

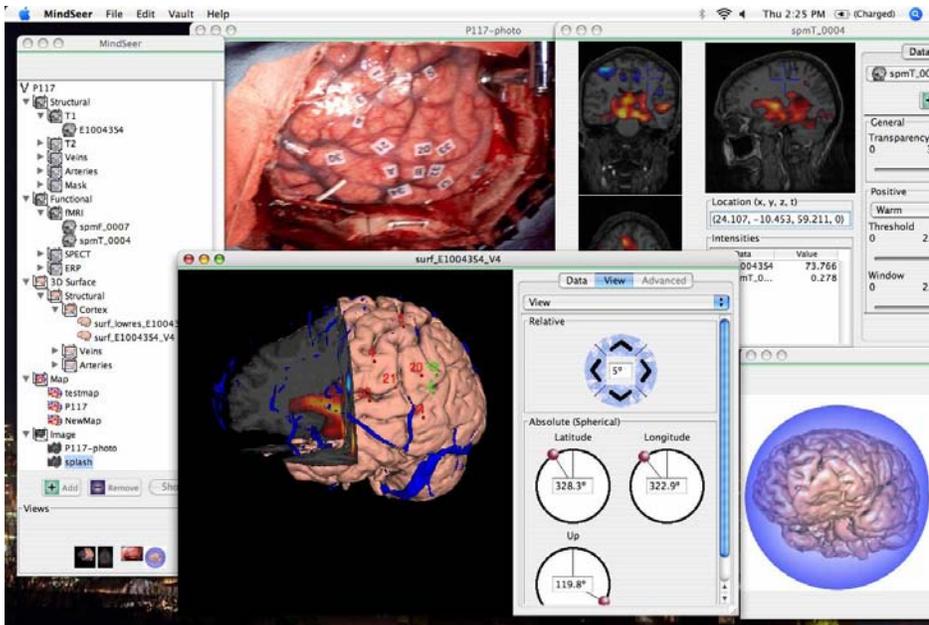
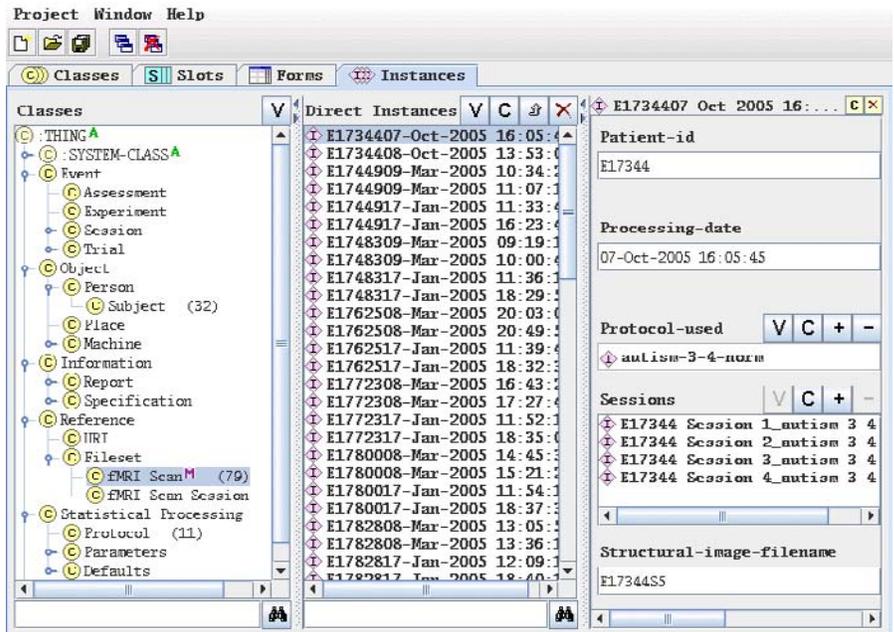
Software Tools for Batch Processing, Management and Visualization of Functional MRI Data.

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Functional MRI is computationally intensive, and presents challenges that are addressed by the emerging field of neuroinformatics. Examples of such challenges include error-proof processing methods for complex analyses, management of large volumes of data, accurate and automated record keeping and advanced visualization. We present software tools developed to i) process and manage functional MRI data and metadata; and ii) visualize functional brain imaging data.

X-batch is a software tool designed to address two needs of functional MRI research: 1) automation of statistical image processing; and 2) management of fMRI data and metadata. X-batch, which runs as a toolbox within SPM2 (www.fil.ion.ucl.ac.uk/spm), provides a Graphical User Interface (GUI) for creating batch processing scripts. Such analysis automation not only streamlines and simplifies the analysis, but also minimizes human error. During processing, X-batch captures the analysis details and automatically populates the Dartmouth fMRI Data Center (www.fmridc.org) ontology-based Experiment Lab Book, thereby hiding the details of data management while permitting researchers to continue using an analysis tool with which they are familiar. The Lab Book is useful as a record keeping tool and, more importantly, can be used as a searchable database. For example, we utilize the database with MindSeer to automatically create workspaces for individual subjects.



MindSeer is our software toolkit for visualization of multimodality brain imaging data. It is cross-platform, utilizes the hardware accelerated Java3D API, and has an extensible architecture so plug-ins can easily be added to accommodate new data sources and novel visualization techniques. MindSeer imports data from several popular analysis software packages, including SPM and FSL. The data are organized by category in a coherent and flexible XML workspace. There are two major views: 1) a slice viewer for image volumes; and 2) an interactive 3D viewer of surfaces and volumes. The slice viewer allows the user to overlay many types of structural and functional data at once. In the 3D view, the user interacts with cortical and other surfaces. Users can also “cut” the surface to see slices of deep structures. The 3D mapping feature allows the user to measure

the coordinates of interesting locations, create points and label them.

These tools were designed to facilitate data sharing and to support remote collaboration among researchers. In particular, MindSeer has a web-enabled version with a thin client and a visualization server, which makes it suitable for remote visualization.

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