

Abstract View

THE SMART ATLAS: A WEB-BASED SPATIAL DATA MANAGEMENT AND DATA MINING TOOL FOR THE MOUSE BRAIN

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One of the most challenging problems in neuroinformatics is to create methods by which data acquired by multiple researchers across sites and scales can be reliably inter-related to form an integrated view of brain function. Anatomy, in the form of brain atlases, provides one framework to build a shared understanding of the brain. We combined advanced information technology with traditional brain atlases to create the "Smart Atlas" a data management and query system for spatially registered brain data. The Smart (Spatial Mark-Up and Rendering Tool) Atlas is built on GIS (Geographical Information System) technology using the Paxinos and Franklin mouse brain atlas. In GIS, spatial features and associated attributes are stored in a coordinate system, in this case anatomical delineations and labels expressed in stereotaxic coordinates. The Smart Atlas retrieves and displays 2- and 3D data registered to the atlas coordinate system overlaid with anatomical delineations. The Smart Atlas is written in java and works from any internet browser. Through the atlas interface, researchers can: 1) query spatial relationships among brain structures; 2) retrieve data from multiple experiments based on location; and 3) perform spatial analysis of image content such as protein labeling patterns from the Cell Centered Database (www.ncmir.ucsd.edu/CCDB) and other distributed databases. The Smart Atlas is designed as a grid-based resource as part of the Biomedical Informatics Research Network (BIRN). Although the Smart Atlas was designed using the Paxinos atlas, it is a general tool that can be used with any vector atlas with a specified coordinate system.

Support Contributed By: NIH through NCRR RR04050, RR08605, RR08605-08S1(BIRN-CC) and RR043050-S2 (Mouse BIRN) and the Human Brain Project DA016602

Citation: M.E. Martone, I. Zaslavsky, H. He, J. Tran, Y. Wang, L. Sun, D. Price, M.H. Ellisman, A. Gupta. THE SMART ATLAS: A WEB-BASED SPATIAL DATA MANAGEMENT AND DATA MINING TOOL FOR THE MOUSE BRAIN Program No. 1032.1. 2004 Abstract Viewer/Itinerary Planner. Washington, DC: Society for Neuroscience, 2004. Online.

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