

NiPy – NeuroImaging software in Python

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We have begun a multicenter project to build software for analyzing functional brain images in Python. Functional brain imaging includes fMRI (fMRI). fMRI involves taking scans of the brain every few seconds that can detect small changes in blood flow. Blood flow increases in brain regions that are doing more work, so we can use analyze fMRI data to detect brain regions involved in particular tasks, such as memory or language. The analysis involves a combination of spatial and statistical processing. Datasets are often very large, with several gigabytes of data per subject.

There are three popular functional imaging packages:

<i>Name</i>	<i>Language</i>	<i>Licence</i>	<i>URL</i>	<i>% use</i>
SPM	Matlab / C	GPL	www.fil.ion.ucl.ac.uk/spm	79
AFNI	C / C++	GPL	http://afni.nimh.nih.gov/afni	9
FSL	C / C++	Free for academic use	www.fmrib.ox.ac.uk/fsl	7

SPM is the most popular package, and is open source, but is developed by a single lab, and runs in Matlab, a language with many disadvantages for large scale computing tasks. The other packages use C or C++. Their code is therefore relatively difficult to read, adapt and extend.

We have therefore gathered an international group of developers who have committed themselves to writing a complete set of neuroimaging tools in Python. We have already written a and released an alpha version of a complete statistical analysis package in Python called **brainstat**. Members of the group have also wrapped pre-existing libraries in C / C++ to provide high-level visualization of activated brain areas on the brain surface, and on 2D slices. The current code already allow fast generation of complex displays of brain data from Python. Work is also underway to encapsulate ITK routines for spatial processing such as registration. We are currently applying for grants to support this project.