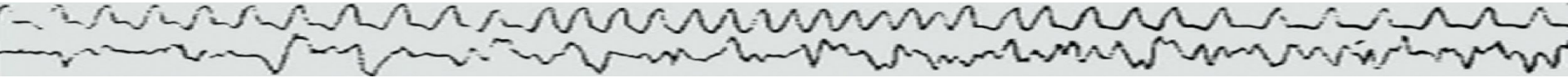
EEG pipelines integration into the CBRAIN platform using the Boutiques command line framework



S. Boroday[1], O.B.K. Ali[2], E. Benderoff[3], A. Taheri[1], P. Rioux[1], G. Kiar[1], J. Bosch[1,7,8], S. Brown[1], J.-M. Lina[4,5], T. Glatard[3], C. Grova[1,2,5,6], A. Evans[1]

[1] Centre for Integrative Neuroscience, McGill Univ.; [2] Physics Dpt. and PERFORM Centre, Concordia Univ.; [3] Computer Science & Software Engineering Dpt., Concordia Univ.; [4] Dpt. de Génie Electrique , ETS; [5] CRM; [6] Biomedical Eng. Dpt., and Neurology and Neurosurgery Dpt., MNI, McGill Univ.; [7] Cuban Neuroscience Center; [8] Univ. of Electronic Sc, and Tech. UESTC, Chengdu, China

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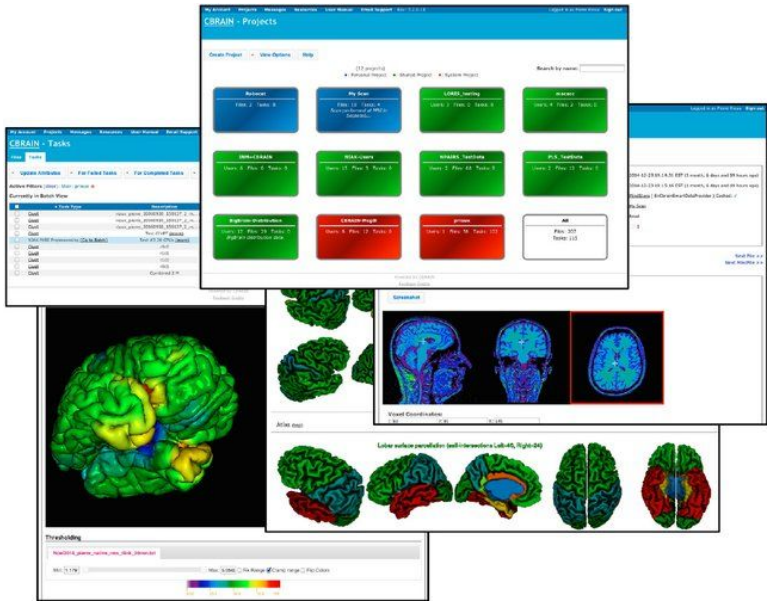
cbrain

Intuitive Web UX For HPC



www.cbrain.ca

CBRAIN creates a user-friendly web interface to high performance computer clusters that allows researchers to use these extra-powerful computers without extensive training

Intuitive Web-based, Open Source, Collaborative, Scalable, Data Science Platform

50+ tools/pipelines, mostly Magnetic Resonance Imaging (MRI) and variants

6 Canadian + intl clusters
140 research groups
22 countries

GitHub, API Swagger Hub

logging, backups, data synchronization

Ruby on Rails

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CBRAIN: not only Magnetic Resonance

- CBRAIN is able to support *any* research endeavor, not only MRI
- Tools are integrated as plugins
  - imperative (Ruby)
  - *declarative* (JSON-Boutiques)
- e.g. processing of genome data

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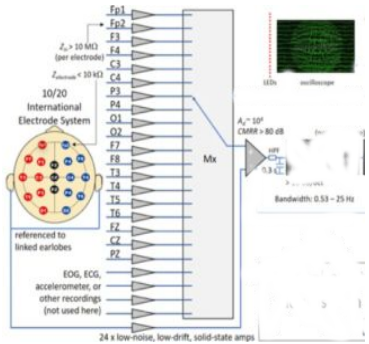
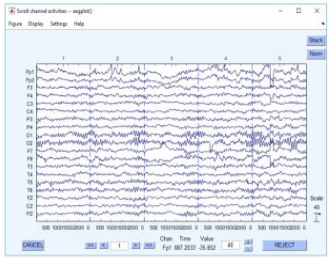
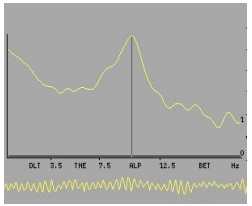
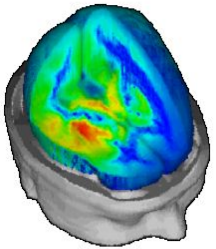
Electro and Magneto Encephalography

- After decades of neglect, EEG (Electroencephalography) MEG (Magnetoencephalography) imaging is gaining momentum
- Low spacial resolution, with high temporal resolution imaging
- Electrophysiological imaging (EEG and MEG) compliments MRI
- Simultaneous EEG with MRI is possible









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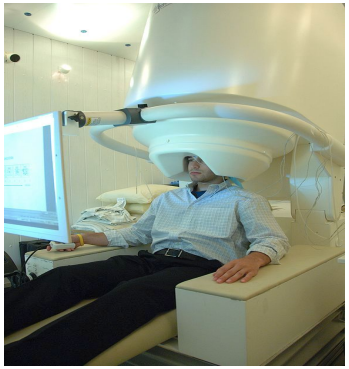

qEEG

- qEEG (a VARETA tool) Cuba-China-Canada
- an improvement on popular LORETA technique(s)
- Only EEG, no MEG
- Experimental BIDs data/app support

BEst

- **B**rain **E**ntropy in **s**pace and **t**ime - based on “Maximum Entropy on the Mean (MEM)” principle
- MEG and EEG
- Oscillatory patterns
- Synchronous regions

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Tool Integration With Boutiques JSON

- Command line UX
- Version control (GitHub, GitLab ...)
- Container (Singularity or Docker, DockerHub)
- Document in detail each parameter
- Parameter default, groups, types, restriction
- Misc details, resources etc
- Encode into JSON file (Boutiques format)
- Publish JSON to Zenodo, GitHub
- Import Boutiques into CBRAIN (autointegration)









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A Boutiques Descriptor Fragment

```
{ "command-line": "run_BEst.sh $MCR_ROOT [RECORDINGS] [LEADFIELD] ADJACENCY_MATRIX][SOURCE]...
  "container-image": { "image": "MontrealSergiy/BEst",
                       " type": "singularity" …
  "name": "BEst",
  "doi": "10.5281/zenodo.2541125",
  "description": "EEG/MEG source localisation techniques based upon the Maximum Entropy on the Mean …
  "inputs":        [ {"id": "recordings",
                      " name": "Recording data",
                      " type": "File",
                      " value-key": "[RECORDINGS]" …
                                        .
  "output-files":  [ { "id": "sources",
                       " name": "Sources",
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```

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Thank you

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