

NEW FEATURES FOR NEURON CLASSIFICATION

Workflow used to reproduce the algorithm described in “New features for neurons classifications” paper.

The examples that are provided in this workflow are obtained using the Alzheimer (local projection) neurons set. See Examples files

1. Download reconstructed neurons from neuromorpho.org
 - http://neuromorpho.org/NeuroMorpho_Linkout.jsp?PMID=12902394 Alzheimer (Local and Long projections) set
 - http://neuromorpho.org/NeuroMorpho_Linkout.jsp?PMID=23325800 Ischemia set
 - http://neuromorpho.org/NeuroMorpho_Linkout.jsp?PMID=22628459 Epilepsy set
2. Obtain time series using Trees Toolbox.
 - Download Trees Toolbox from www.treestoolbox.org
 - Copy the folder “Add_Trees_toolbox” to Trees Toolbox root directory.
 - Using the function “cellcelloftree.m” to obtain the “.mtr” file with the neurons trees separated in two groups. See “AlzheimerLocal.mtr” in examples files.
 - Run the functions cs_wj.m, cs_woj.m, ss_wj.m y ss_woj.m to obtain the time series. See in examples files, “Time series to load in MATS” folder.
3. Obtain the features dataset using Measures of Analysis of Time Series toolkit (MATS). In MATS all operations should be running from the graphical user interface (GUI).
 - Download MATS from <http://eeganalysis.web.auth.gr/>
 - Copy to MATS root directory the “MeasureParam” file, available in examples files folder.
 - In the GUI
 - Load time series.
 - Select / run measures.
 - Load Measure Parameters (Select “MeasureParam” file copy previously)
 - Run
 - View measures
 - Table of measures
 - Copy the “Table of Measures” result to Microsoft Excel, add the class column and save as “.csv”. See example “TableofMeasures(SS-WOJ).csv” in examples files folder.
 - Open “.csv” file with measures obtained in Weka and save as “.arff”, See example “TableofMeasures(SS-WOJ).arff”.
4. Feature selection and classification using the interface MatLab Weka, available in: <http://www.mathworks.com/matlabcentral/fileexchange/21204-matlab-weka-interface> . This interface link MatLab and Weka, to automatize the process of feature selection and classification.
 - Download matlab2weka interface.

- Rename the functions the functions: “wekaClassification.m” and “wekaFeatureSelection.m”. For example “wekaClassificationOriginal.m”
 - Copy from “Add_matlab2weka” folder, the functions: “wekaClassification.m” and “wekaFeatureSelection.m” to matlab2weka directory placed inside matlab2weka root directory.
 - Copy to matlab2weka root directory the functions: cellcelloftree.m, loaddata.m, eval_classif.m and select_class_experimenter.m
 - Run:
 - loaddata.m to load or select the “.arff” dataset
 - eval_classif.m to configure the parameter selection.
 - select_class_experimenter.m for the features selection and classification process.
 - The result is saved as “.csv” file during the classification process in the matlab2weka root directory. See “Classification result example.csv”
5. Obtain the morphological features using L-measure.
- Download L-measure from <http://krasnow.gmu.edu/cn3>
 - In the “Function Panel” select all morphometric functions.
 - In the “Input Panel” add the neuron file(s) to be analyzed.
 - In the “Output Panel” write the “result.csv” to redirect the results of the analysis to “result.csv” file.
 - In the “Go Panel”, the Go Button starts the analysis; the results is saved in the “result.csv” file automatically. The “result.csv” file contains 215 morphometric features. See “result_lmeasure.csv” file example.
 - Convert the “result_lmeasure.csv” file to “result_lmeasure.xlsx” file using Microsoft Excel.
 - Transform the result.xlsx file using the Microsoft Excel macro “MacroMorpho.xlsm”. With this macro we obtain the morphological features dataset. “MacroMorpho.xlsm” is available in examples files folder.
 - Add the column class to the morphological features dataset and save as “.csv” file. See example “MORPHO_Dataset.csv”.
 - Open the “.csv” file with the morphological features in Weka and save as “.arff”, See example “MORPHO_Dataset.arff”.
 - Run again the 4 step.

Important: Before run this workflow, run the example scripts class_example.m