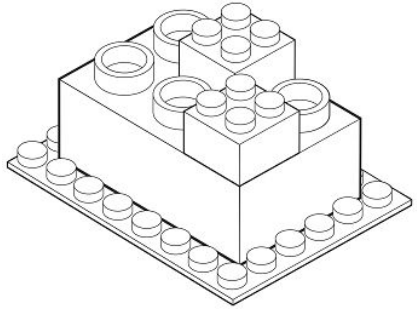


EBRAINS

digital infrastructure
for brain research

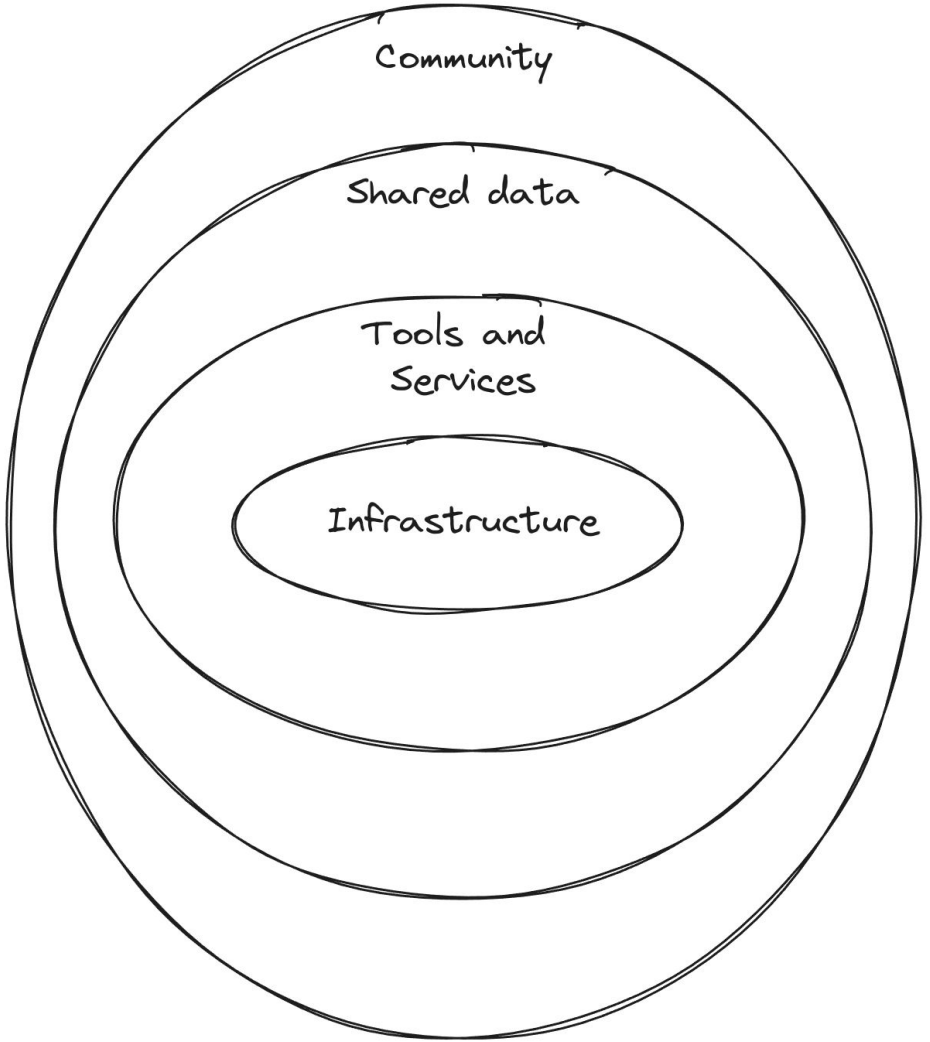
Jan Fousek

FAIR data pro uživatele CF MAFIL: 14. 02. 2024

EBRAINS

Overview

- digital research infrastructure for neuroscience
- focus on collaborative open science
- integrated set of multiscale data, tools, IT resources, and collaborative environments



https://www.ebrains.eu

EBRAINS

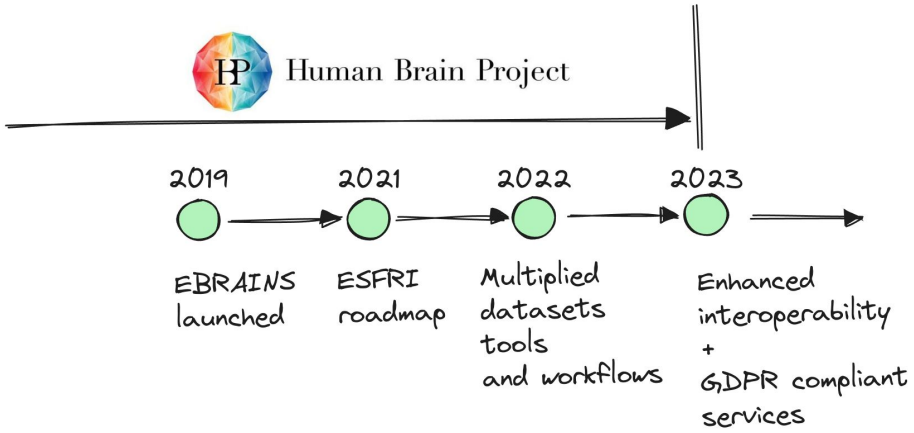
Overview

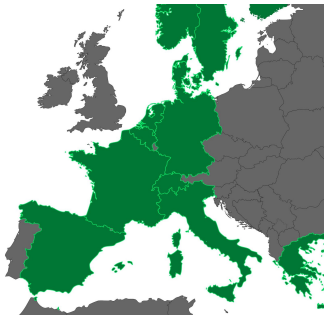
- digital research infrastructure for neuroscience
- focus on collaborative open science
- integrated set of multiscale data, tools, IT resources, and collaborative environments

Origins

- developed within The Human Brain Project (10 years EU-Flagship)
- multidisciplinary effort centered around co-design principles

https://www.ebrains.eu





EBRAINS RI services

Data

- storage, sharing, and access to data, models, software and workflows

Brain atlases

- navigate, characterize, and analyze brain data based on anatomical location

Modeling, simulation and computing

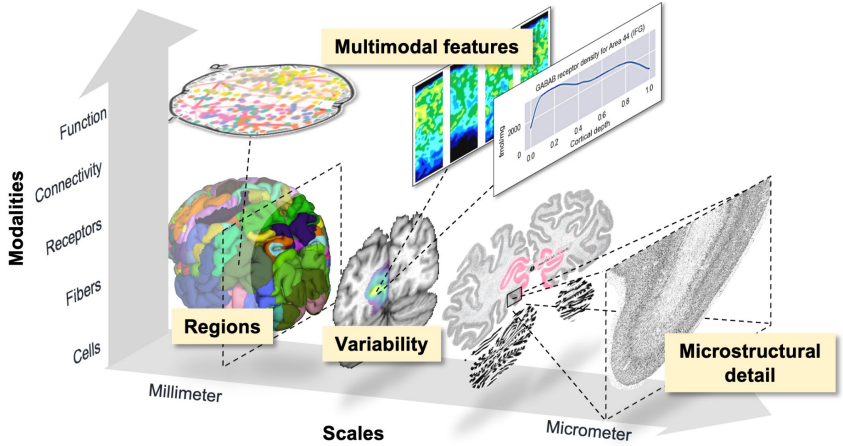
- enable simulation studies from cellular to whole-brain level

Validation and inference

- analytic tools and model validation

Health research platforms

- GDPR-compliant tools to access medical brain data



The coming decade of digital brain research: https://zenodo.org/records/10035197

Data sharing process in EBRAINS

1. **Submission**
   initial description of data sharing intent
2. **Review**
   within 5 days
3. **Acceptance**
   assigns curator
4. **Integration**
   registering metadata in openMINDS format, data upload to long-term storage
5. **Publication**
   DOI assigned, entry in the Knowledge Graph
6. **In-depth integration**
   continuous *post-publication metadata expansion*

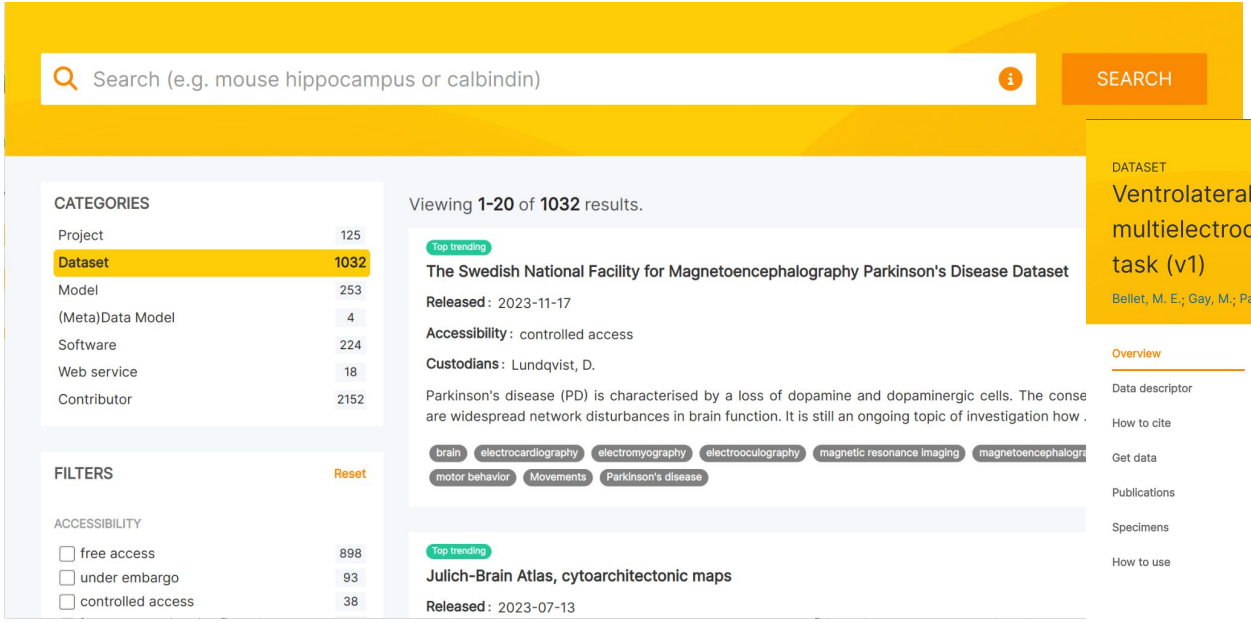
Metadata description:

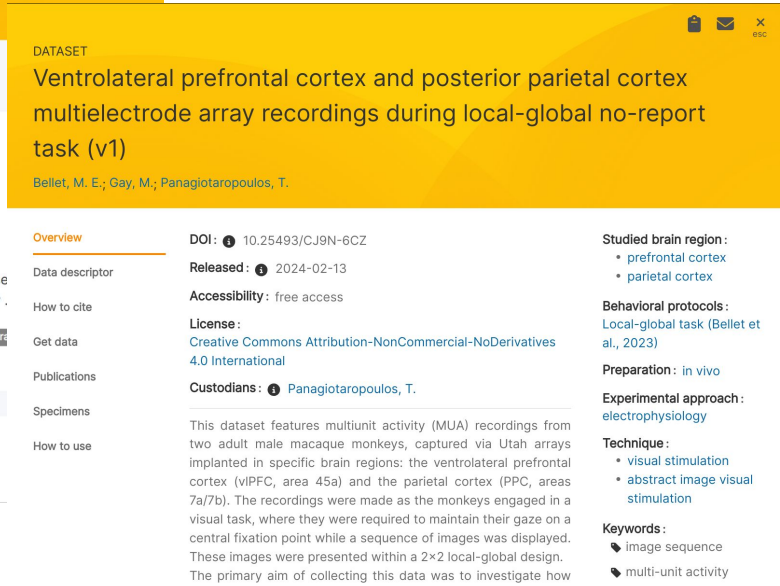
- openMINDS
  open Metadata Initiative for Neuroscience Data Structures
  - (meta)data models
  - predefined metadata schemas (ontologies)
  - tooling (Python / MATLAB / BIDS)

Findable 🔎

Find data on EBRAINS

Knowledge Graph search: **https://search.kg.ebrains.eu/**





Accessible 👆

Data access in EBRAINS

- placement in a **long-term repository requested** during the curation process
- can be **hosted by EBRAINS** (data-proxy)
- **standardized repositories** (ModelDB) can also be linked from the KG
- **external data hosting** suitable also for sensitive data

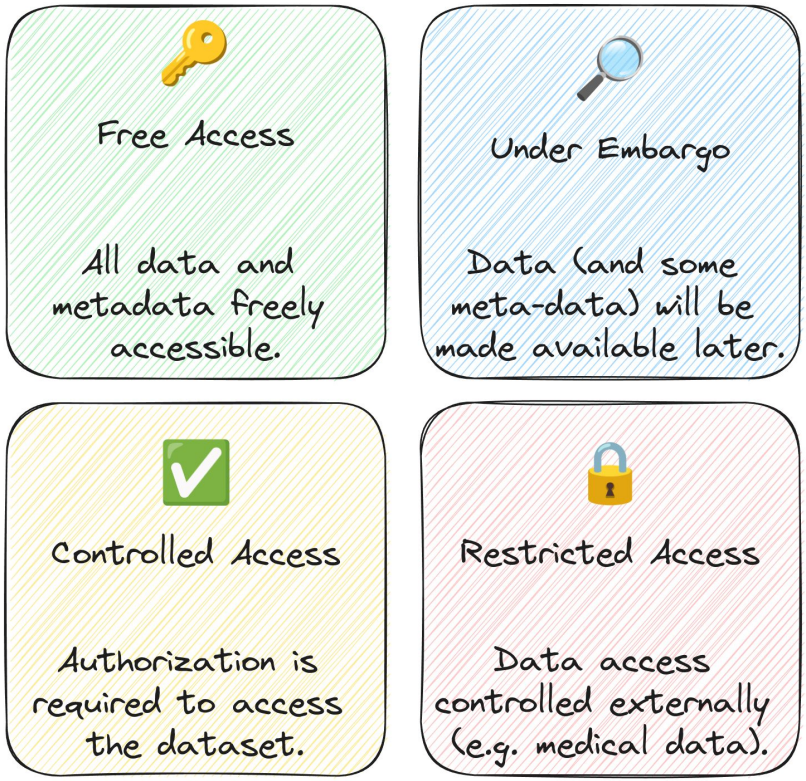


figure adapted from France Nivelle

Data access in EBRAINS

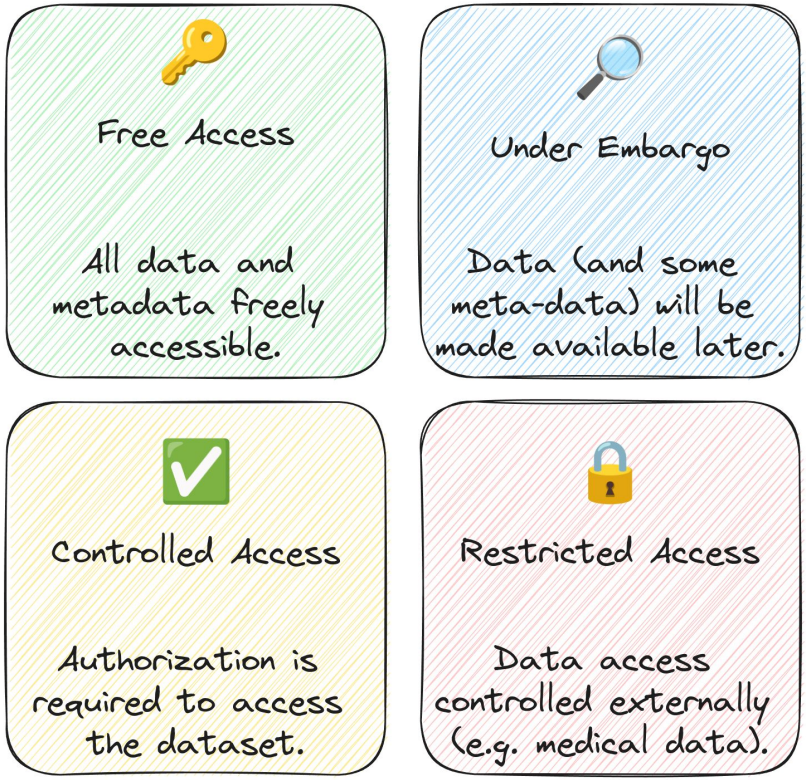
- placement in a **long-term repository requested** during the curation process
- can be **hosted by EBRAINS** (data-proxy)
- **standardized repositories** (ModelDB) can also be linked from the KG
- **external data hosting** suitable also for sensitive data

DATASET

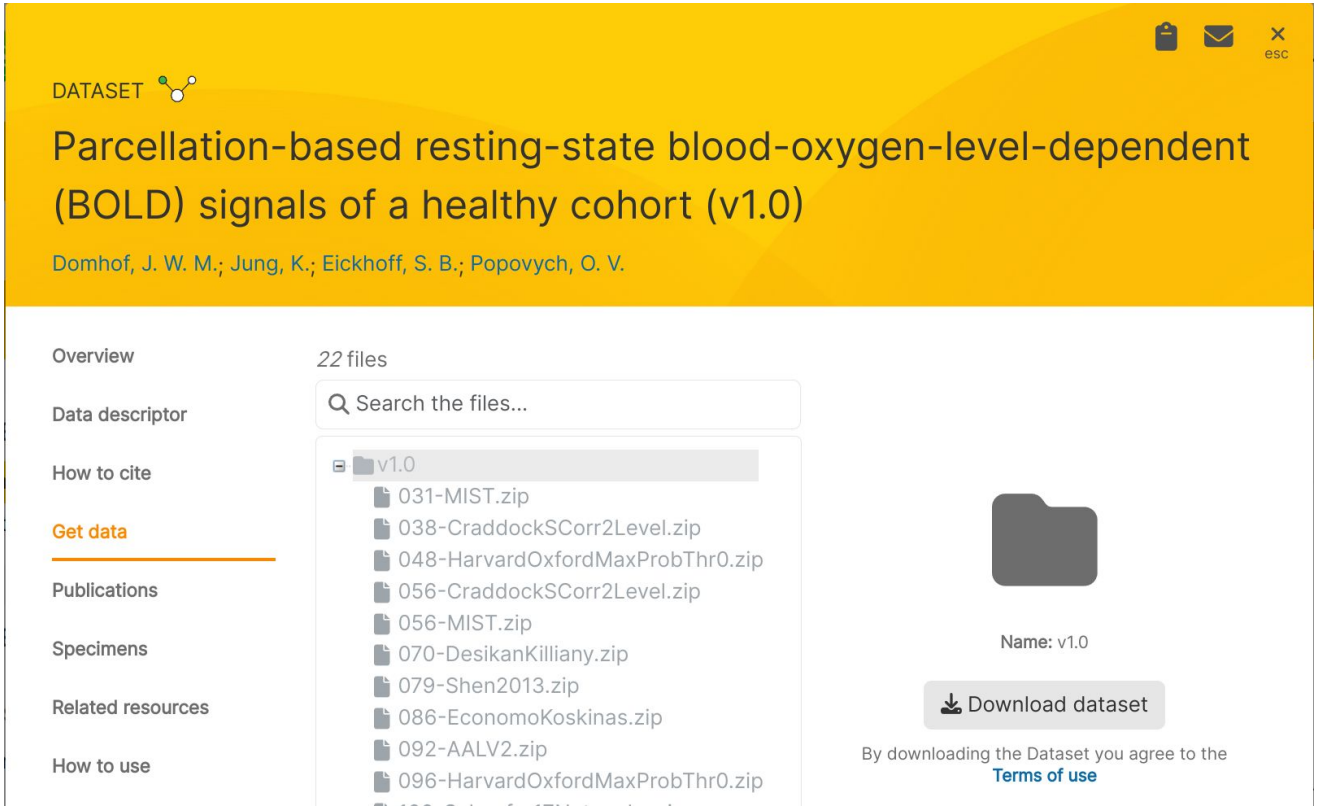
Human Connectome Project Young Adult fMRI time series, structural and functional connectomes (v1.0)

Schirner, M.; Ritter, P.

- The data is currently shared via the Virtual Research Environment at Charité – Universitätsmedizin Berlin.
- Please contact **petra.ritter@bih-charite.de** and **michael.schirner@bih-charite.de** for access.
- Data Processing Agreement for HCP Young Adult Connectomes can be found **here**



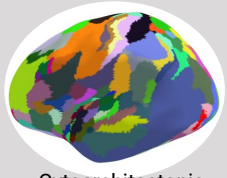
Data access in EBRAINS



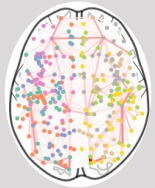
Interoperable 

Showcase 1 - Workflow

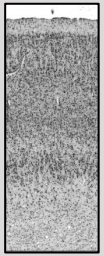
Data collection



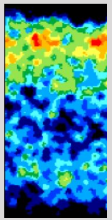
Cytoarchitectonic maps



Structural & functional connectivity

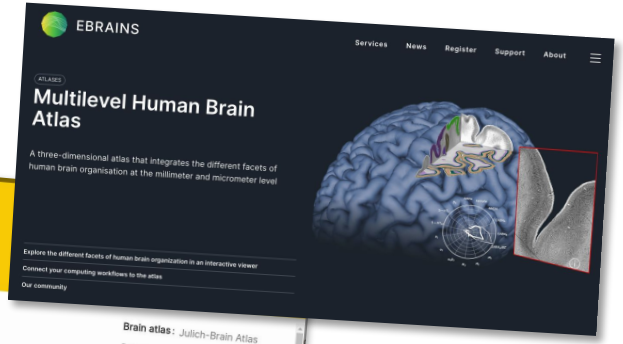


Cell densities



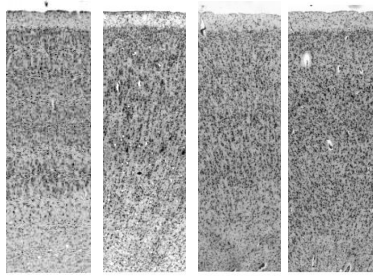
Receptor densities

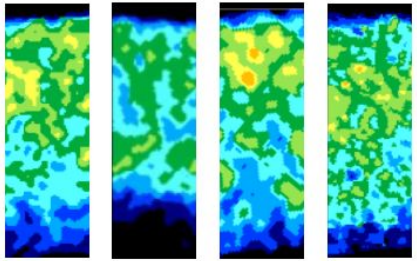
Human Data Gateway



Individual time-series and connectomes

siibra PYTHON

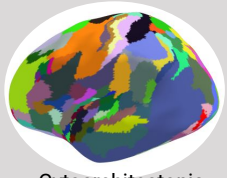




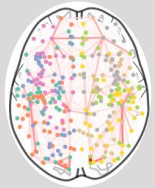
Regional variance of multimodal features

Showcase 1 - Workflow

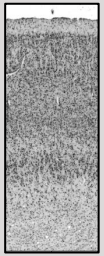
Data collection



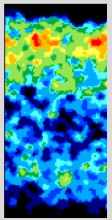
Cytoarchitectonic maps



Structural & functional connectivity

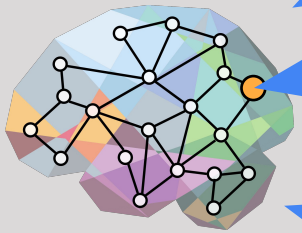


Cell densities



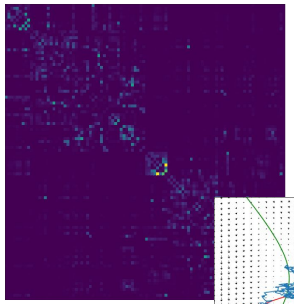
Receptor densities

Model construction

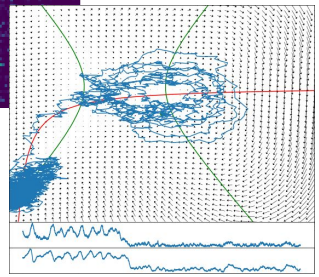


TVB: Brain Network Model

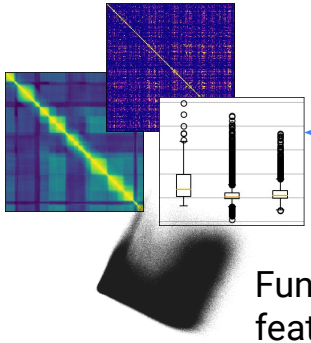
THEVIRTUALBRAIN.

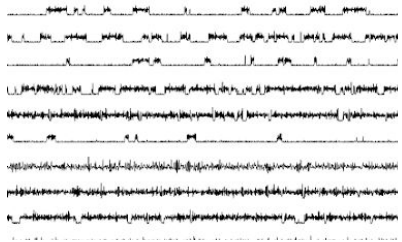


Build the network



Node dynamics



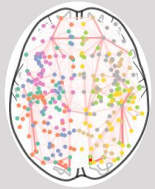


Functional data features

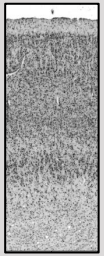
Showcase 1 - Workflow

Data collection

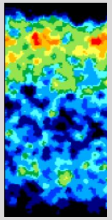
Cytoarchitectonic maps



Structural & functional connectivity



Cell densities



Receptor densities

Model construction

TVB: Brain Network

THEVIRTUALBRAIN.

Build the network

Previous

MODEL

esc

The Virtual Aging Brain (v1.0.0)

Lavanga, M.; Stumme, J.; Yalcinkaya, B. H.; Fousek, J.; Jockwitz, C.; Sheheitli, H.; Bittner, N.; Hashemi, M.; Petkoski, S.; Caspers, S.; Jirsa, V.

Overview

How to cite

Get model

Publications

Related resources

DOI: 10.25493/SVZE-Y7H

License: The MIT license

The Virtual Ageing Brain is a mechanistic model linking changes in structural connectivity and brain function to address the inter-individual variability in decline of cognitive abilities during healthy ageing. At the core of the VAB is a dynamical brain network model informed by individual brain imaging data (structural whole-brain connectivity), and a connectivity mask selecting interhemispheric connections is used to define the age-related changes to the structure. This model can be then

Custodians: Fousek, J.

Study targets: Homo sapiens

Model scope: network: whole brain

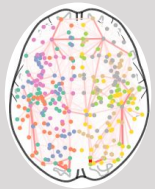
Abstraction level: population modelling: neural mass

Functional data features

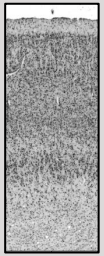
Showcase 1 - Workflow

Data collection

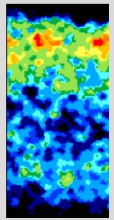
Cytoarchitectonic maps



Structural & functional connectivity

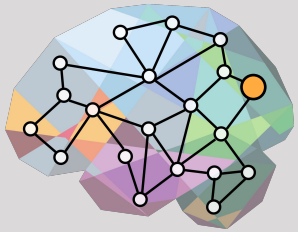


Cell densities



Receptor densities

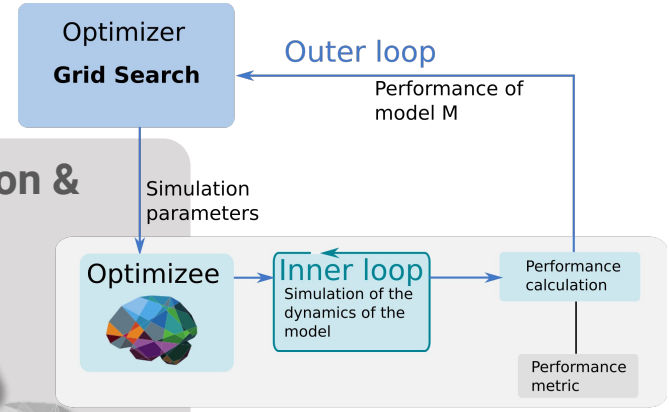
Model construction

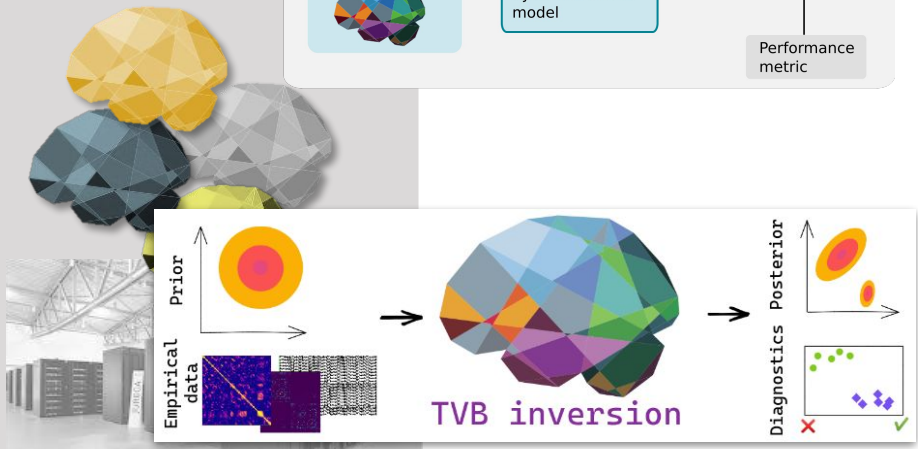


TVB: Brain Network Model

THEVIRTUALBRAIN.

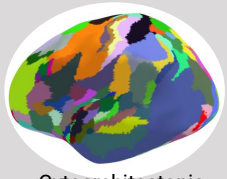
Optimization & Inference



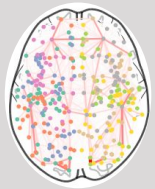


Showcase 1 - Workflow

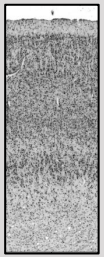
Data collection



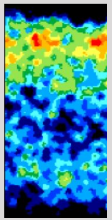
Cytoarchitectonic maps



Structural & functional connectivity

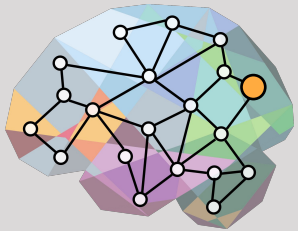


Cell densities



Receptor densities

Model construction

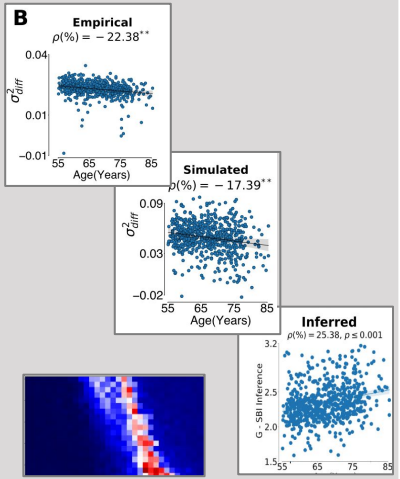


TVB: Brain Network Model

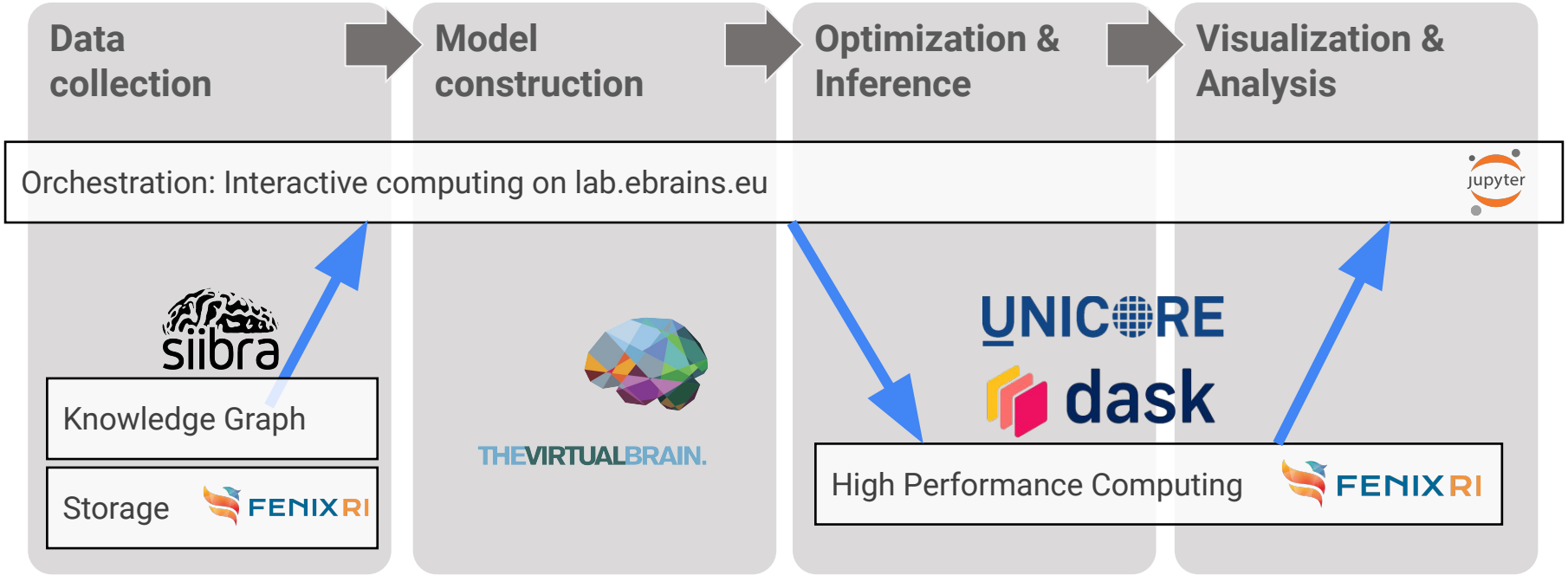
THEVIRTUALBRAIN.

Optimization & Inference

Visualization & Analysis



Showcase 1: A scaffold for interactive computing with EBRAINS data & services



Sh
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Data
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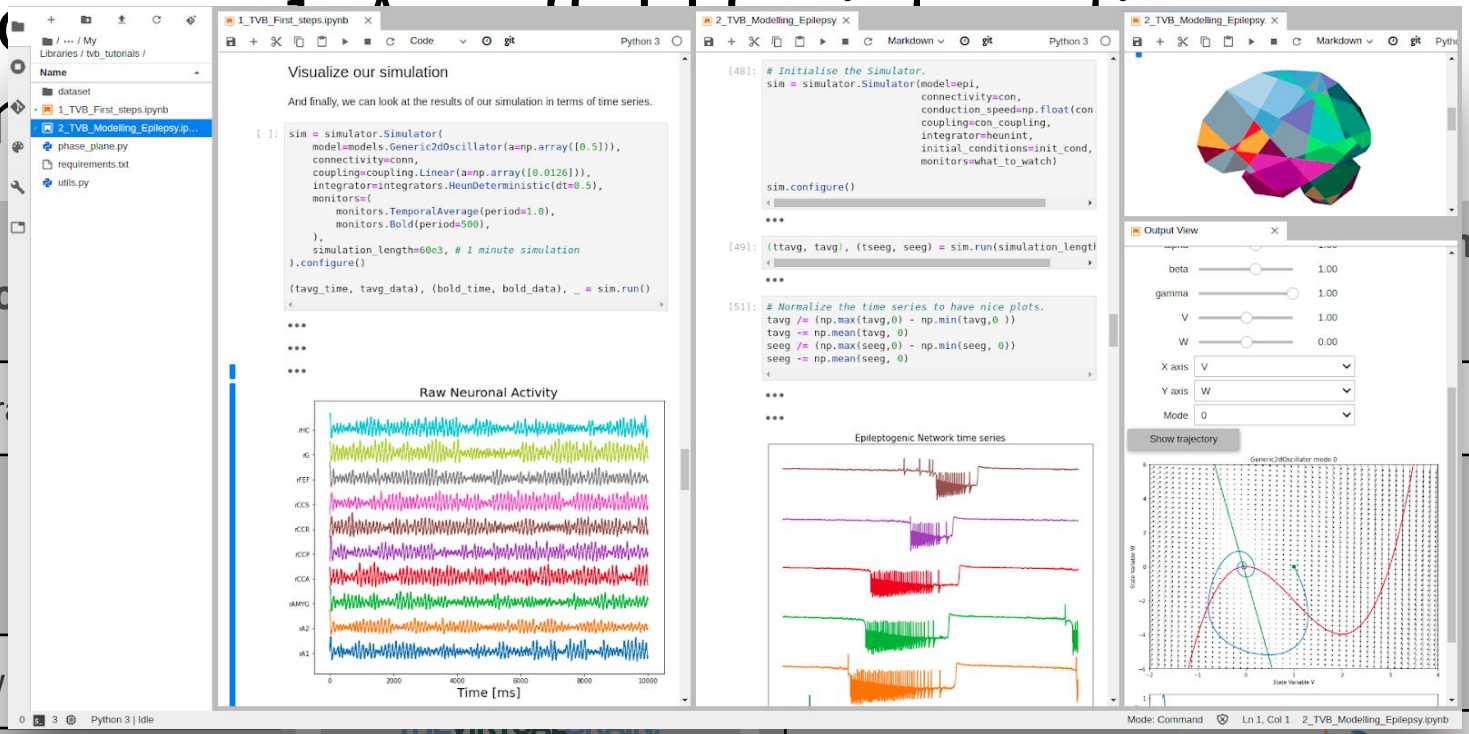
Orchestra

Know

Storage



jupyter

High Performance Computing

FENIX RI

FENIX RI

Reusable 

Reusable ♻


CLASSIC
EBRAINS
Ages/edades
4-99
10698
LEGO® Large Creative Brick Box
790 pcs/pzs
IDEAS INCLUDED
WARNING:
CHOKING HAZARD

Reusable ♻


CLASSIC
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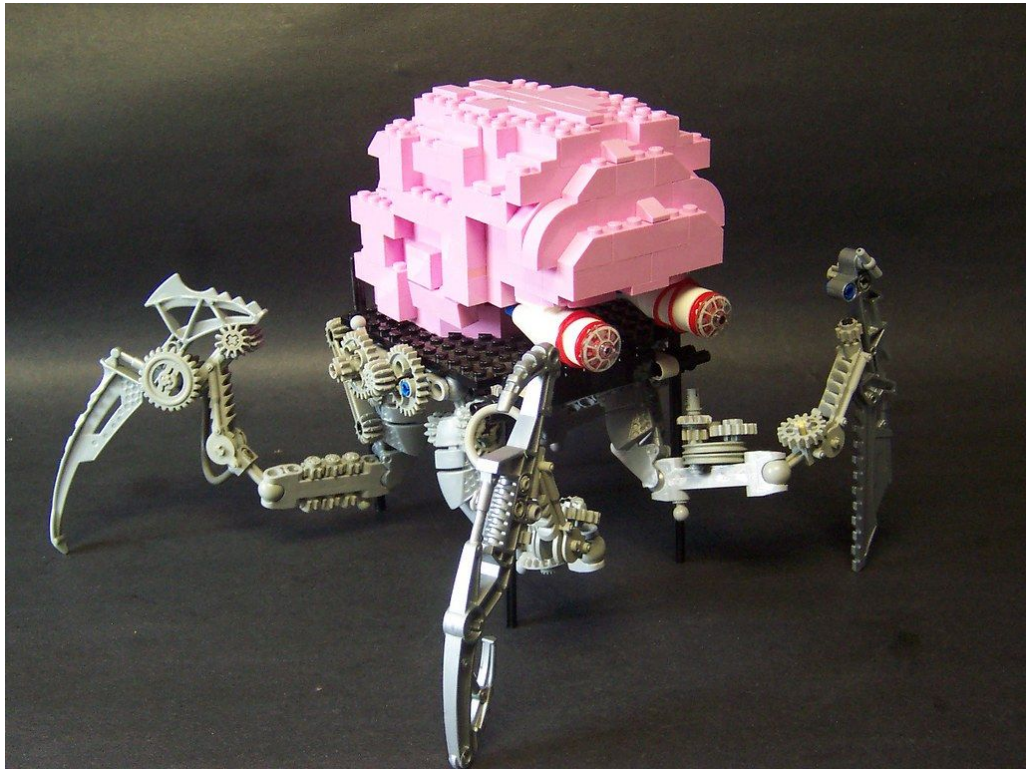

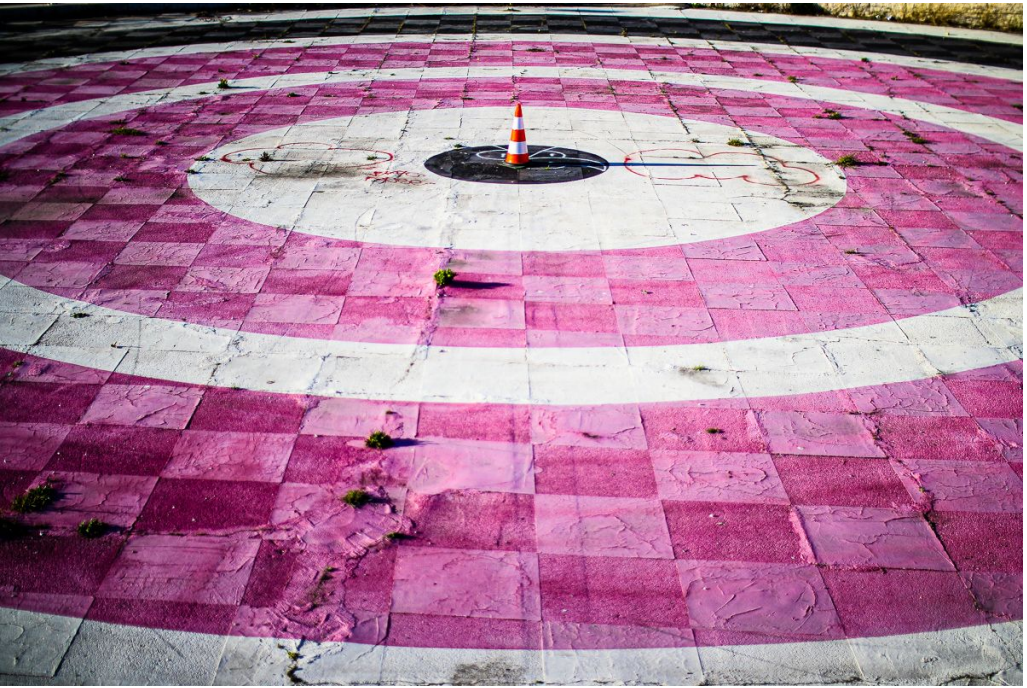

Thank you!

Photo by Michael Burgstahler, two tribes