NeuroVault: a web repository for sharing statistical parametric maps

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Introduction

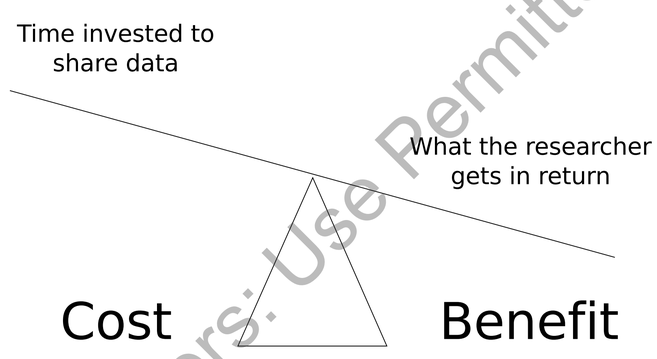
Motivation

MRI based studies are expensive and time consuming. Yet due to the fact that the research community is stuck with the archaic paper format, the outcome of a study consists mostly of authors' interpretation of the data not the data itself. Brain mapping papers often include peak coordinates of statistically significant clusters which are the basis for meta-analysis [1,2]. However, through thresholding a lot of information is discarded and sub-threshold effects consistent across studies are lost [3].

Goals

To improve the situation, unthresholded statistical maps need to be collected and shared. Succeeding in this endeavor requires consideration of cost and benefit of data sharing from the perspective of the individual researcher (Fig. 1).

1



Yet another database? There have been several attempts to build databases for sharing neuroimaging data in the past. Most of them, however, had an ambitious goal of collecting raw data, which requires laborious description to become reusable. It is hard to match this cost with a benefit from the point of view of an individual researcher. We believe that statistical maps are much easier to share, and even though they do not improve replicability, they can aid in more accurate meta-analysis. Technological improvements also contribute to decreasing the cost matched by providing supplementary services (visualization or decoding).

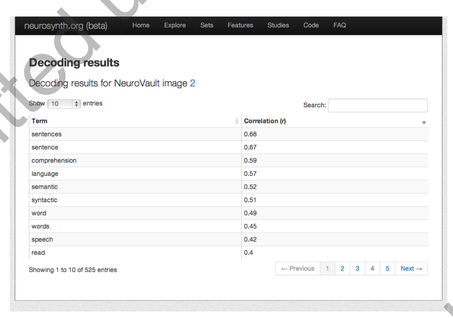
Methods

2



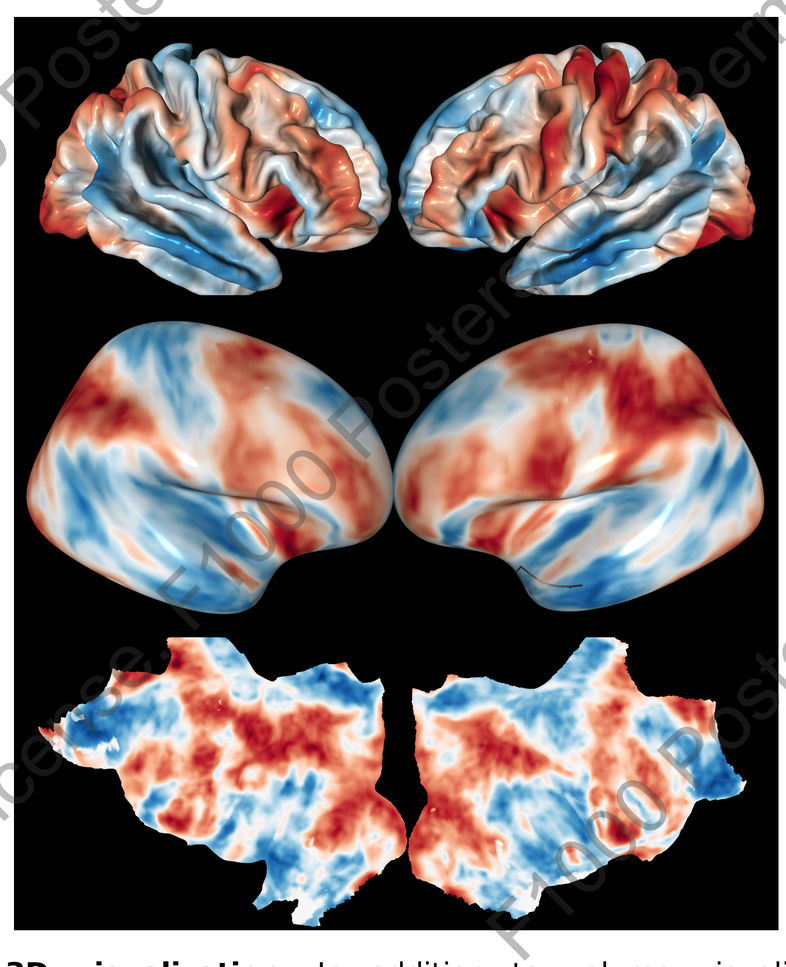
Simple as 1,2,3. The interface of the database has been designed with speed and ease of use in mind. In three simple steps, the user is able to upload and share a statistical map. The login procedure is facilitated through existing external solutions (Facebook, Google). Entire folders with statistical maps can be uploaded with one click of a button. The mandatory fields describing the data have been reduced to a minimum with the assumption that the DOI of the corresponding paper is the best available description.
Even though the set of fields required to upload the image has been reduced to a minimum, users have the option to provide more information. An extensive form (over 80 fields) with acquisition and processing details is provided. Additionally, users can create (and filter by) their own tags.

3



Decoding. Each map uploaded to NeuroVault can be decoded using patterns extracted by Neurosynth. It is a valuable tool for neuroscientists looking for papers that show similar activation to put their results in the context of existing literature. All data is available to other developers through JSON API.

4



New 3D visualization. In addition to volume visualization (powered by Papaya viewer) we now provide 3D (fiducial, inflated, flattened) visualization (powered by pycortex). All visualizations are interactive and run in a browser without the need for external plugins.

Discussion

- We hope that NeuroVault.org will prove to be a useful tool for sharing, decoding, and visualization of statistical maps.
- Papers can include links to the interactive NeuroVault.org visualization to enhance the dissemination of results.
- In the future we plan to improve collection of metadata by allowing users to upload information generated automatically by FSL and SPM.
- Newly developed NI-DM standard will be incorporated as an API for NeuroVault.org providing a unified way of interacting with the database.
- **We need your help!**
  - **Have you published a paper recently? Upload your maps to NeuroVault.org and let us know how it went.**
  - **Have ideas how to make NeuroVault.org better? Send them over!**

NeuroVault.org

References

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