



Parrot: a subject-specific whole-brain EEG-fMRI simulator

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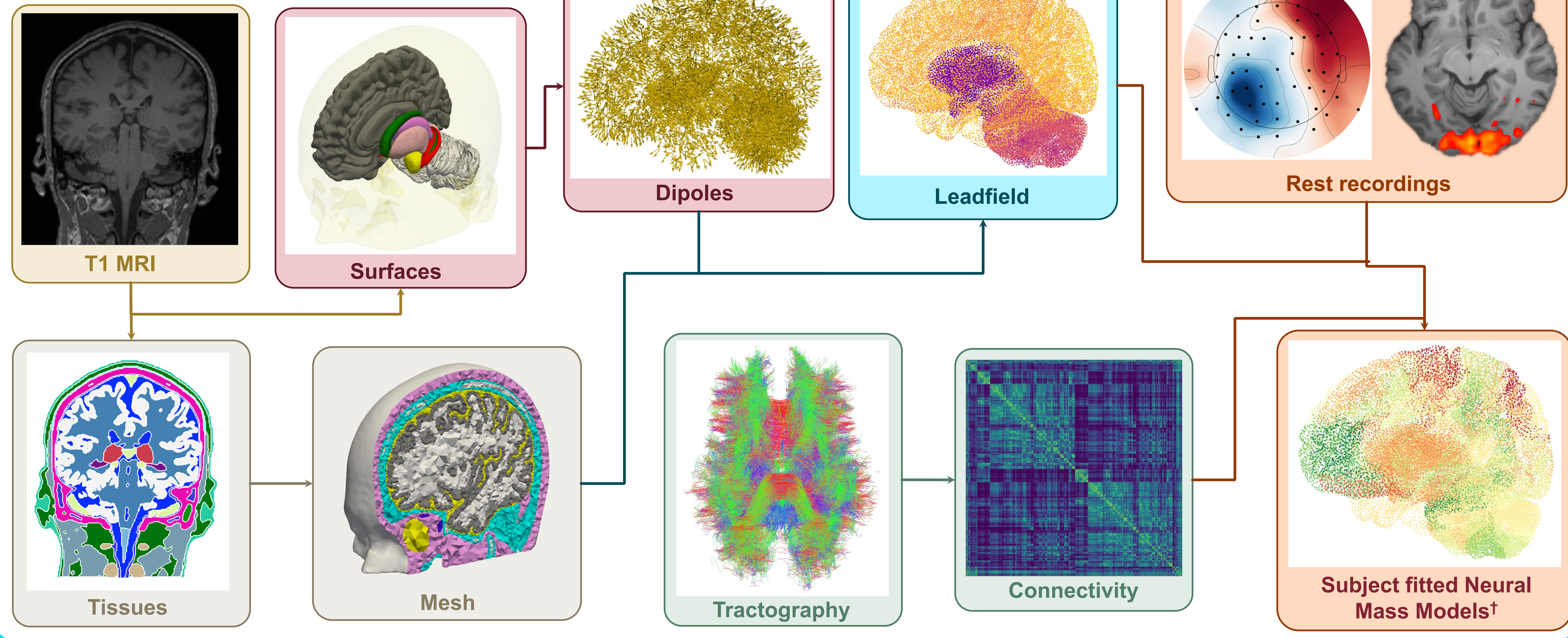
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A virtual brain you can record from

- Large-scale models like The Virtual Brain (TVB^[1]) are powerful — but EEG simulation is cortex-only
- **Parrot**: subject-specific, whole-brain (cortex + deep + cerebellum), multimodal EEG-fMRI simulator
- Anatomically & electrically precise; fitted to real recordings[†]; >1000 nodes
- Generates synthetic signals with known ground truth — open, automated, containerized

Subject-specific modelling



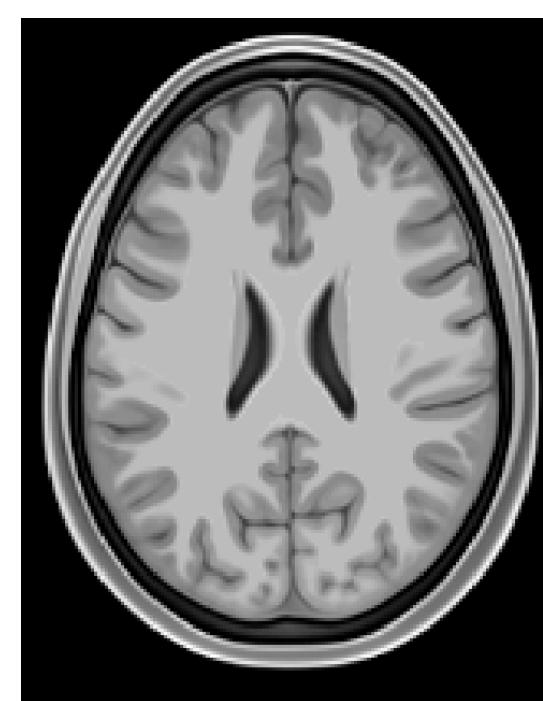
Data (in)dependencies

The full subject-specific pipeline uses four inputs:

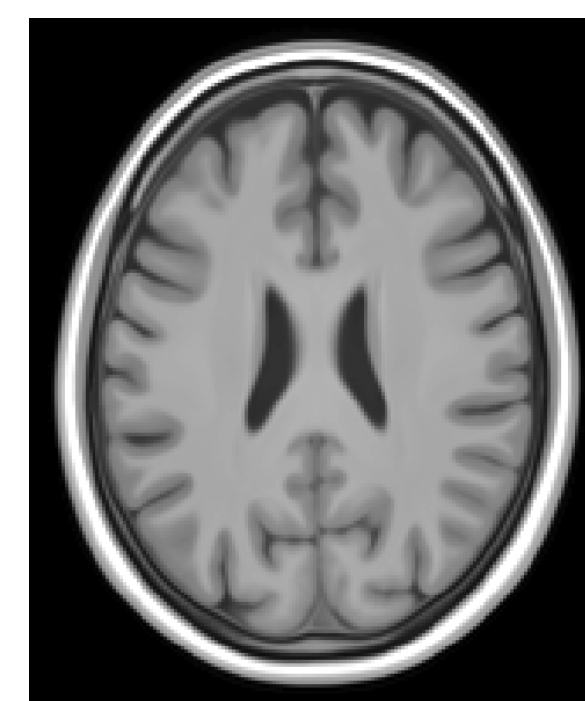
- T1 (anatomy)
- Diffusion Weighted Imaging scan (connectivity)
- resting-state EEG
- resting-state fMRI

Missing one? Parrot falls back to shipped templates

We ship the simulator with several average pre-segmented models[†]



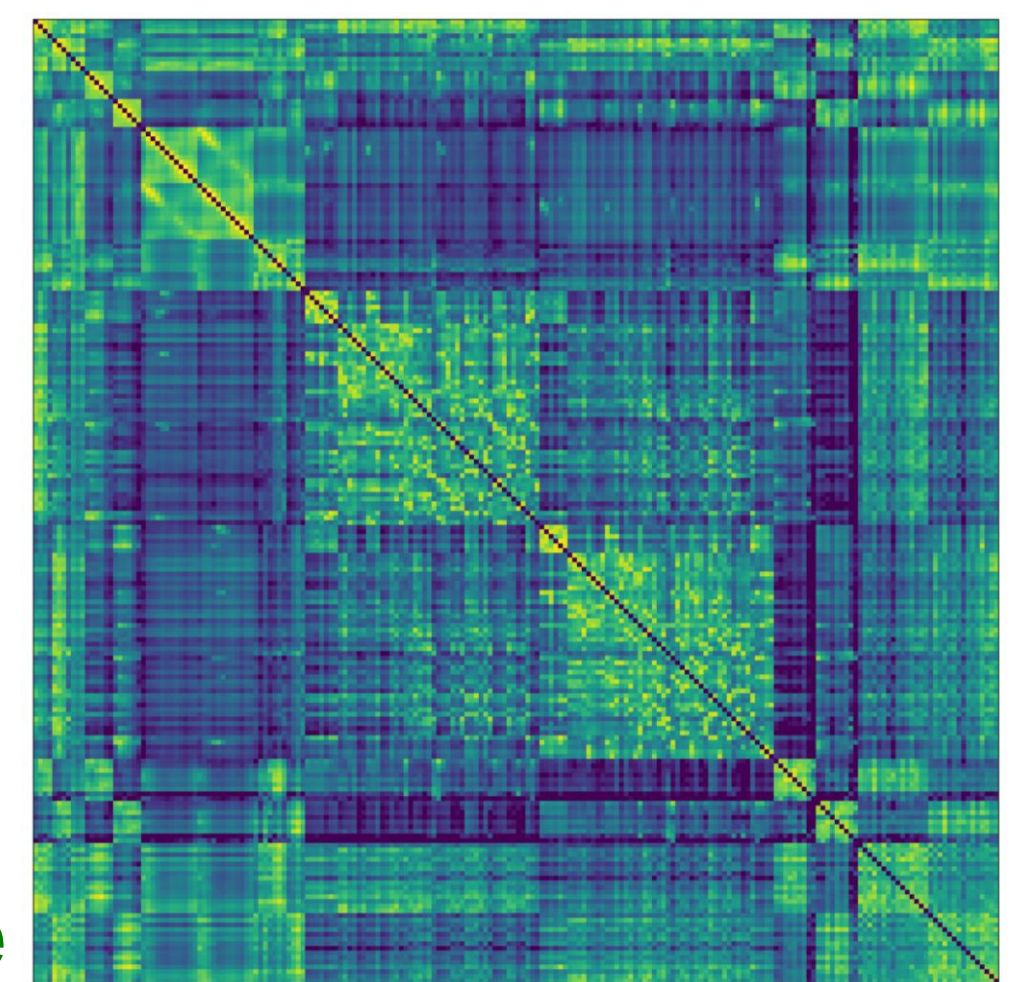
HCP



OMM

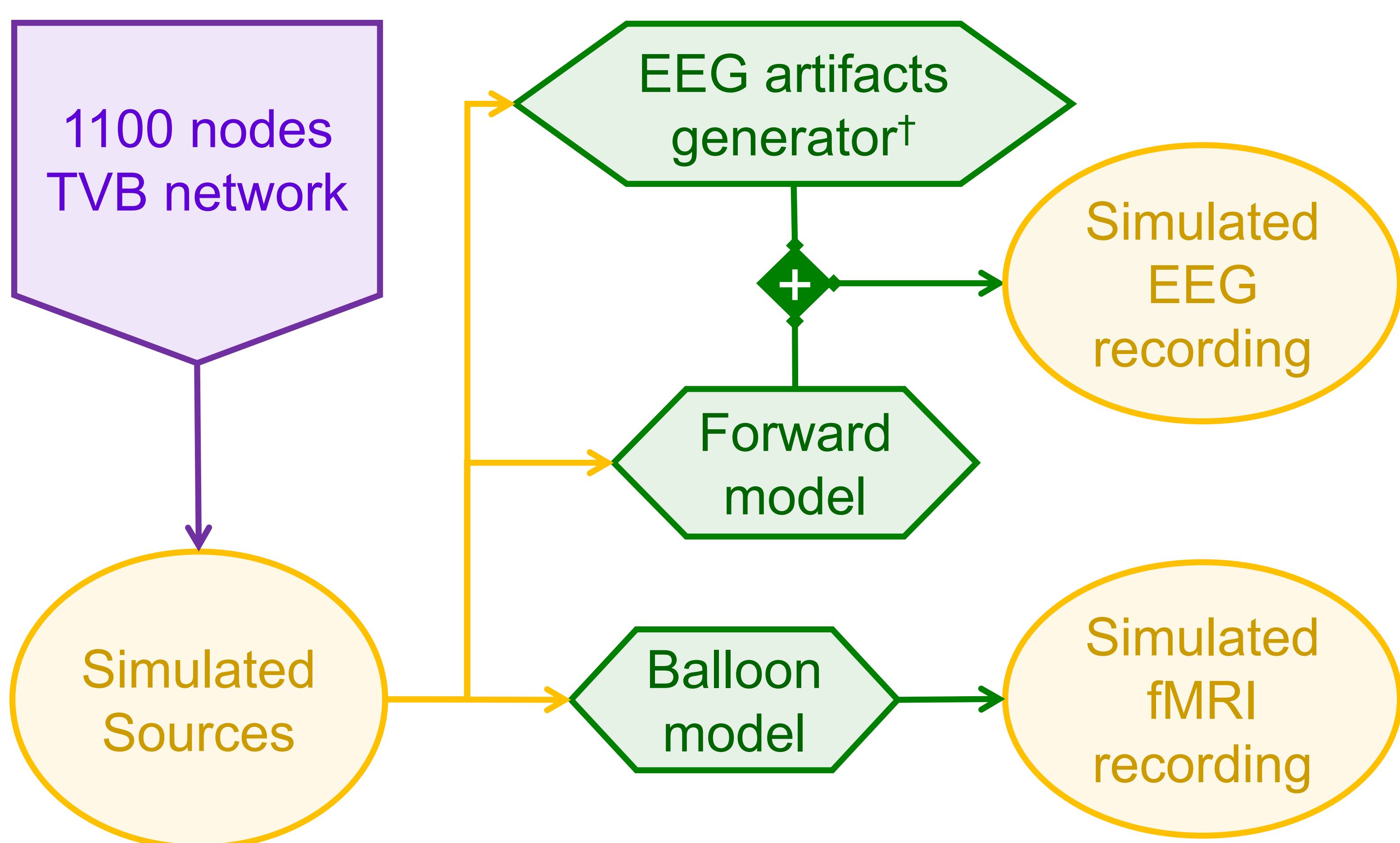
We provide a connectome averaged over the 1200 Human Connectome Project (HCP^[2]) subjects

Average HCP Connectome



Simulating the whole brain, multimodally

One fitted model produces co-registered EEG and fMRI with shared ground-truth sources and realistic correlated noise.



Outlook & Open Release

Applications

- Training AI inverse models to recover deep & cerebellar sources
- Benchmarking source-localization methods against known ground truth
- Data augmentation and noise-robustness studies for EEG ML
- Multimodal (EEG + fMRI) simulation for fusion methods

Toward learned inverse models.

We have validated ML inverse modeling on earlier simulators; Parrot supplies the anatomically complete, deep-and-cerebellar-inclusive training data to extend it.

Open & reproducible.

Full source code and a containerized implementation will be released publicly.



github.com/christianbuda/parrot-neuro[†]

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AEGEUS

References

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[†] Work In Progress

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