Elements Read GUI: a versatile tool to display and analyse electrophysiological experimental data

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In this work we developed a tool to load, display, analyse and export data coming from cellular electrophysiology experiments. This tool was realized for and thanks to Elements srl, which will distribute it as an open source software.
This will allow researchers to use this GUI to perform simple analyses on their data, but also to modify it (or to add code to it) in order to implement the functionalities they desire. The possibility of customization to the needs of every laboratory was one of the main goals of our work. This is the reason why the tool was developed in MATLAB (version 2019b) using only the Home license, without the requirement of additional toolboxes.
Data can be loaded in .abf or .mat file format; once loaded, current and voltage data are displayed, and cursors can be placed to extract a specific portion of signal. Moreover, basic data information (file name, sampling frequency, number of samples and sweeps) can be visualized. The analyses that can be performed include: I/V and G/V graphs, histograms and power spectral densities (with Welch's method). Furthermore, fittings (linear, exponential, Gaussian, Boltzmann's curve) can be performed on both raw data and data coming from the analyses. Other functionalities include the possibility to select the fitting of the desired sweep and the visualization of the parameters of the fitting itself. Plus, during the analyses, data can be normalized to the maximum value or to the cell capacitance one (to which a specific field was dedicated in the tool).
Finally, it is possible to export the original data, the data of the analyses and the fitting parameters in a .mat file, thus allowing further and more complex analyses in MATLAB.