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neuromaps: a Python toolbox for the structural and functional interpretation of brain maps

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Imaging technologies are increasingly used to generate high-resolution reference maps of brain structure and function. Comparing experimentally generated maps to these reference maps facilitates cross-disciplinary scientific discovery. Although recent data sharing initiatives increase the accessibility of brain maps, data are often shared in disparate coordinate systems, precluding systematic and accurate comparisons. Furthermore, no data sharing platforms integrate standardized analytic workflows. Here we introduce *neuromaps*, an open-access Python toolbox for accessing, transforming and analyzing structural and functional human brain maps.

Our toolbox implements functionalities for generating high-quality group-level transformations between four standard coordinate systems that are widely used in neuroimaging (MNI152, fsaverage, fsLR, CIVET), and integrates them via a set of accessible, uniform interfaces. We also curated more than 40 reference brain maps from the literature that have been published during the past decade to facilitate contextualization of brain maps with respect to the biological ontologies of the human brain, including molecular, microstructural, electrophysiological, developmental and functional ontologies. Finally, we implement spatial autocorrelation-preserving null models for statistical comparison between brain maps that will help researchers to perform standardized, reproducible analyses of brain maps.

Collectively, *neuromaps* represents a step towards creating systematized knowledge and rapid algorithmic decoding of the multimodal multiscale architecture of the brain.

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