



Grids services for medical image analysis and registration

Description

Goals: The goal of this tutorial is help people from the medical imaging and the computer assisted intervention communities to understand grid technologies applications to these fields. It does not enter technical details on grids implementation but rather focuses on describing how medical image processing applications can benefit from grid architectures. Concrete application examples are given. The second part of this tutorial more specifically focuses on the medical image registration application. It presents on-going activities in this field and opens the discussion to the audience in the purpose of federating workers in this field. The goal is to create an international collaboration promoting medical image registration algorithms and applications.

Provisional schedule

- **Grids: a tool for compute and data-intensive medical imaging applications**, JOHAN MONTAGNAT (CREATIS, CNRS-Inserm, Lyon, France – EU DataGrid / MEDIGRID ACI-GRID projects)
- **Mammography analysis on grids**, MIKE BRADY (Oxford University, UK – EU Mammogrid / eDiamond e-Science projects)
- **Brain Image Research Network**, RON KIKINIS (SPL, Brigham and Women's Hospital and Harvard Medical School, Boston, USA – BIRN project)
- **IXI**, DEREK HILL, (King's College, London, UK – IXI e-Science project)
- **The case of medical image registration Demonstration, IMAGE Workshop and Health-Grid conference report** DANIEL RUECKERT (Imperial College, London, UK)
- **Round table: Our vision of grid technology for medical images registration, trends and problems, opened discussion, call for participation;** X. PENNEC, D. HILL, J. MONTAGNAT

Responsible organiser

Johan Montagnat, johan@creatis.insa-lyon.fr

Additional Information

Topic areas:

- Medical image analysis,
- Medical image registration,
- Grid computing.

Demonstration: A demonstration of a web portal to grid-enabled medical image registration algorithms will be shown.



History: Medical image registration is an active research topic well established in the MICCAI community. Grid technologies recently emerged (less than 10 years ago) as a way of processing huge amounts of data or sharing data, algorithms, and resources among several user communities. Grid technologies are now becoming mature enough to address medical application requirements. Grids are a vector for promoting research on medical image processing algorithms in general, and medical image registration in particular, by allowing several research team to share algorithms and data, and to lead large scale experiments on distributed data sets.

List of related events:

- HealthGrid conference 2003: January 2003, Lyon, France
<http://lyon2003.healthgrid.org/>
- IMAGE Workshop: September 2003, London, UK
<http://www.nesc.ac.uk/esi/events/image03/>
- French (ACI-GRID) - UK (eScience) Workshop: November 2003, London, UK
<http://www.nesc.ac.uk/events/UKFranceNov03/>
- HealthGrid conference 2004: January 2004, Clermont-Ferrand, France
<http://clermont2004.healthgrid.org/>
- HealthGrid conference 2005: January 2005, Oxford, UK
<http://oxford2005.healthgrid.org/>

A description of the audience: This tutorial is opened to any people from the medical imaging and computer assisted intervention community who want to learn more about grid technologies and their possible application in their field: grid promises and existing grid applications. The second part of this tutorial focuses on the medical image registration applications and all researchers interested in this field are welcome to learn more about existing grid activities and to participate to the open discussion. We would like to create an international collaboration dedicated to medical image registration promotion and development by use of the grid technologies.

Detailed schedule

- **Grids: a tool for compute and data-intensive medical imaging applications**, JOHAN MONTAGNAT (EU DataGrid / MEDIGRID ACI-GRID projects)

Johan Montagnat is a researcher of the French National Center for Scientific Research (CNRS) in the CREATIS laboratory. His research interests are in medical image processing and grids. He is coordinating the workgroup of biomedical applications in the EU FP6 EGEE project (<http://www.eu-egee.org>) and the French ACI-GRID MEDIGRID project (<http://www.creatis.insa-lyon.fr/MEDIGRID/>).
<http://www.creatis.insa-lyon.fr/~johan/>

- **Mammography analysis on grids**, MIKE BRADY (EU Mammogrid / eDiamond e-Science projects)

Mike Brady is BP Professor of Information Engineering in the Department of Engineering Science as well as a Fellow of Keble College in the University of Oxford. He is a fellow of the Royal Society, the Royal Academy of Engineers, the Institution of Electrical Engineers, the Institute of Physics and American Association of Artificial Intelligence. Recently, and following is work on mammographies analysis, he is participating to the EU FP5 Mammogrid project (<http://mammogrid.vitamib.com/>).
<http://www.robots.ox.ac.uk/~mvl/external/mvl-html/people/jmb/>

- **Brain Image Research Network**, RON KIKINIS (BIRN project)



Ron Kikinis is the Director of the Surgical Planning Laboratory of the Department of Radiology, Brigham and Women's Hospital and Harvard Medical School, Boston, MA, and an Associate Professor of Radiology at Harvard Medical School, as well as an Adjoint Professor of Biomedical Engineering at Boston University.

His interests include the development of clinical applications for image processing, computer vision and interactive rendering methods. He is currently concentrating on developing fully automated segmentation methods and introducing computer graphics into the operating room. He is the author of 166 peer-reviewed articles.

Before joining Brigham & Women's Hospital in 1988, he worked as a researcher at the ETH in Zurich and as a resident at the University Hospital in Zurich, Switzerland. He received his M.D. from the University of Zurich, Switzerland, in 1982.

<http://splweb.bwh.harvard.edu:8000/pages/ppl/kikinis/>

- **IXI, DEREK HILL, (IXI e-Science project)**

Derek Hill is a Reader in Medical Imaging Sciences in the School of Medicine of King's College London. His research interests include MR image acquisition and analysis, image registration and image guided interventions. He has recently become interested in computational grids for higher throughput analysis, delivering algorithms to end-users and acting as a driver for novel algorithms. He is currently coordinating, jointly with Jo Hajnal, the IXI e-Science project on information extraction from images (<http://www.ixi.org.uk>).

<http://www-ipg.umds.ac.uk/d.hill/>

- **The case of medical image registration Demonstration, IMAGE Workshop and Health-Grid conference report DANIEL RUECKERT**

Daniel Rueckert is a Senior Lecturer at the Department of Computing, Imperial College London. He holds Diploma in Computer Science (equiv to MSc) from the Technical University Berlin and received his PhD in the field of computing for his work on medical image analysis and, in particular, on cardiac image analysis. He spent his post-doc at Guy's Hospital, King's College London working on non-rigid image registration. His research interests include image registration, segmentation and visualization of medical images, grid computing for image mining and 3D face recognition.

<http://www.doc.ic.ac.uk/~dr/>

- **Round table: Our vision of grid technology for medical images registration, trends and problems, opened discussion, call for participation; X. PENNEC, D. HILL, J. MONTAGNAT**

Xavier Pennec <http://www-sop.inria.fr/epidaure/personnel/Xavier.Pennec/>

Xavier Pennec is a researcher in the French National Institute for Informatics and Automatics (INRIA) in the EPIDAURE team. His research interests are in medical image analysis, geometric data processing, surface and image-based registration and matching, evaluation and validation or registration algorithms, statistics for functional images.

<http://www-sop.inria.fr/epidaure/personnel/Xavier.Pennec/>