**Description:**

NiChart: NeuroImaging Computational Harmonization and Artificial Intelligence Toolbox

NiChart is an ecosystem of software components enabling constructive integration, statistical harmonization, and ML-centric data analyses across studies.

NiiChart enables large-scale analyses of multi-modal brain MRI data as well as mapping of such data into a dimensional system of neuroimaging signatures implemented by a large number of ML models. The axes of this dimensional system represent two types of information:

1) a panel of structural (sMRI), diffusion (dMRI) and functional connectomic (fcMRI) imaging derived phenotypes, such as multi-scale brain parcellations and brain networks;

2) complex ML-based imaging signatures previously derived from carefully processed and curated data of 65,000 individuals from 22 harmonized studies. ML signatures capture multi-variate imaging patterns that reflect the heterogeneity of brain aging, neurodegeneration, as well as of neuropsychiatic disorders

Using our software toolboxes researchers will be able to map new data into NiChart, ML models trained in NiChart, compare their data with NiChart-based normative ranges, and jointly evaluate their results vis-a-vis those of other studies.

Users will also be able to contribute their own ML models back to NiChart, thereby contributing to a dynamically growing community using ML neuroimaging models.

Software deployment accommodates different case scenarios, providing python installation packages through PIP, reproducible Docker and Singularity containers and a web application on AWS.

**Image Processing Components:**

**sMRI:** DLMUSE

**fMRI:** xcpengine (https://xcpengine.readthedocs.io/overview.html)

**dMRI:** qsiprep ([https://qsiprep.readthedocs.io](https://qsiprep.readthedocs.io/))

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