researchers to simultaneously record from a large number of neurons in different areas of the brain. This opens the door for a wide range of complex analyses potentially leading to a better understanding of the principles underlying neural network computations. At the same time, due to the increasing amount of data with increasing complexity, significantly more emphasis has to be put on the data analysis task. Although high-level scripting languages such as Matlab can speed up the development of analysis tools, in our experience, a too large amount of time is still spent on (re)structuring and (re)organizing data for specific analyses.

Therefore, our goal was to develop a system which enables experimental neuroscientists to spend less time on organizing their data and more on data collection and creative analysis. We developed an object oriented Matlab toolbox which supplies the user with basic data types and functions to organize and structure various types of electrophysiological data. By using an object oriented, hierarchical layout, basic functionality, such as integration of metadata, or storage and retrieval of data and results, is implemented independent of specific data formats or experimental designs. This provides maximal flexibility and compatibility with future experiments and new data formats. All data and experimental results are stored in a database, so the experimenter can choose which data to keep in memory for faster access and which to save to disk to save resources. Additionally, we have created an extensive library of basic analysis and visualization tools that can be used to get an overview of the data.