D. Louis Collins

This web page is out of date.
The new BIC faculty page is here and my personal web page is here.

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I'm an Assistant Professor in the departments of Neurology & Neurosurgery, and Biomedical Engineering at McGill University of Montreal, Canada. I work at the McConnell Brain Imaging Centre of the Montreal Neurological Institute. My research involves automated anatomical segmentation and atlasing in a neurosurgical context. Computerized image processing techniques, such as non-linear image registration and model-based segmentation, are used to automatically identify structures within the human brain. These techniques are applied to a large database of magnetic resonance (MR) data from normal subjects to quantify anatomical variability. In image guided neurosurgery (IGNS), similar techniques provide the surgeon with computerized tools to assist in interpreting anatomical, functional and vascular image data to effectively plan and carry out minimally-invasive neurosurgical procedures.

The Image Processing Lab

There is quite a number of people in the lab working on segmentation techniques and their application to analysis in Image Guided Surgery, Multiple Sclerosis, and Epilepsy.

Current Projects

- BIC MINC software (docs, old docs, downloads)
- Automatic model-based segmentation of gross anatomical structures of the human brain (using ANIMAL)
  - instructions for automatic atlas-based MRI segmentation (internal use only).
  - instructions for automatic PET segmentation (internal use only).
- MNI_AutoReg: Automatic Inter-Subject Stereotaxic Linear Registration. See the short history on

stereotaxic volumes at the MNI.
- MNI ANIMAL: Automatic Non-linear Registration (click for movie demos).
- Intra-Subject Multimodality Linear Registration
- Detection and quantification of CNS atrophy (brain, spinal cord)
- Automatic extraction. modelling and visualization of blood vessels (see Lasse 鐀tergaard's home page).
- Digital human brain phantom (see the phantom or a descriptive paper) for use in PET and MR Simulators (see BrainWeb for simulated MRI volumes,served over the web or CERMAP PET-SORTEO for simulated PET data using a different phantom))
- McConnell Brain Imaging Center Internal Demo
- ICBM MRI data base of normal human anatomy and its analysis with steretaxic registration, tissue classification, structure segmentation, and surface extraction.
    - Database organization
    - Database update information
    - Stereotaxic Data viewer

Past Projects

- Volume rendering for surgery planning (click for demos: low compression,high compression)

Collaborations

- CMIST: Consortium for medical imaging, science and technology
- ICBM: International Consortium for Brain Mapping
- Development of image processing tools with Dr. K. Siddiqi at the Center for Intelligent Machines.
- Development of neurosurgical planning tools with the group of Dr. T. Peters in London, Ontario. and Dr. T. Arbel at the CIM.

Publications:

- Papers in peer-reviewed journals
- Book Chapters
- Tech reports
- Papers in peer-reviewed conference proceedings
- Abstracts
- HTML versions of some papers are available.
- PS version of my PhD Thesis.

Courses/Seminars

- 399-500B: Biomedical Engineering Seminars
- 399-501A: Selected Topic in Biomedical Engineering
- 399-650A: Advanced Imaging
- Killam Seminars

Other interests:

- My attempt at artwork

- Interesting Brain mapping/image processing links

Last modified: March 9, 1998. Comments or suggestions to louis@bic.mni.mcgill.ca