e-Science tools for brain imaging

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Background context

The Brain Imaging Network (BIN) is a distributed research facility supporting the neuroscience community in Portugal (www.brainimaging.pt). The BIN network makes use of an advanced cyberinfrastructure to provide storage, processing capabilities and network bandwidth compatible with the highly-demanding requirements of modern neuroscience modalities. The BIN has recently entered a production stage and is now producing a sustained flow of brain data for research applications.

Objectives of the PhD Work

A central goal to the BIN cyberinfrastructure is to provide not only “basic” connectivity and storage capabilities, but e-Science services, including analysis algorithms and semantic tools for multimodal images of the human brain, such as MRI or fMRI. The end users (neuroscientists) rely on the BIN to solve the Information Technology needs and provide the info-services o support their daily work on-demand.
The current PhD work programme addresses the enhancement of the BIN cyberinfrastructure with tools for neuroscientists, including:

- Enhance the existing BIN architecture to include a flexible framework to enable the deployment of new processing algorithms (operators) in the cyberinfrastructure.
- Develop and/or adapt selected sample analysis algorithms on brain imaging modalities to run on BIN, using a cluster or Grid high performance computing environment;
- Integrate semantic tools to enhance the cases description and discovery;
- Evaluate the proposed framework and algorithms;
- An additional goal is to enhance to the existing BIN to interoperate with international existing neuroscience e-infrastructures initiatives. This includes specifically the integration in Grid computing infrastructures and the semantic harmonization of representation models.

The results from this work will be integrated in the production BIN infrastructures for the benefit of the national and international research community in neurosciences.

Further information:

Brain Imaging Network website: http://www.brainimaging.pt
Supervisor group website: http://www.ieeta.pt/sias