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).

Talks

- The Scalable Brain Atlas and the 3d Brain Atlas Reconstructor, presentation at the Joint MRC/INCF/SICSA Workshop on Atlas Informatics; Edinburgh, 15-16 May 2012

- 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.

Abstracts, Posters

- Online repository of three-dimensional models of brain structures: Majka P., Kowalski J. M., Chlodzinska N., Wójcik D. K.,; Neuroinformatics 2012, September 10 ? 12, Munich, Germany;

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

- 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.

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.