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Neuroinformatics database for visualization and analysis of anatomical data from the rat brain

Integration of dispersed and complicated information collected from the brain may be hampered by rigid presentation formats, diversity of data formats among laboratories, and lack of access to lower level data. We have addressed some of the fundamentals of this challenge for anatomical data, by producing a coordinate based digital atlas and database application for a major projection system in the rat brain: the cerebro-ponto-cerebellar system. This application, 'Functional Anatomy of the Cerebro-Cerebellar System' (FACCS), is available via The Rodent Brain WorkBench (rbwb.org). The data included are x,y,z – coordinate lists describing exact distributions of tissue elements (axonal terminal fields or cell bodies) that are labeled with use of axonal tracing in rats. All data are translated to a common local coordinate system to facilitate across animal comparison. A search capability allows queries based on, e.g., location of tracer injection sites, tracer category, size of the injection sites, and contributing author. A graphic search tool allows the user to move a volume cursor inside a coordinate system to detect particular injection sites having connections to a specific tissue volume at chosen density levels. Tools for visualization and analysis of selected data are included, as well as an option to download individual data sets for further analysis. The application is built on a three layer architecture based on the J2EE standard. The bottom layer is the data store layer. The middle layer contains models for all objects that are used in the presentation layer. It also takes care of the transformation from the database layer to the presentation layer, which in turn handles the interface against the end-user. With this application, data and metadata from different experiments are mapped into the same information structure and made available for re-use and re-analysis in novel combinations. The application is prepared for future handling of data from other projection systems as well as other data categories. Supported by The Research Council of Norway and EC.