3d Brain Atlas Reconstructor

Software dedicated to automatic generation of models of 3D brain structures.

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Project goals

1. Creating software dedicated to automated reconstruction of 3D brain models. Key features:
    - ♦ Generating model of any combination of structures (ie. basing on structures hierarchy),
    - ♦ Arbitrary resolution of generated model (depends on source atlas quality only),
    - ♦ Exporting models as polygonal mesh or volumetric datasets.
    - ♦ Modularity: One 3D model generation module, many wrappers for different input atlases.

2. Support the software with:
    - ♦ Own data (ultimate goal),
    - ♦ Existing 2D atlases (as training sets).

3. Creating special dataset format
    - ♦ Based on SVG format,
    - ♦ Adapted for handling representation of brain structures,
    - ♦ Supporting brain regions hierarchy,
    - ♦ Maximizing possibilities of atlasing systems interoperability.

Publications

- Common Atlas Format and 3D Brain Atlas Reconstructor, the infrastructure for constructing 3D brain atlases by Piotr Majka, Ewa Kublik, Grzegorz Furga, Daniel K. Wójcik (Neuroinformatics, 2012).

- Automated reconstruction of three-dimensional brain structures based on 2D histological atlases by Piotr Majka, Grzegorz Furga, Ewa Kublik and Daniel Wójcik. Neuroinformatics 2010 Conference, Kobe, Japan. Poster Presentation.

- Serving three-dimensional models of brain structures online Piotr Majka, Jakub M. Kowalski, Rembrandt Bakker, Daniel K. Wójcik. Neuroinformatics 2011, Boston, USA. Poster Presentation.

Talks

- 3D Brain Atlas Reconstructor and Common Atlas Format, the infrastructure for constructing tree dimensional brain atlases, presentation at "Python in Neuroscience" workshop, August 29-30 2011, Ecole Normale Supérieure, Paris.

3d Brain Atlas Reconstructor workflow

Application screenshots

Ontology tree (left) allows browsing for structures, select structures for reconstruction or load already reconstructed models. **Structure selection tab** (right) displays detailed information about currently reconstructed structure as well as provides reconstruction properties.

Model customization tab: Reconstructed structures may be previewed before exporting. Furthermore, additional model modifications (smoothing, mesh complexity reduction, etc.) may be applied.