

# NeuroVault.org: a web database for sharing statistical parametric maps

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## Introduction

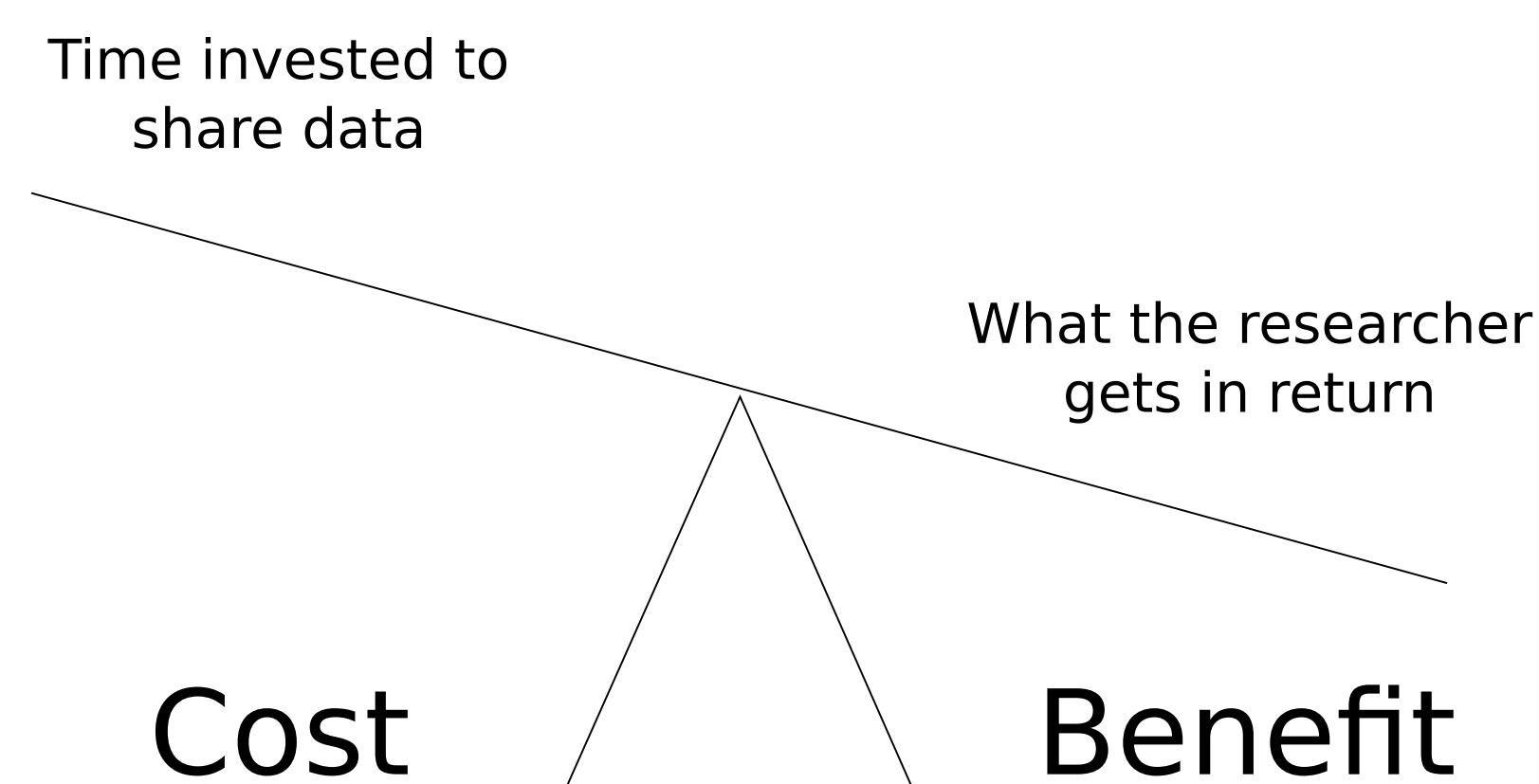
### Motivation

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. Those coordinates are a basis for meta-analysis [1,2]. However, because of thresholding a lot of information is being discarded. Subthreshold effects consistent across studies are missed by current meta-analysis tools [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 single researcher (Fig. 1).

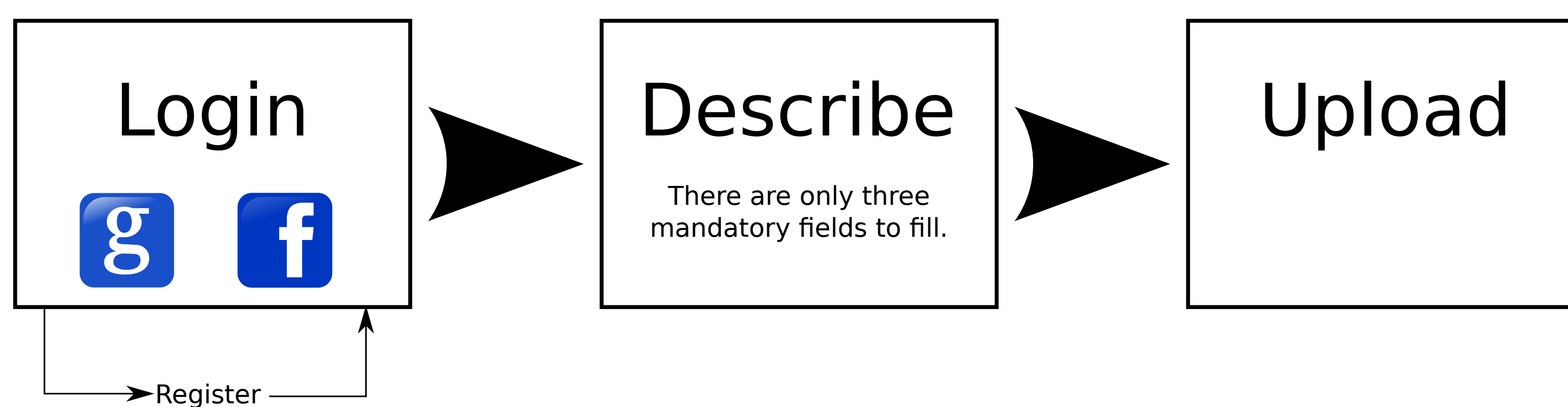
1



**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).

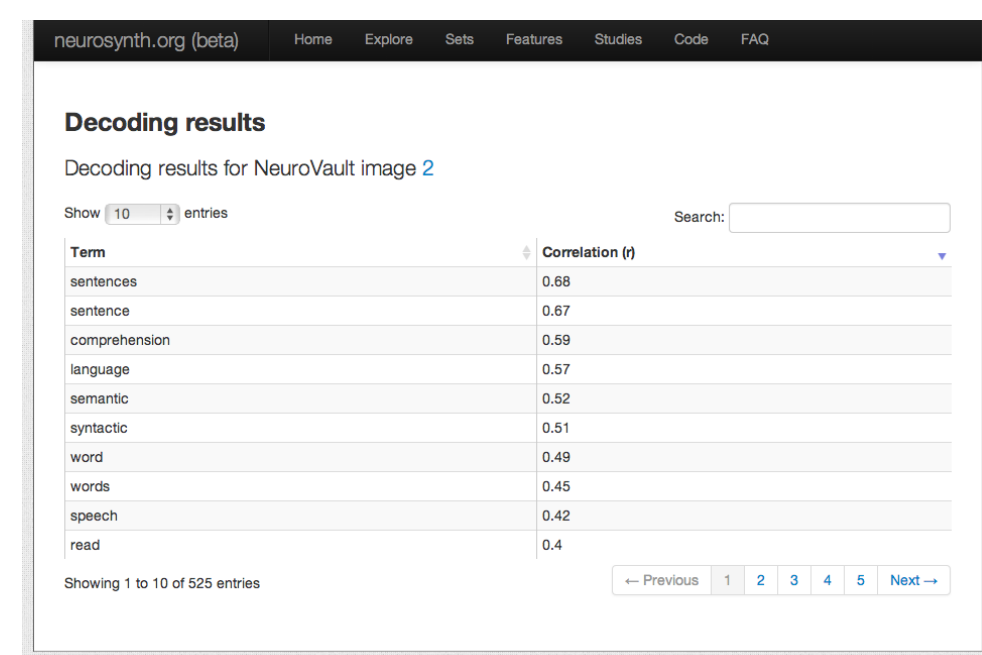
## Methods

2



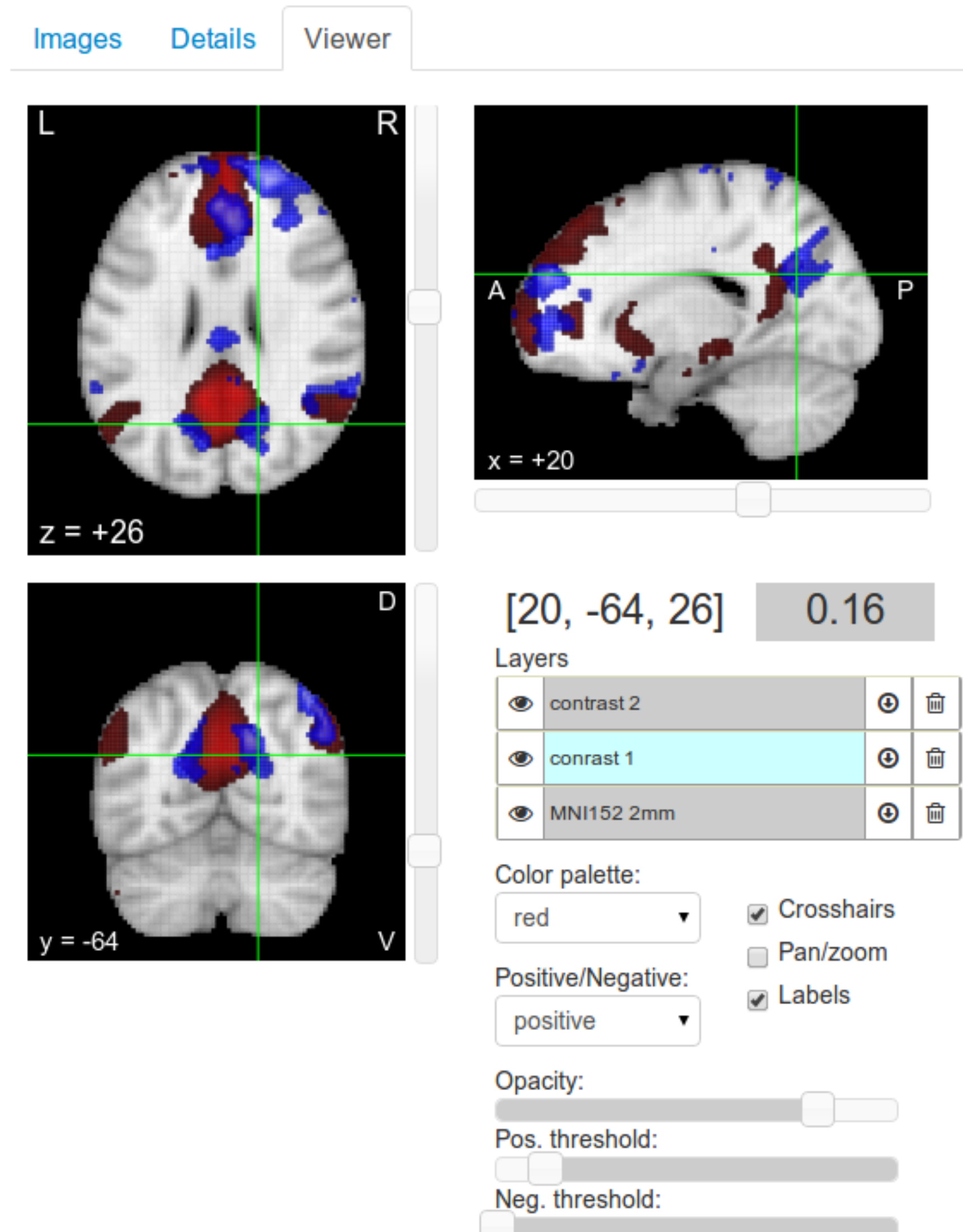
**Simple as 1,2,3.** The interface of the database has been design with speed and ease of use in mind. In three simple steps user is able to upload and share a statistical map. Login procedure is facilitated through existing external solutions (Facebook, Google). The mandatory fields describing the data have been reduced to minimum with the assumption that DOI of the corresponding paper is the best description one can get. Even though the minimal set of fields required to upload the image has been limited if user has time and motivation he or she can provide more information. And extensive (over 80 fields) form is with acquisition and processing details is provide. 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. This is an invaluable tool for neuroscientists looking for papers that are showing similar activation to put their results in the context of existing literature. All data is available to other developers through JSON API.

4



**Attractive visualization.** All maps are instantly visualized using the Neurosynth JavaScript viewer. Each map and study is assigned a permanent URL that can be embedded in a paper or shared with collaborators.

## Discussion

- We hope that NeuroVault.org will prove to be 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.
- In a similar matter acquisition parameters can be obtained from DICOM or Dcmstack NIFTI files.
- **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 or join us at the hackathon!**

# NeuroVault.org

### References

- [1] Laird AR, Lancaster JL, Fox PT. (2005). BrainMap: The social evolution of a functional neuroimaging database. *Neuroinformatics* 3, 65-78.
- [2] Yarkoni T, Poldrack RA, Nichols TE, Van Essen DC, & Wager TD (2011). Large-scale automated synthesis of human functional neuroimaging data. *Nature methods*, 8(8), 665-70.
- [3] Salimi-khorshidi G, Smith SM, Keltner JR, Wager TD, & Nichols TE (2009). NeuroImage Meta-analysis of neuroimaging data : A comparison of image-based and coordinate-based pooling of studies. *NeuroImage*, 45(3), 810-823

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