Open Electrophy

Architecture and coordination with NeuroTools
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Samuel Garcia
Data processing ingineer, CNRS

Works : Olfaction and Audio systems
Type of user:
Biologists In vivo recording (intra or extra cellular)

Type of analyses:
Spike

LFP oscillations
GUI

Toolbox for scripting

Database storage
Central piece of work

Generic multi methods
spike sorting

Non stationary Oscillation
detection

[Images of software interfaces for spike sorting and oscillation detection]
Spike detection and spike sorting: methods compilation

Filtering
- FFT
- Médian windowed
- Butterworth

Détection
- Threshold: std, abs
- No
- ICA
- PCA
  (Wavelet ...)

Projection

Clustering
- K-Mean
- Superparamegetic
LFP Oscillations analysis : new approach

Classical analysis : FTT or
Morlet wavelet time frequency map (scalogram)

New approach :
Use the scalogram for extracting oscillations
Each oscillation is stored in the database

Avantage : Quantitative study (length, energy, phase, frequency ...)

Article :
A wavelet-based method for local phase extraction from a multi-frequency oscillatory signal
J Neurosci Methods
Stéphane G. Roux, Tristan Cenier, Samuel Garcia, Philippe Litaudon, Nathalie Buonviso
Oscillation detection: principle

Morlet scalogram: local maxima extraction

Ridge extraction: time-frequency line

Oscillation in time domain
Fusion or modules in common?

NeuroTools
OpenElectrophy
FIND
Plotting methods
Computing methods
MySQl mapper

Collection of analysis
Very Specific
No GUI only script

OpenElectrophy classes

IO
Spike Sorting
Oscillation detection
Plotting methods
Computing methods
MySQL mapper

DATA

The past Version 0.1
Plotting methods
Computing methods
SQLalchemy
Plotting methods
Computing methods
SQLalchemy
Spike Sorting
Oscillation detection
Collection of analysis
Very Specific
FIND structure
IO
GUI exploring
GUI spikesorting
GUI oscillation detection
GUI inserting
FIND
GUI explorating
GUI spikesorting
GUI oscillation detection
FIND
Important work to do for merging or getting closer:

Work 1: Same technologies

Work 2: Same classes and variables name/convention

Work 3: Same layer for data storage
Work 1: choosing the technologies

Language: Python

Dependencies: SciPy, Matplotlib, MDP, QT4, ...

Platform: Linux, Win32/64, OSX, WEB, ..

Documentation: Sphinx, wiki?

Packaging: .egg, .exe, .deb?

Version system: svn, GIT, Ag
## Work 2: Convention for classes

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Work 3: datastorage

Proposal

Common layer for datastorage

Package

SQLAlchemy

Final Formats

MySQL
SQLite
PostgreSQL
HDF5

NeuroTools
FIND
OpenElectrophy
Work has started yersterday:

https://neuralensemble.org/trac.neo
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Nicolas Fourcaud-Trocmé for helping in code

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