Brain Imaging Analysis Kit: Advanced fMRI analysis at scale

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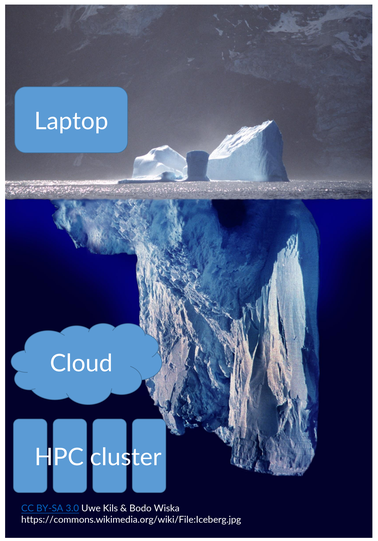
BrainIAK

Introduction



Many neuroscientists use only a fraction of the computing resources available.

Software toolboxes are crucial for advancing research and reproducibility.

Toolboxes should facilitate the use of computing resources via high-performance computing (HPC) technology.

BrainIAK is a new fMRI analysis toolbox that leverages HPC technology.

With BrainIAK, you can scale from your laptop to a supercomputer.

Characteristics

BrainIAK is
- A Python library
- Optimized using Cython, C++, OpenMP, and MPI
- Developed via open collaboration

Components
- fMRI analysis methods
- Machine learning algorithms
- Brain data simulator
- Distributed searchlight framework

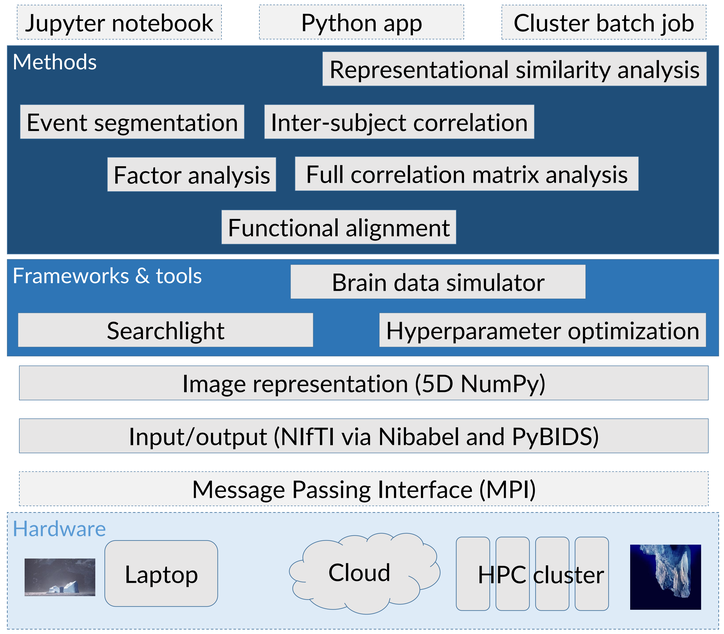
```
$ docker pull brainiak/brainiak

$ pip install brainiak
```

Scalability examples
- Multi-subject datasets (e.g., SRM, HTFA)
- Full-brain analyses (e.g., FCMA, ISFC)
- Statistical resampling (e.g., permutation tests, cross-validation)

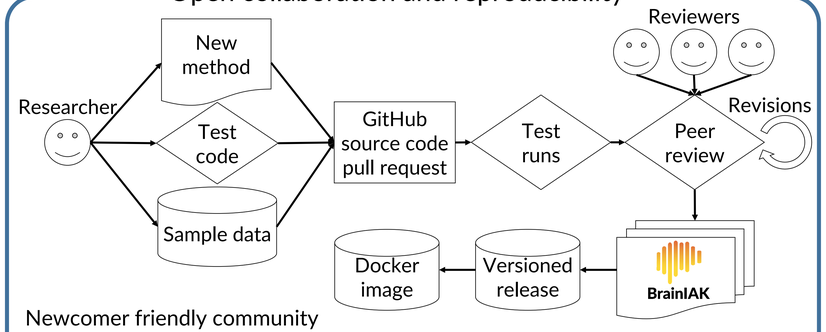
BrainIAK

BrainIAK is free and open-source software.
Learn more about BrainIAK, events, and all our SfN posters at
http://brainiak.org/sfn2017

Architecture



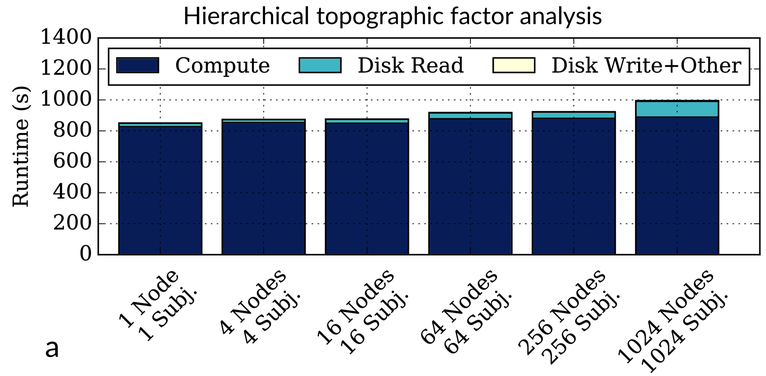
Open collaboration and reproducibility



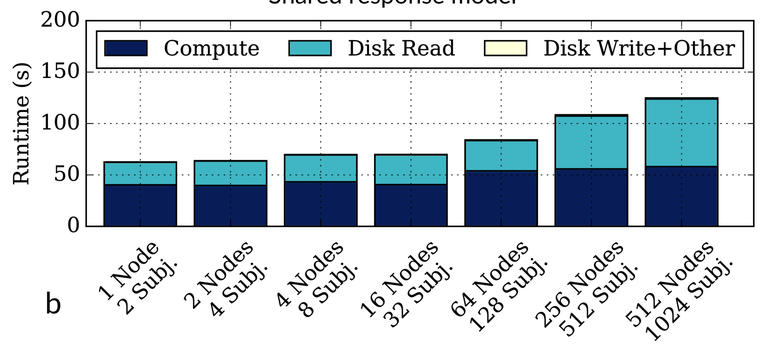
Newcomer friendly community
Opportunities for performance optimization
Contribute your method!

Hackathons
Join us at Virginia Tech in March 2018!

Performance at scale



1024 subjects analyzed almost as fast as 1 subject

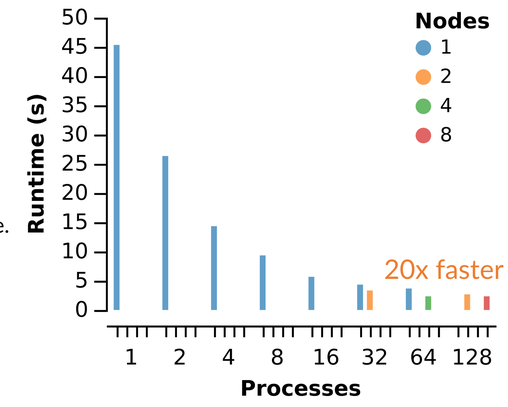


Searchlight

Distributed searchlight correlation computation for musical genres in auditory cortex.

Data: simulated data for 16 subjects, 2 genres.

Setup: 88 cores per node. More details online.



a, b: Anderson et al., 2016, doi:10.1109/BigData.2016.7840719.